



Santa Rosa, CA

COMPANY Calpine Corporation
 WELL Tocher 3 - RD
 FIELD Geysers
 COUNTY/STATE Lake County, California
 WELL HEAD COORDINATES
 794'S 887'E of NW corner of Sec.27,T11N,R8W
 ELEVATION 3163'
 SPUD DATE 04/27/86
 TD DATE 7/8/08
 TOTAL DEPTH 10405'
 TRUE VERTICAL DEPTH 9632'
 TD LOCATION 1618.6' N, 2120.9' E
 CONTRACTOR/RIG Kenai Rig #3
 COMPANY REPRESENTATIVE Silva, Gamble

LOG INTERVAL

DATE LOGGED 05/09/08 TO 7/8/08
 DEPTH LOGGED 4525' TO 10405'
 MUD DRILLING 4525' TO 5732'
 AIR DRILLING 5732' TO 10405'
 LOG SCALE 1:600 UNIT NO. 324

LOGGING GEOLOGISTS
 M.Dobbs,S.Ahlquist,A. Frazer,T.Blazina
 M.Lamont,M. Flaherty,E. ter Weele,D.Boschmann

HOLE

10.625 TO 5732
 8.5 TO 10405
 TO
 TO
 TO

CASING

30 FROM 0 TO 40
 22 FROM 0 TO 231
 13.375 FROM 0 TO 1257
 11.75 FROM 0 TO 4523
 9.625 FROM 4396 TO 5718
 7 FROM 0 TO 10405

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

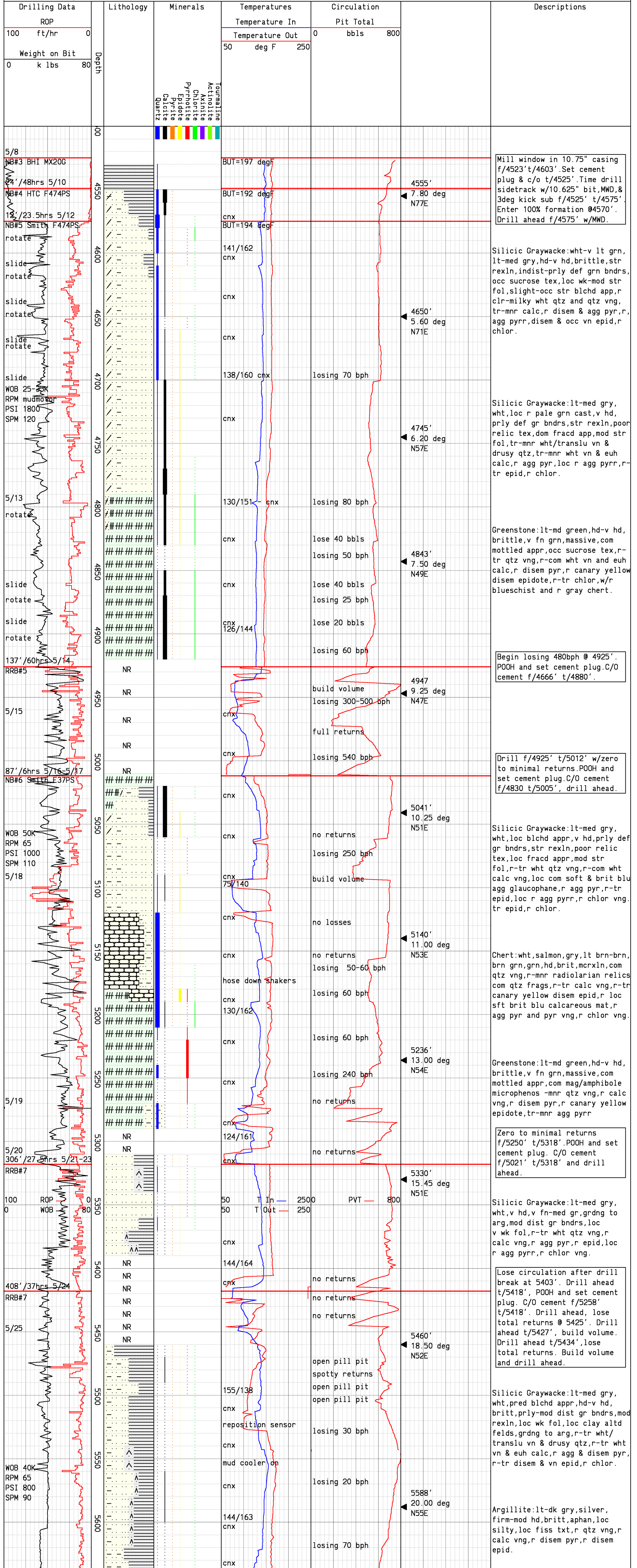
	Argillite		Argillaceous Grywcke
	Chert		Volcanic Graywacke
	Phyllite		Siliceous Graywacke
	Greenstone		Weak Foliation
	Serpentine		Strong Foliation
	Blueschist		Marginal Alteration
	Felsite		Pervasive Alteration
	Rhyolite		Weakly Hornfelsic
	Andesite		Strongly Hornfelsic
	Lithic Graywacke		

