



Santa Rosa, CA

COMPANY Calpine Corporation
 WELL NEGU 8 Fork ST1,ST2,ST3,ST4
 FIELD Geysers
 COUNTY/STATE Lake County, California
 WELL HEAD COORDINATES
 1,783,226 E 426,535N
 ELEVATION 2631.6GL KB=30'
 SPUD DATE 3/15/08 (Run in Hole)
 TD DATE 7/14/08
 TOTAL DEPTH 8605
 TRUE VERTICAL DEPTH 8378
 TD LOCATION 579.3'S 1277.1'E of wellhead
 CONTRACTOR/RIG Kenai Rig #6
 COMPANY REPRESENTATIVE Powers,Darnel, Potter

LOG INTERVAL

DATE LOGGED 3/14/08 TO 07/28/08
 DEPTH LOGGED 3256 TO 8605
 MUD DRILLING 3256 TO 5273
 AIR DRILLING 5273 TO 8605
 LOG SCALE 1:600 UNIT NO. 324
 LOGGING GEOLOGISTS
 Teays,Dunlap,McLaughlin
 Booker,Shepflin,Broderick

HOLE

0 TO 0
 0 TO 0
 0 TO 0
 10.625 TO 5273
 7.625 TO 8605

CASING

30 FROM 0 TO 41
 22 FROM 0 TO 294
 13.375 FROM 0 TO 1306
 11.75 FROM 1299 TO 3218
 8.625 FROM 3305 TO 5273
 5.5 FROM 3305 TO 8577

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

Data includes fork and all sidetracks.
 All depths from Kelly Bushing. KB=30'.
 ST = Sidetrack
 cnx = connection
 Swedge collapsed casing at 1360'.
 Whipstock was removed from original hole but
 unable to remove fish.