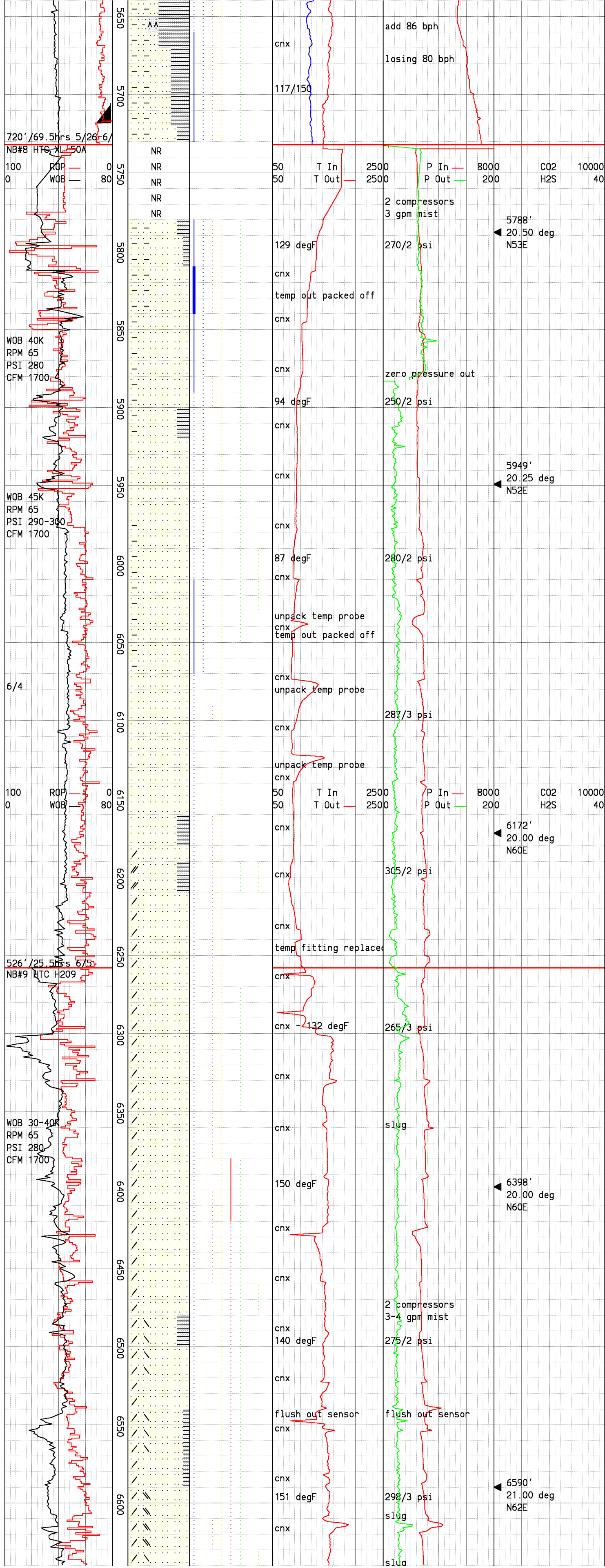
REMARKS

All depths from Kelly Bushing.
 KB = 30'
 cnx = connection
 NR = no returns

SECONDARY MINERALS

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





Silicic Graywacke: lt-med gry, wht, pred blchd appr, hd, britt, prly-mod dist gr bndrs, mod rexln, mn-r-com rehyd, loc wk fol, loc clay altd felds, grdng to arg, r-tr wht/translu vn & drusy qtz, r agg & disem pyr, r disem & vn epid, r chlor.

Drill to 5732', P00H. Run 38 joints of 40# 9 5/8 casing f/top of liner @4396' to shoe @5718'. Cement casing, P00H, ready BHA, RIH, clean out casing f/5417' t/5732'. Begin air drilling with 8.5" bit.

Drilling break at 5800'.

Silicic Graywacke: lt-med gry, wht, pred blchd appr, mod hd-hd, britt, prly-mod dist gr bndrs, mod rexln, loc wk fol, r-abund clay, tr-mnr wht/translu vn & drusy qtz, r agg & disem pyr, r disem & vn epid, r chlor.

Drilling breaks at 5900', 5924', 5941', and 5953'.