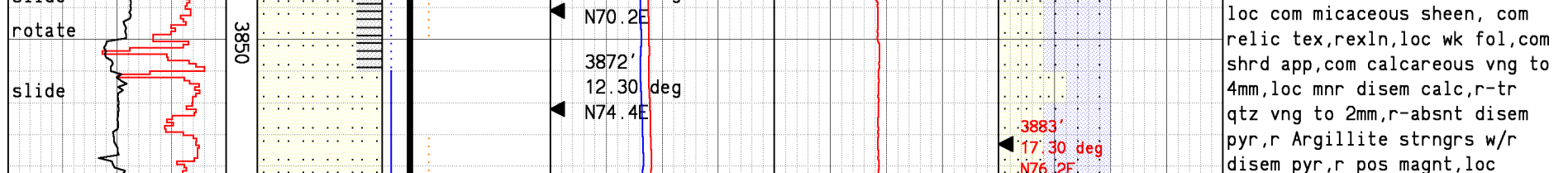
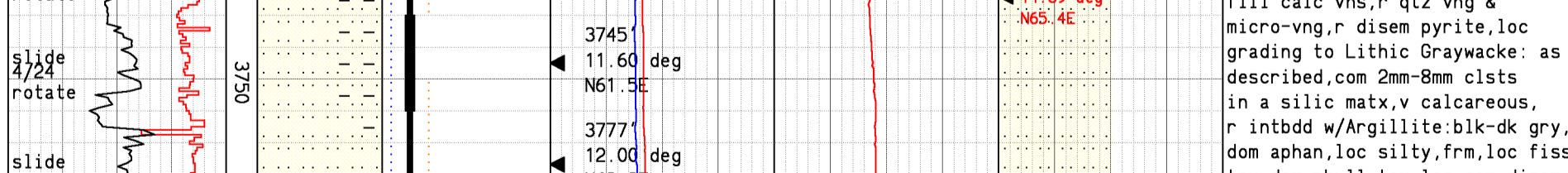
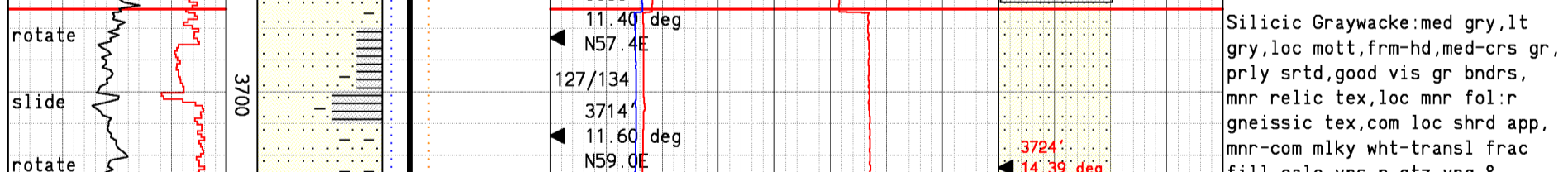
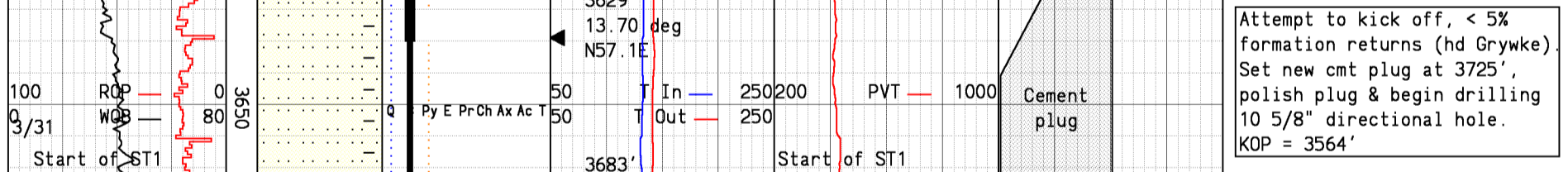
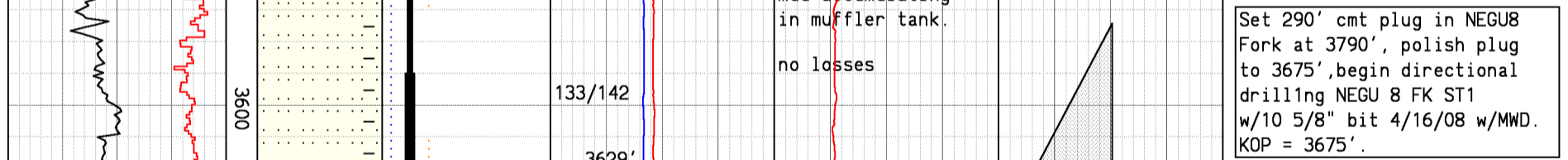
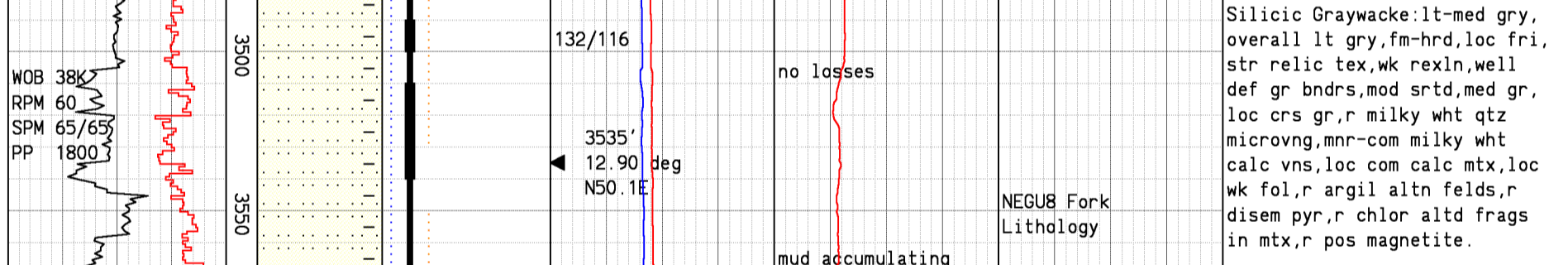
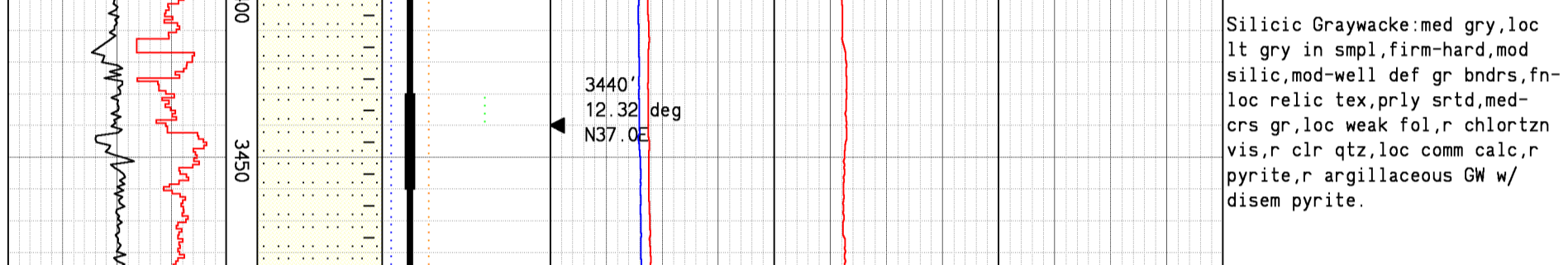
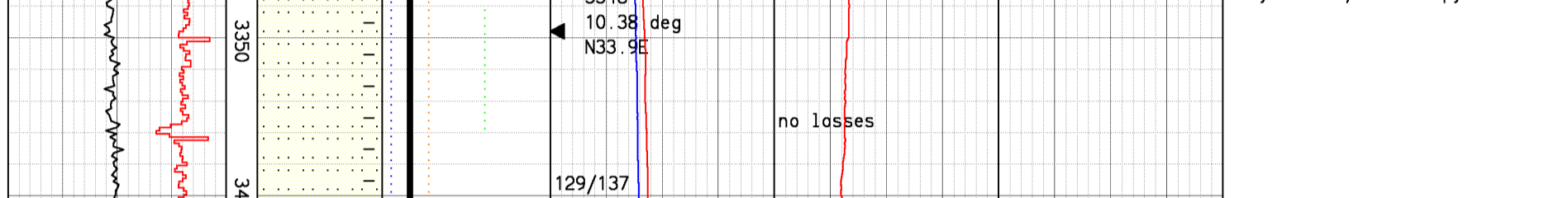
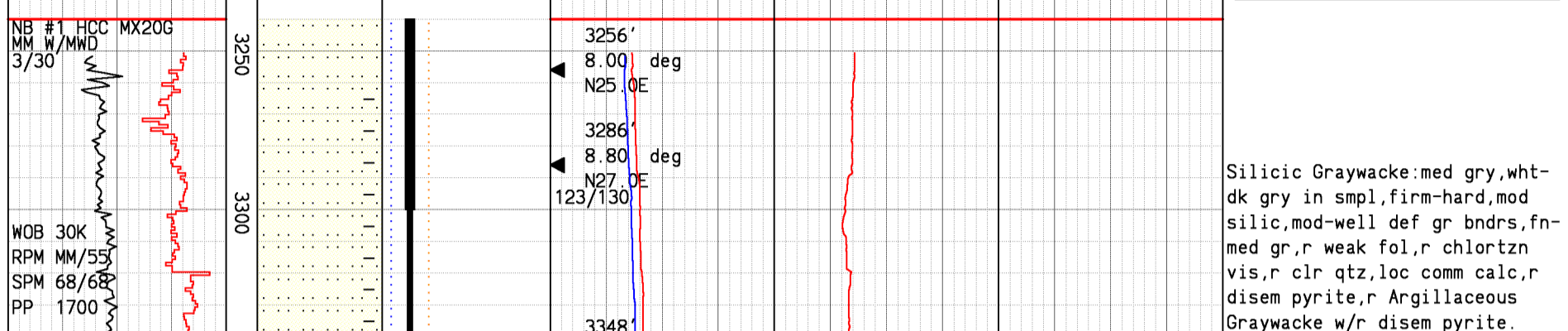
SECONDARY MINERALS

Q = Quartz
 C = Calcite
 P = Pyrite
 E = Epidote
 R = Pyrrhotite
 Ch = Chlorite
 X = Axinite
 A = Actinolite
 T = Tourmaline

Rare << 1%
 Trace < 1%
 Minor 1% to 4%
 Common 4% to 7%
 Abundant 7% to 10%
 > 10%

Drilling Data		Lithology	Minerals	Temperatures		Circulation		Descriptions
ROP				Temperature In	Temperature Out	Pit Total		
100	ft/hr 0			50	deg F 250	200	bbbls 1000	
Weight on Bit								
0	k lbs 80							

Set whipstock in NEGU 8 @ 3252'. Mill window f/3218' t/3240'. Directional drill 10 5/8" hole. KOP = 3216'



NEGU8 Fork Lithology

Cement plug

Start of ST1

mud accumulating in muffler tank.

no losses

no losses

no losses

Start of ST1

133/141

NB #1 HCC MX20G MM W/MWD 3/30

WOB 30K RPM MM/55 SPM 68/68 PP 1700

WOB 38K RPM 60 SPM 65/65 PP 1800

100 ROP 0 WOB 80 3/31 Start of ST1

rotate

slide

rotate

slide

rotate

slide

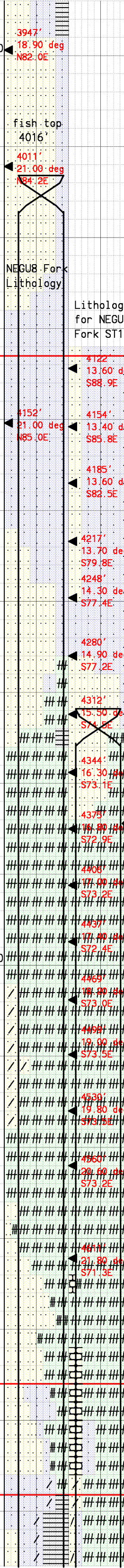
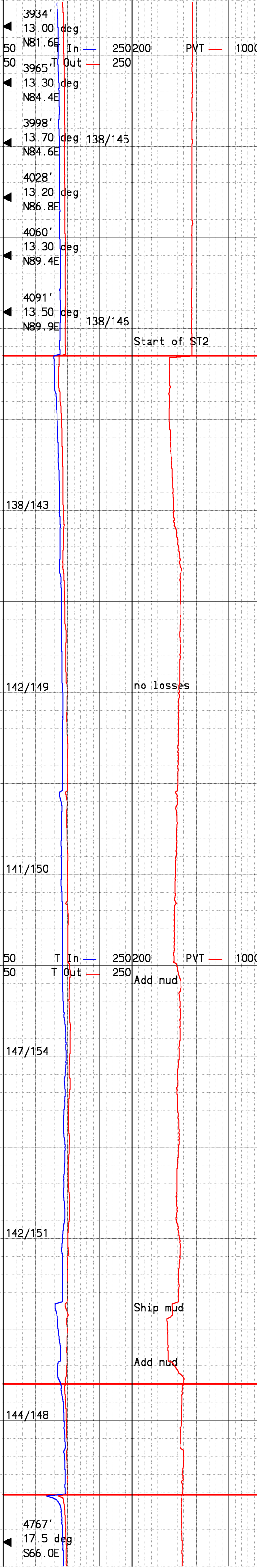
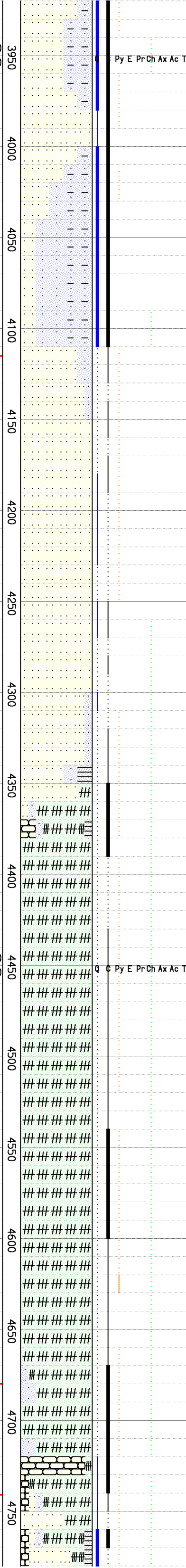
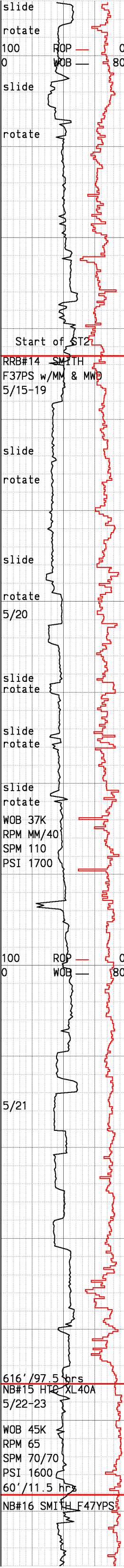
rotate