Silicic Graywacke: lt-med gry, wht, pred blchd appr, hd-v hd, britt, prly-mod dist gr bndrs, mod rexln, loc wk fol, r-tr wht/translu vn & drusy qtz, r disem pyr, r disem & vn epid, r chlor, r pink actinolite.

Measured temp out with hand-held digital thermometer since sensor packed off. Reading of 118 degF

Silicic Graywacke: wht-lt gry, v hd, britt, mod-str blchd appr, v fn-med gr, mod dist gr bndrs, mod rexln, loc com clay altd felds, r qtz vng, r euh qtz vugs, r pyr, r epid.

Silicic Graywacke: wht-lt gry, com brn cast, loc grn cast, loc mod blchd appr, v hd, britt, v fn-med gr, mod dist gr bndrs, mod rexln, perv dk grn-brn mnrlzn, loc com clay altd felds, r qtz vng, r euh qtz vugs, r pyr & other sulfides, r epid, r chlor, r act.

Drilling break at 6229'.

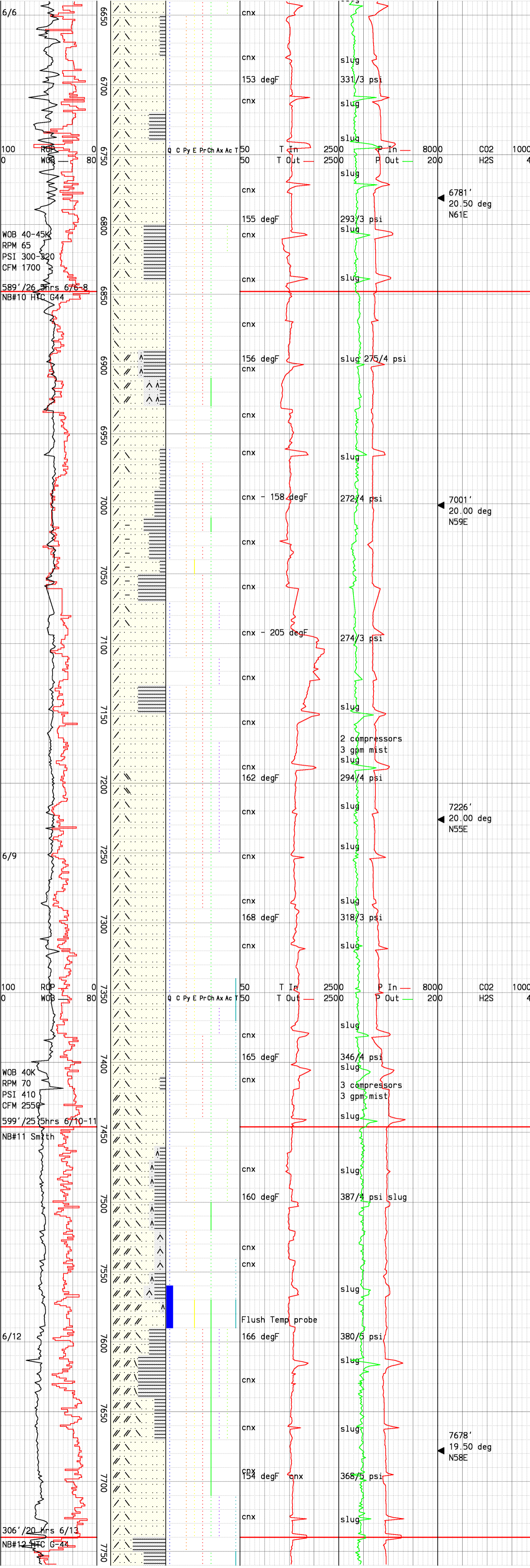
Drilling break at 6302'.

Silicic Graywacke: wht-lt gry, com brn cast, loc grn cast, loc mod blchd appr, v hd, britt, v fn-med gr, mod dist gr bndrs, mod-str rexln, loc com clay altd felds, r qtz vng, r euh qtz vugs, r pyr & other sulfides, r epid, r chlor.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, loc str blchd appr, v hd, britt, v fn-med gr, prly dist gr bndrs, mod-str rexln, loc com clay altd felds, v r qtz vng, r euh qtz vugs, r pyr, r epid, r-tr pyrr, r chlor.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc wk fol, loc-com hornfelsic txt, v r qtz vng, r euh qtz vugs, r epid, r disem & vn pyrr, r chlor, r pink actinolite, intrbddw/Argillite: lt dk gray, red brown, mod hd-hd, mass, r disem pyrr.

Drilling breaks at 6625', 6632', and 6660'.



Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc com hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor, r act, loc intrbdd w/Argillite: dk gry-blk, mod hd, v fn gr, silicic, relict bedding, mnr v fn agg/vn pyr & pyrr.