slide

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slide

rotate



Silicic Graywacke:lt-med gry,lt gry in sample,loc mott,frm-hd, prly indur i.p.,med-crs gr,prly srted,good vis gr bndrs,com relic tex,overall as descr above, loc grd to Lithic Graywacke: med gry,hd,brit,com 2mm-1cm clasts in calc mtrx,loc mod fol, com loc shrd app,com-abund mlky wht-transl frac fill calc and qtz vns,loc r qtz micro-vng, r-absnt disem pyr,r sndy Arg, r phyll app along shrs,r pos mag.

Set cmt plug in NEGUBFKST1 from 4270-4064'. Polish plug and begin drilling 10 5/8" directional hole. KOP = 4115'

Silicic Graywacke:med gry,lt gry,loc mott,frm-hd,med-crs gr,prly srted,good vis gr bndrs, com relic tex,loc wk fol,com shrd app,dom calcareous:2mm-4mm mlky wht-transl frac fill vns,loc mn r disem calc,r qtz vng,r wht Chert,r-absnt disem pyr.

Silicic Graywacke:lt-med gry, com chlor stn,hd-v hd,med-crs gr,prly srted,mod dist-indist gr bndrs,loc mn r fol:r gneissic tex,r-tr mlky wht-transl frac fill calc vns,r-tr qtz vng & micro-vng,r disem pyrite,loc grading to Lithic Graywacke: lt-med gry,com 2mm-4mm clsts in a silic matx,v calcareous, intbdd w/r Greenstone,r silty Argillite, v r blueshist.

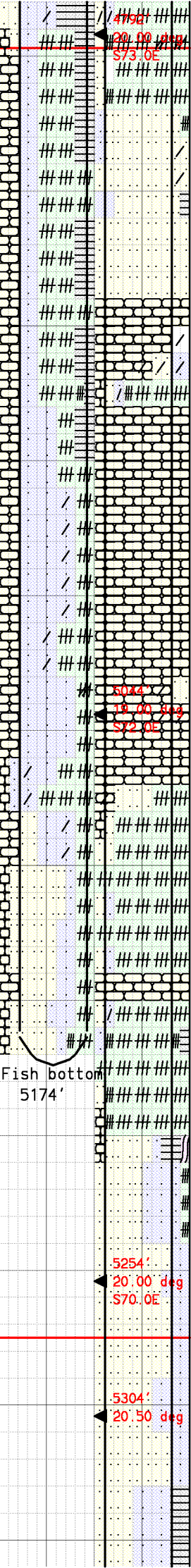
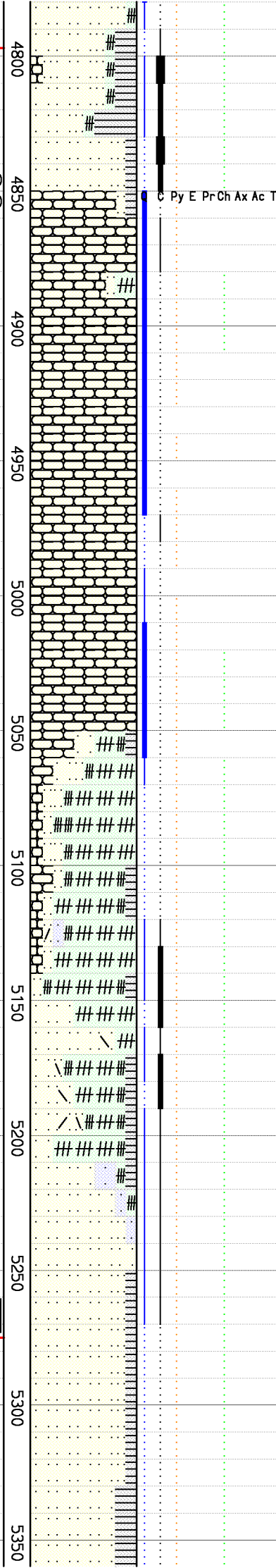
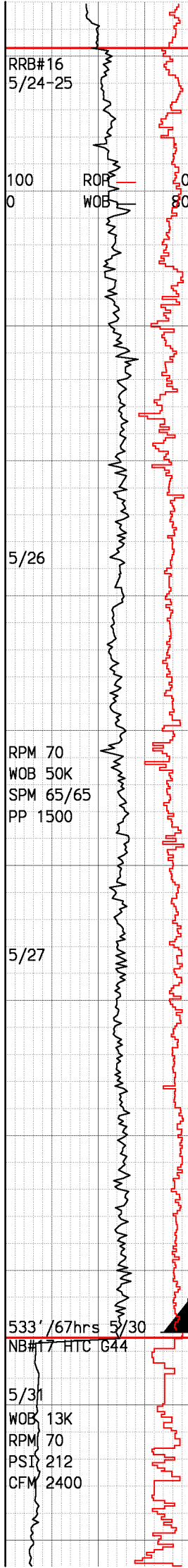
Possible small water entry @4372' in original fork: 10 degree increase with no pressure change.

Greenstone:med-dk grn,loc blchd wht,mott i.p.,hd-v hd,mnr aphan, loc fn-med gr,r str rexln,loc shrd,r brecc txt,mnr marg altrn; com frac fill calcite;r mlky wht qtz vng,r chlor flk & stng,r disem & vn pyr,occ wht chert frags,r drusy qtz, intrcltd w/tr Lithic Graywacke & black phyll sandy Argillite.

Note: Heavy sloughing from rubble zone 4465'- 4540' in original fork.Adding soap to air injection.

Greenstone:med grn,lt-med gry-grn,frm-hd,loc brit,com mott app,dom mass,aphan,r feldspr rextalzn,sl-mod blchd app,pr relic tex,loc shrd app,r qtz vng,tr-mnr calc vng,r disem & agg pyr,r chlor flks,r drusy qtz,r clr qtz,r intrbding w/ chert & Lithic Graywacke.

Greenstone:lt-med grn,frm-V hd, loc brit,mass,aphan,sl-mod blchd app,r qtz vng,t-mnr calc vng,r disem & agg pyr,r chlor flks,r-tr transl serp,intbdd w/ Chert:reddish brn,salmn pink,hd, brit,tr qtz vng,r calc vng, v hd,intbdd w/Lithic Graywacke:lt-med gry,frm-hd,med-crs gr,prly srted,fair-good vis gr bndrs,com silic grywke clasts, r-mnr dk gry-black phyll Argillite.



Short trip:Electrical problem with mud pumps

Silicic Graywacke: lt-med gry, frm-v hd, med gr, mod-pr gr bndrs,occ fresh app,prly-mod srted, r-tr qtz vng, tr-c mlky wht frac fill calc,r-absnt disem pyr,r term clr qtz xls, loc intbdd w/Argillite:dk gry-blk,frm,slty,loc phyll shn, com shrd app,r disem pyr,loc grd to Argillaceous Graywacke, loc intbdd w/pale green chert.

Chert:red,brn,grn,salmn,pale jade, milky wht,v hd,brit,dm microxln,mass,com crvlnr frct, r bnnd i.p.,r calc vng,r-mod qtz vng,occ free clr qtz,r lithic & silicic Graywacke strgrs,r altered rd claystone, r sandy argillite,r disem & vn pyrite,v r chlor.

Melange:20-60% Greenstone:dom hornfelsic,tan,brn,red-brn,mnr lt-med grn,lt-med gry-grn,frm-hd,loc brit,com mott app,mass, fn gr,com strng feldspr rxlzn, sl blchd app,pr relic tex,loc shrd app,r qtz vng,r calc vng, r disem & agg pyr,r chlor flks,10-20% Lithic Graywacke: med gry,lt gry,loc mott,frm-hd, med-crs gr,prly srted,poor-mod vis gr bndrs,mnr relic tex,r wk fol,com loc shrd app,mnr mlky wht-transl frac fill calc, 10-20% Chert:red,brn,grn,salmn, hd,brit,tr red alt claystone,r realgar.

Stuck pipe @5174' in original fork, back off @ 3790', attempt to fish,set 290' cmt plug @ 3790'.Prepare ST1.

Set 8 5/8" casing from 3305' to 5273' and drill ahead with air.

Silicic Graywacke:med gry,lt gry,loc mott,frm-hd,fn-med gr, prly srted,poor-good vis gr bndrs,com relic tex,r wk fol, com shrd app,r wht-trans calc & qtz vns,loc mnr disem calc,r wht Chert,r-absnt disem pyr,w/stringers of Argillite: blk-dk gry, firm,brit-hd,disem pyr.

Adding 12 BPH

Losing 60 BPH

Sweep

Build volume

Blooe line circ. temp. off

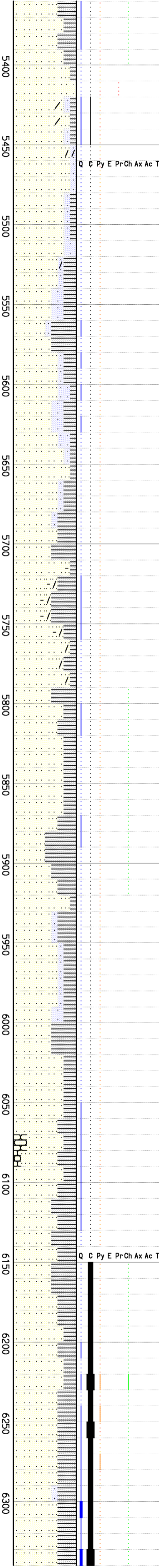
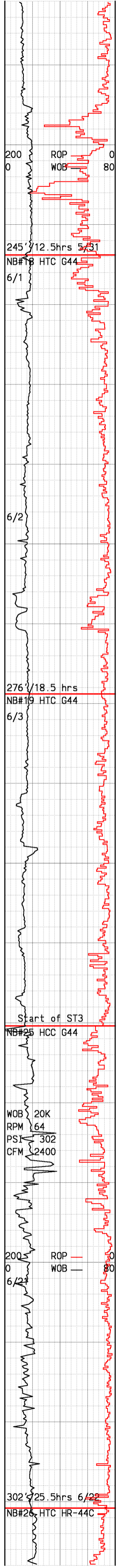
Adding 20-27 BPH