Drilling break at 6735' and 6745'.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc com hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor, r act, loc intrbdd w/Argillite: dk gry-blk, mod hd, v fn gr, silicic, relict bedding, mnr v fn agg/vn pyr & pyrr.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc com hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor, r act, loc intrbdd w/Argillite: dk gry-blk, mod hd, v fn gr, silicic, relict bedding, mnr v fn agg/vn pyr & pyrr.

Silicic Graywacke: wht-med gry, com brn cast, loc pale grn cast, com-pred str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc com hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor, r act, loc intrbdd w/Argillite: med-dk gry, blk, mod hd, v fn gr, silicic, relict bedding, r qtz vng, mnr v fn agg/vn pyr & pyrr.

Drilling breaks at 7107', 7147', 7216' and 7240'.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly to mod dist gr bndrs, mod-str rexln, loc com hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor wash & vng, r pink axinite.

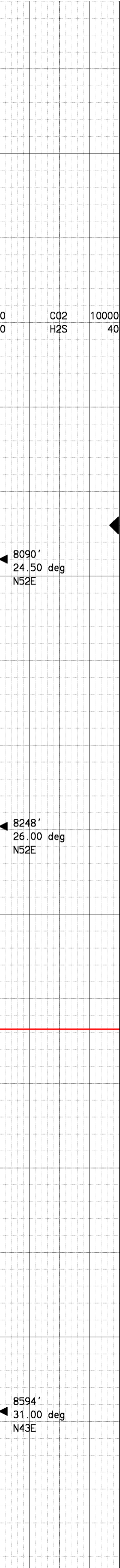
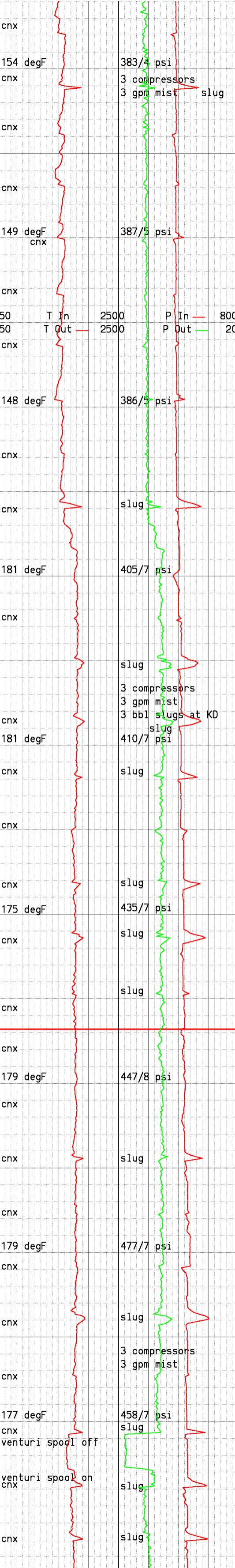
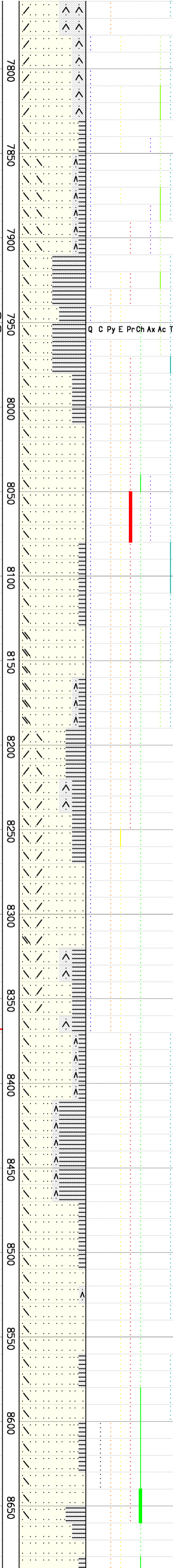
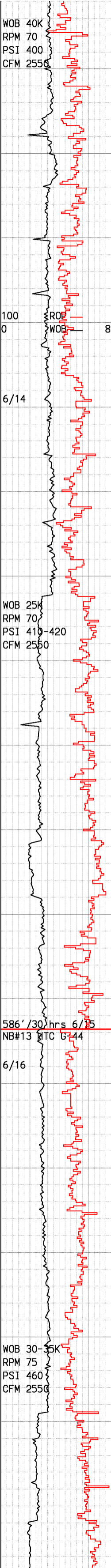
Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn gr, prly def gr bndrs, str rexln, loc abund hornfelsic txt, v r qtz vng, r euh qtz vugs, r pyr, r epid, r pyrr, r chlor wash & vng, r axinite, r dk brm-blk tourm.