Adding 15 BPH

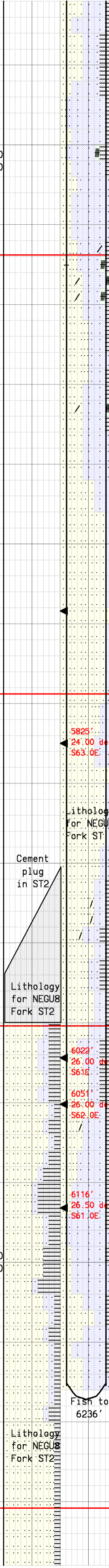
Losing 10 BPH

Begin Air Drilling
2 Compressors

198/1



Depth (ft)	Tool Joint (TJ)	In (ft)	Out (ft)	Pressure (PI)	Pressure (PO)
5400	cnx	2500	2500	800	20
5478'	cnx	2500	2500	800	20
5500	cnx	2500	2500	800	20
5600	cnx	2500	2500	800	20
5721'	cnx	2500	2500	800	20
5800	cnx	2500	2500	800	20
5900	cnx	2500	2500	800	20
6000	cnx	2500	2500	800	20
6112'	cnx	2500	2500	800	20
6247'	cnx	2500	2500	800	20
6300	cnx	2500	2500	800	20



Drill breaks: 5430' to 5450' & 5470' to 5485'.

Silicic Graywacke: lt-med gry, loc pale green cast, loc mott, hd-v hd, fn-med gr, prly srted, indistinct grn bndrs, com relic tex, loc wk fol, com rxln, com shrd app, r wht-trans qtz vns, r chloritized grns, r disem calc, r-absnt disem pyr, grading to Lithic Graywacke, intbdd w/ Argillite: dk gry-blk, firm, silty text, r disem pyr.

Silicic Graywacke: lt-med gry, loc pale green cast, loc mott, hd-v hd, fn-med gr, prly srted, indistinct grn bndrs, com relic tex, loc wk fol, com rxln, com shrd app, r wht-trans qtz vns, r chloritized grns, r disem calc, r-absnt disem pyr, grading to Lithic Graywacke, intbdd w/ Argillite: dk gry-blk, firm, silty text, r disem pyr.

Silicic Graywacke: lt-med gry, loc pale green cast, loc mott, hd-v hd, fn-med gr, prly-mod srted, mod distinct grn bndrs, com relic tex, loc wk fol, comwk-mod rxln, com shrd app, r-tr wht-trans qtz vng, r-tr clear qtz vugs, r chloritized grns, r disem calc, r-absnt disem pyr, r pyr vng, com Lithic Graywacke, intbdd w/ Argillite: dk gry-blk, soft-firm, silty text, r disem pyr.

Drill break: 5730' to 5752'

Silicic Graywacke: lt-med gry, hd-v hd, med gr, good vis gr bndrs, dom fresh app, prly-mod srted, loc mnr relic tex, r-tr milky wht frac fill qtz, r milky wht frac fill calc vng, decr calc w/depth, r disem pyr, loc chlorite stn, intrbdd w/ Argillite: dk gry-blk, soft-firm, silty text, r fracfill calc & qtz vng, r disem & vn pyrite, r chert, com Lithic Graywacke, com Argillaceous Graywacke.

Set cement plug in Negu 8 ST2. Kick off and begin ST3 by time drilling 7.625" hole from 5963' with aerated water, Mud Motor and MWD.

Time drill with Mud Motor and MWD to 6003'. Drill ahead with rotary assembly and air.

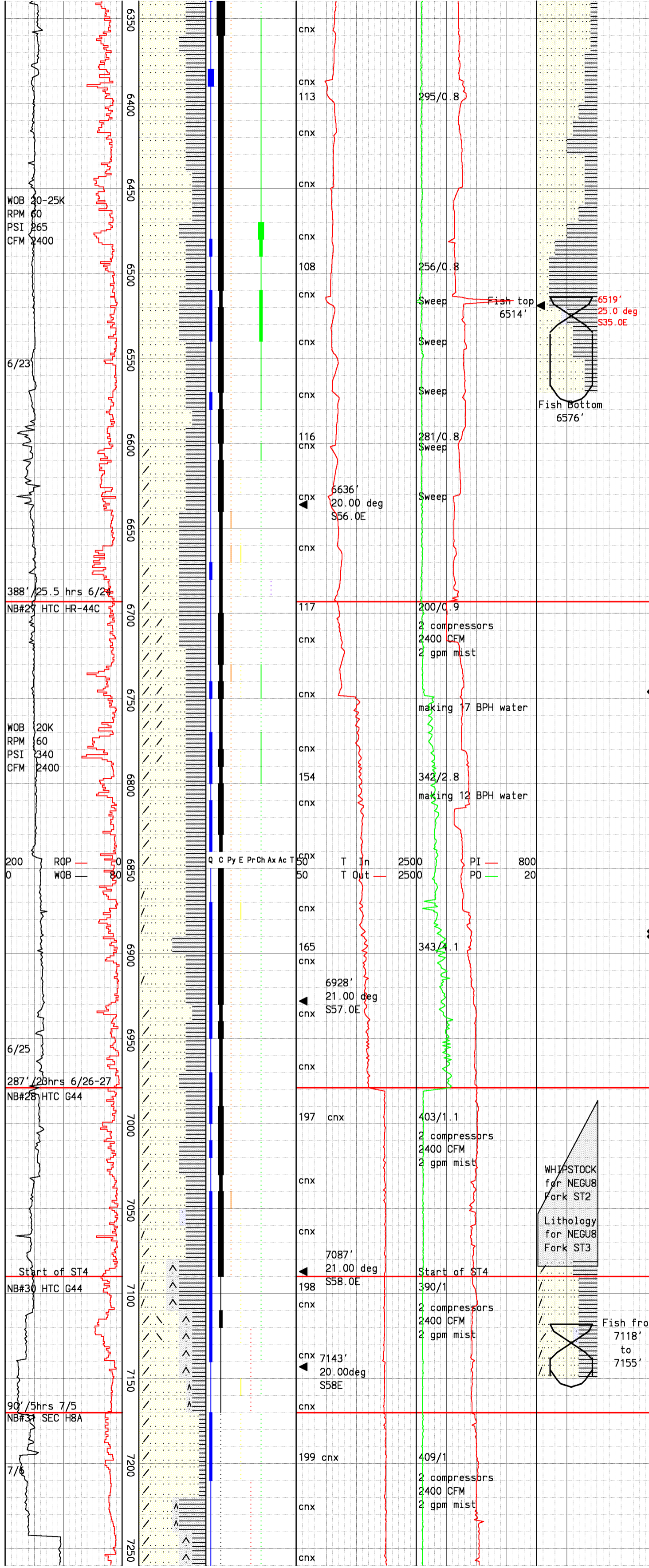
Silicic Graywacke: med gry, lt gry, loc mott, frm-hd, fn-med gr, prly srted, poor-mod vis gr bndrs, com relic tex, rexln, loc wk fol, com silic & calcareous vng, loc tr disem calc, r-tr qtz vng to 2mm, r-absnt disem pyr, intrbdd w/ Argillite strngs, dom sandy app w/mnr disem & agg pyr, tr free clr-milky wht qtz, loc str rexln, r Lithic Graywacke.

Silicic Graywacke: lt-med gry, loc wht-v lt gry, hd-v hd, sl-occ mod altrd, fn-med gr, mod-pr srted, fr-mod dist gr bndrs, com flattened arg grs, pred fr-good relict tex, occ wk lin, r drusy qtz, r-loc mnr clr & wht qtz vng, com-abun wht calc vng & vn frags, r-tr disem & occ vn pyr, r-tr chlortzd grs, intrbdd w/ Argillite: dk gry-blk, frm-hd, mass, pred wk-mod phyll shn, com dull, loc r qtz vng, r-tr wht calc vng, r-loc tr disem/agg pyr, r Chert & Greenstone frags.

Drill t/6236' in original fork, stuck pipe. Free point @ 4238'. Back off and work fish. Plug back and prepare to sidetrack ST1 5/14/08.

Possible steam entry 6262' in ST2.

Drilling breaks @ 6297', and f/6333-6343' in ST3.



Silicic Graywacke:lt-med gry, loc mott,frm-hd,fn-med gr, prly srted,poor-mod vis gr bndrs, occ good gr bndrs,com relic tex, rexln,loc wk fol,com silic & calc vng,mn-com disem calc,r-tr qtz vng,dom r disem pyr,intrbdd w/Argillite strngs,mass w/r disem & agg pyr,tr-mrn free clr-milky wht qtz,loc str rexln, r Lithic Graywacke.

Drilling breaks f/6389-6391', and f/6476-6483' in ST3.

Stuck pipe @ 6576' in ST2. Unable to retrieve fish. Top of fish @6514'. Set cement plug and start ST3.

Silicic Graywacke:lt-med gry, occ dk gry,sl-occ mod altrd, mod-loc str rexln,pred fn gr, pred mod srted,fr-well defined gr bndrs,fr-mod relic tex,occ wk fol/lin,loc r clr drusy qtz, tr-mnr clr/wht qtz vng,mnr-abun intrstit & wht vn calc w/mnr-com wht vn frags,r disem & occ vn pyr,loc r disem pale yel epid,r-loc com chlortzd grs/staining,loc tr-mnr wht clay altrd felds grs.

Drilling break f/6662-6677'.

Argillite:dk gry-blk,dk gry brn,mod hd-hd,wk-mod phyll shn sl incr w/depth,loc r clr qtz vng,r-tr calc vng,loc r-r disem pyr w/occ vng.

Drilling break f/6735-6737', and f/6745-6746'.

Possible Steam/Water Entry at 6746'in ST3. 16# initial Pressure In incr,0.4# initial Pressure Out incr, 0 degF Temperature Out incr. Stable at: Press In 4#,Press Out 1#, Temp Out 23 degF. Well making 17 BPH water.

Drilling break f/6774-6785', and f/6798-6800' in ST3.

Steam Entry at 6887' in ST3. 14# initial Pressure In incr, 1.3# initial Pressure Out incr,25 degF Temperature Out incr. Stable at: Press In 14#, Press Out 1.3#, Temp Out 15 degF. Well making 12 BPH water.

Drilling break f/6932-6935' in ST3.