Silicic Graywacke: wht-med gry, com brn cast, loc pale grn cast, com-pred str blchd appr, v hd, britt, v fn-med gr, prly def gr bndrs, mod-str rexln, com hornfelsic txt, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor, r act, loc intrbdd w/Argillite: dk gry-blk, mod hd, v fn gr, silicic, mnr agg/vn pyr & pyrr.

Silicic Graywacke: wht-med gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn gr, prly def gr bndrs, str rexln, com hornfelsic txt, perv altrd/minrlzd, r euh qtz vugs, r pyr, r epid, r pyrr, tr chlor, r axinite, r act, loc intrbdd w/Argillite: dk gry-blk, loc red brn w/baked appr, hd, v fn gr, silicic, mnr pyr & pyrr.

Drilling breaks at 7572', 7597', 7623', 7630'.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly def gr bndrs, str rexln, loc com hornfelsic txt, loc abund qtz vng, r euh qtz vugs, r pyr, r epid, r disem & vn pyrr, r chlor wash & vng, r tourm.



Silicic Graywacke: lt gry, occ brn cast, occ grn cast, hd, silic & rexln w/indist gr bndrs, tr-r tourm, tr-r actin, r clr qtz, r epid, r sulfides.

Argillaceous Graywacke: med-dk gry, com brn cast, hd, v fn-med gr, qtz & felds float in rexln arg mtx, grds to dk gry, hd, re-xln Arg.

Argillite: dk gry-blk, brn, hd, mass, rexln, r clr qtz, r dism pyr & pyrr, r actin, r tourm, r sft chlor(?).

Silicic Graywacke: lt-med gry, occ brn cast, r grn cast, hd, silic & rexln w/vague grn bndrs, incr in hornfelsic clr & txt, r wht/clr qtz vn, r actin in agg & vns, r sub-euhed pink axin.

Probable small steam entry at drilling break @ 8070'. 25 deg stable temp incr/10# stable press incr.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly def gr bndrs, str rexln, decr hornfelsic txt, r euh qtz vugs, r pyr, r epid, r pyrr, r-mnr chlor wash & vng, r tourm.

Silicic Graywacke: wht-lt gry, com brn cast, loc pale grn cast, com str blchd appr, v hd, britt, v fn-med gr, prly def gr bndrs, str rexln, decr hornfelsic txt, r euh qtz vugs, r pyr, r euh epid, r pyrr, r-mnr chlor wash & vng, r axinite, r-tr tourm.

Silicic graywacke: wht-med gry, com brn cast, loc grn cast, loc blchd, hd-v hd, prly sortd, strg rexln, loc strg hornfelsic txt, r qtz, r disem pyr, loc pyr vng, r pyrr, r-tr chlor, intrbdd w/ Argillite: med gry-blk, loc brn, loc silty, frm-hrd, loc hornfelsic, r qtz, r pyr.

Drilling breaks at 8186', 8319', 8329', 8343'.

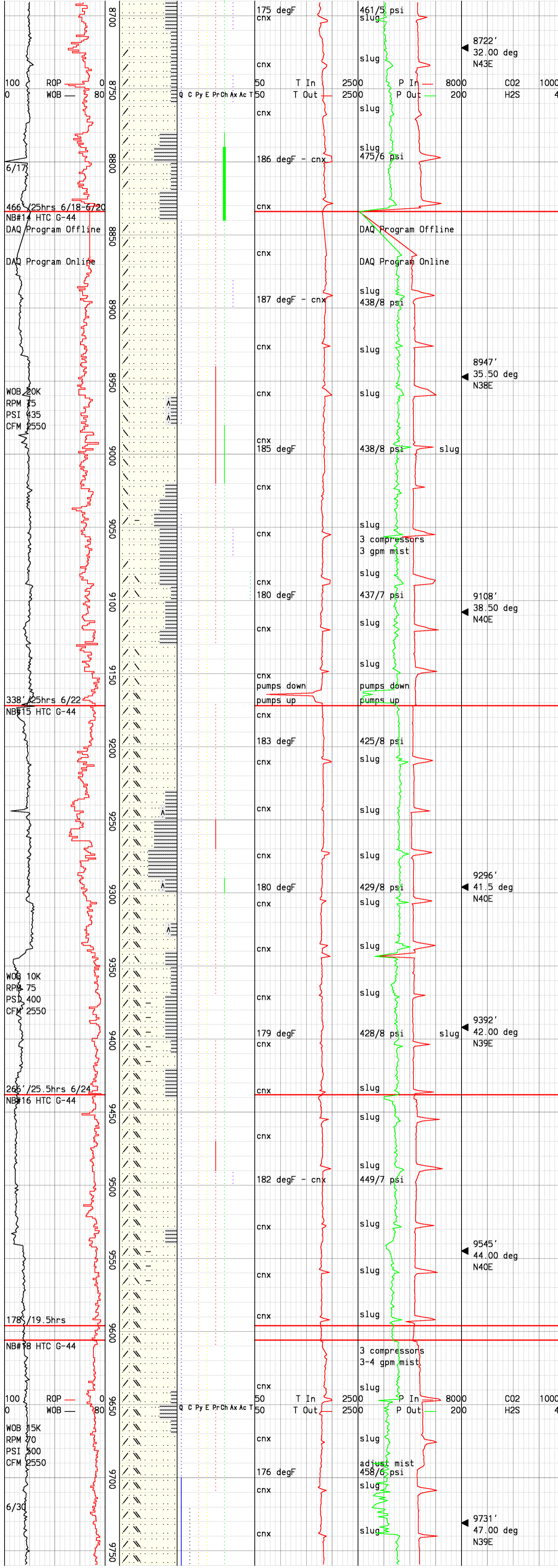
Silicic Graywacke: lt gry, com blchd, com brn cast, occ grn cast, hd, silic & rexln w/indist gr bndrs, com hornfelsic tex, r pyrr, r epid, r chlor, r tourm.