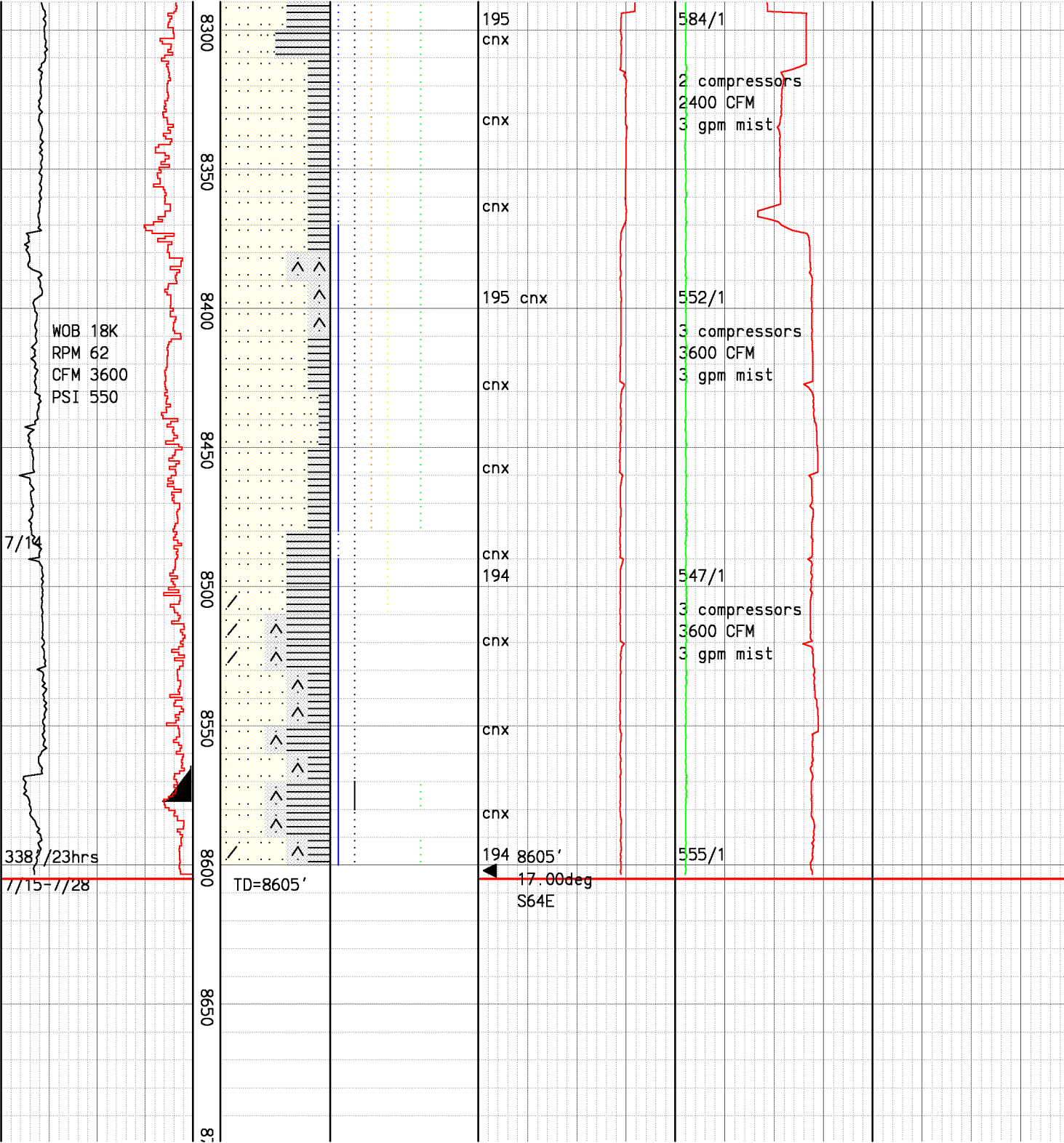
Note: Remove venturi spool at 6979'. Casing collapsed at 1460'. Swedge out bad spot and drill ahead.

Silicic Graywacke:lt-med gry, loc mott,frm-hd,fn-med gr, prly srted,poor-good vis gr bndrs,occ good gr bndrs,com relic tex,rexln,loc wk fol,com silic & calc vng,mn-com disem calc,r-tr qtz vng,dom r disem pyr,intrbdd w/Argillite strngs, mass w/r disem & agg pyr,mrn fre clr-milky wht qtz,loc str rexln, r Lithic Graywacke.

Stuck pipe @ 7155'. Unable to retrieve fish. Top of fish @ 7118'. Set whipstock on top of fish & start ST#4

Set whipstock on top of fish in Negu 8 ST3. Kick off and begin drilling ST4 at 7085' with air.

Recalibrate WOB.



Silicic Graywacke: white, lt-med gry, com loc pale green cast, com blchd app, hd-v hd, fn-med gr, prly srted, mod dist gr bndrs, com flattened arg grs, mod rxln, r-tr clr & milky wht Qtz vng & vugs, loc r wht calc vng & vn frags, r chlortzd grs, r pist grn epid, r-tr pyr vng, intrbddd 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, med gr, r Qtz vng, r pyr vng.

Silicic Graywacke: white, lt-med gry, com loc pale green cast, com blchd app, hd-v hd, fn-med gr, prly srted, mod dist gr bndrs, com flattened arg grs, mod rexln, r-tr clr & milky wht Qtz vng & vugs, r wht calc vng & vn frags, loc r chlortzd grs, intrbddd w/Argillite: dk gry-blk, frm, silty-sandy, mass, pred wk phyll shn, dull, loc r Qtz vng, grading to Argillaceous Graywacke: dk gry-blk, med gr, r Qtz vng.

Drill Negu 8 ST4 with a 7.625" bit to a total depth of 8605'. Run 130 jnts of 5.5", L80, 17#, BUTT, blank and slotted liner to a depth of 8577'. Casing hanger at 3305'. Retrieve whipstock from original Negu 8 hole. Run in, get stuck in, and abandon original hole.