Silicic graywacke: wht-med gry, com brn cast, loc grn cast, loc blchd, hd-v hd, strg rexln, loc strg hornfelsic txt, r pyrr, r chlor, r tourm, intrbdd w/ Argillite: med gry-blk, loc brn, loc silty grdng to Arg GW, silic, hrd, loc hornfelsic, r pyrr.

Drilling break at 8475'.

Silicic Graywacke: lt gry, com blchd, com brn cast, occ grn cast, hd, silic & rexln w/indist gr bndrs, com hornfelsic tex, r pyrr, r epid, r-tr chlor, r tourm, loc intrbdd w/Argillite: med gry-blk, loc brn, loc silty grdng to Arg GW, silic, hrd, loc hornfelsic, r pyrr.

Drilling breaks at 8715', 8720'-8725', and 8747'.



8722' 32.00 deg N43E
 Silicic Graywacke: wht,lt-med gry,com v lt pale grn cast,loc str blchd appr,v hd,britt,v fn-med gr,prly def gr bndrs,str rexln,loc wk fol,loc r hornfelsic txt,loc r clay altd felds,r euh qtz vugs & milky white qtz frags,r pyr,r euh and disem epid,r pyrr,r-mnr chlor wash & vng,r axinite,r tourm, interbdd w/Argillite:lt-dk gry, loc brn,hd,loc silty,r qtz vng, r vn and disem pyr.

8947' 35.50 deg N38E
 Silicic Graywacke: wht,lt-med gry,pred blchd appr,v hd,britt, v fn gr,prly def gr bndrs,str rexln,loc wk fol,loc r hornfelsic txt,loc r clay altd felds,r euh qtz vugs & milky white qtz frags,r pyr,r euh and disem epid,r disem pyrr,r chlor, r axinite,

9108' 38.50 deg N40E
 Silicic Graywacke: lt gry,com blchd,com brn cast,occ grn cast, hd,silic & rexln w/indist gr bndrs,loc com hornfelsic tex,r qtz vng/vugs,r-tr pyrr,r epid,r-tr chlor,loc intrbdd w/Argillite med gry-blk,loc brn,loc silty grdng to Arg GW,silic,hrd,loc hornfelsic,r-tr pyr & pyrr.

9296' 41.5 deg N40E
 Silicic Graywacke: wht,lt-med gry,com-pred v lt pale grn cast, loc str blchd appr,v hd,britt,v fn-med gr,prly def gr bndrs,str rexln,loc wk fol,loc r hornfelsic txt,r-tr clay altd felds,r euh qtz vugs & milky white qtz frags,r pyr,r euh and disem epid,r disem &vn pyrr,r chlor vng ,r axinite,r tourm, interbdd w/Argillite:lt-dk gry, loc brn,hd,r qtz vng,r vn and disem pyr.

9392' 42.00 deg N39E
 Silicic Graywacke: lt-med gry, abund brn cast,r grn cast,hd, silic & rexln w/vague grn bndrs, incr in hornfelsic txt,r wht/clr qtz vng,r pyr,r epid,r-tr pyrr,r chlor.

9545' 44.00 deg N40E
 Silicic Graywacke: brn,lt-med gry,com v lt pale grn cast,pred brn cast,v hd,britt,v fn-med gr, prly-mod well def gr bndrs,str rexln,loc wk fol,dom hornfelsic txt,r-mnr clay altd felds,r euh qtz vugs & milky white qtz frags,r pyr,r euh and disem epid,r disem & vn pyrr,r chlor, interbdd w/Argillite:lt-dk gry, loc brn,hd,r qtz vng,r vn and disem pyr.

9731' 47.00 deg N39E
 Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-med gr,str rexln w/ indist gr bndrs,dom hornfelsic txt,r euh qtz vugs & milky white qtz frags,r pyr,r epid,r-tr pyrr,r chlor.

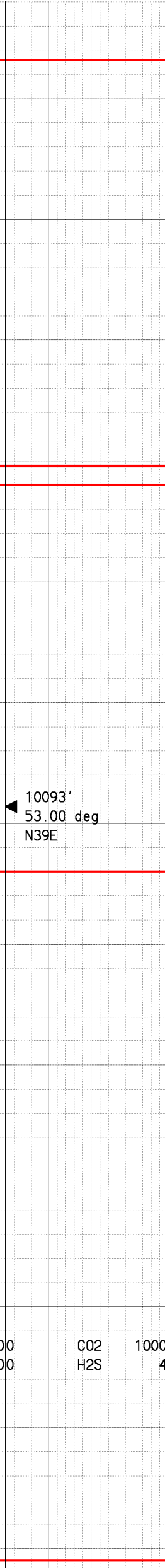
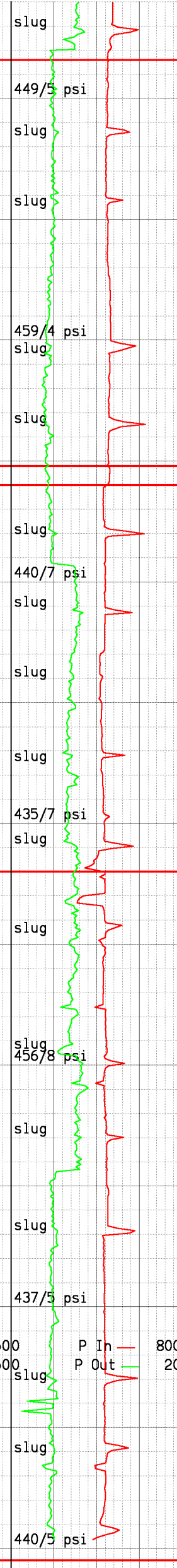
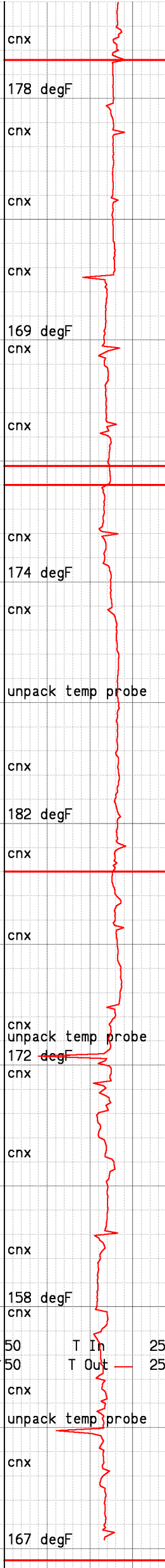
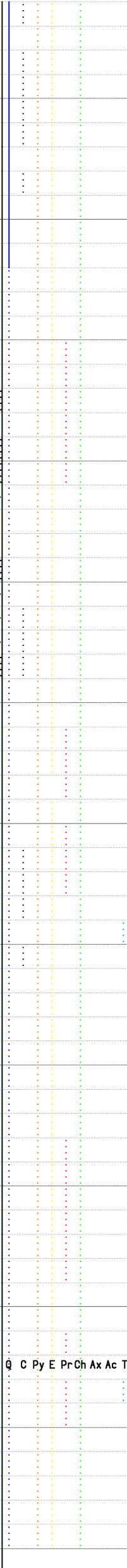
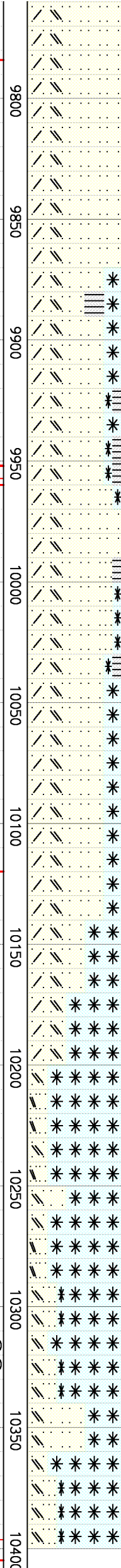
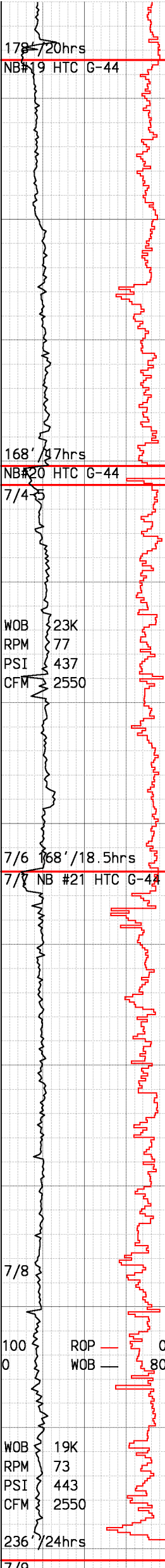
Drilling breaks from 9129'-9135' and at 9167'.

Drilling breaks from 9238-9242',and 9256-9264'.

Drilling breaks at 9380', 9387', and 9452'.

Drilling breaks at 9512' and 9520'.

Twist off at bit depth of 9596' leaving 5902' of drill string in hole.Polish top of fish w/mill,retrieve drill string w/fishing tools.Drill ahead f/9596' t/9606' w/ NB#17 HTC G-44.POOH to inspect BHA due to low ROP.



Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-fn gr,str rexln w/ indist-prly def gr bndrs,dom hornfelsic txt,milky white qtz frags,r disem pyr,r epid,r disem pyrr,r chlor.

Drilling breaks from 9877' to 9883' and at 9926'.

Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-fn gr,str rexln w/ indist-prly def gr bndrs,dom hornfelsic txt,r clear qtz frags,r disem pyr,r epid,r disem pyrr,r chlor.

Felsite:gry,lt-gry,indist gr bndrs,blk mica,v hd.

Twist off at bit depth of 9952' leaving 1435' of drill string in hole.Retrieve drill string w/fishing tools.RIH and drill ahead to 9960. Twist off again, leaving 1438' of drill string in hole, retrieve W/fishing tools. RIH and drill ahead.

Drilling breaks at 10,030', 10,036' and 10,060'

Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-fn gr,str rexln w/ indist-prly def gr bndrs,dom hornfelsic txt,r clear qtz frags,r disem pyr,r epid,r disem pyrr,r loc euhd pyrr&pyrr vng,r chlor.Felsite:lt-gry,wht,indist grn bndrs,blk mica,v hd.

Twist off at 10119' leaving 7183' drill string in hole, retrieve w/ fishing tools

Felsite: lt-gry,wht,indist-grn bndrs,blk mica,v hd, gen rexln app, disem pyr & loc pyr vng,loc r tour,loc r brn stn. Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-fn gr,str rexln w/ indist gr bndrs,dom hornfelsic txt,r clear qtz frags,r disem pyr,r epid,r disem pyrr,r loc euh pyr & pyr vng,r chlor.

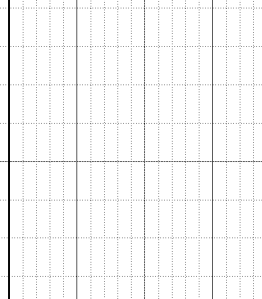
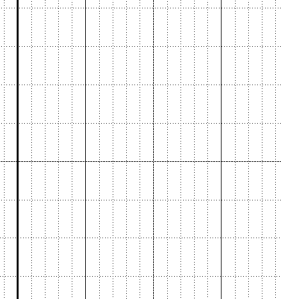
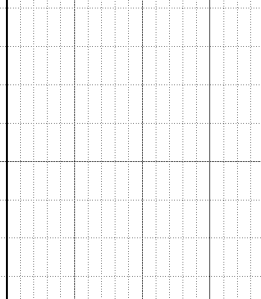
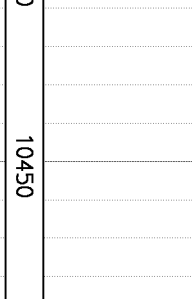
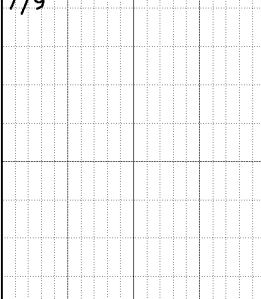
Drilling break at 10280'

Felsite: lt-gry,wht,indist-grn bndrs,blk mica,v hd, gen rexln app disem pyr & loc pyr vng,loc r tour,loc r brn stn. Silicic Graywacke: brn,lt-med gry,loc v lt pale grn cast,v hd, britt,v fn-fn gr,str rexln w/ indist gr bndrs,dom hornfelsic txt,r clear qtz frags,r disem pyr,r epid,r disem pyrr,r loc euh pyr & pyr vng,r chlor.

Drilling break at 10379

Twist off at 10405',RIH w/ fishing tools & retrieve entire drill string.

TD @ 10405'.Run 7" 29# Hydril 521 slotted liner F/10405' T/7874' & solid liner F/7874' T/receptacle assy @ 4255'.Kill well & run solid liner F/receptacle T/surface.



100 ROP — 0
0 WOB — 80

50 T In — 2500 P In — 8000 C02 10000
50 T Out — 2500 slug P Out — 200 H2S 40