Tecton Geologic

COMPANY	Calpine Corporation
WELL NAME	Wildhorse State 71 ST1
FIELD	The Geysers
COUNTY	Sonoma
STATE	California
WELL HEAD COORDINATES	
	1798.3'N,2950.8'E of SW Corner of Sec3,T11N,R9W
	N: 423,497.6, E: 1,758,754.6
ELEVATION	2753.7' GL
RIG - DAY RATE START DATE	3/1/2010
TD DATE	5/10/2010
TOTAL DEPTH	9976'
TRUE VERTICAL DEPTH	9714.5
TD LOCATION	1893.9' North and 350.7' West of Wellhead
DRILLING CONTRACTOR	Thermasource
COMPANY REPRESENTATIVES	Keith Power
	Russ Silva

LOG INTERVAL

DATE LOGGED	3/1/10	TO	5/10/10
DEPTH LOGGED	66'	TO	9976'
MUD DRILLING	66'	TO	4210'
AIR DRILLING	4210'	TO	9976'
LOG SCALE	1:600		
UNIT NO.	C23		

LOGGING GEOLOGISTS

Dick Dunlap (DD), Patrick Broderick (PB), Eric ter Weele (ET), Matt Lamont (ML), Kelly Richardson (KR), Steve Ahlquist (SA)

HOLE

26"	TO	625'
17.5"	TO	4210'
12.25"	TO	8045'
10.625"	TO	9075'
8.5"	TO	9976'

CASING

20"	FROM	Surface	TO	614'
13.375"	FROM	Surface	TO	4200'

LINER

FROM		TO	
FROM		TO	
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		
SFR	Steam Flow Rate		

LITHOLOGY

- Argillite
- Chert
- Siltstone
- Greenstone
- Serpentine
- Blueschist
- Felsite
- Clay
- Lithic Graywacke
- Argillaceous Graywacke
- Siliceous Graywacke
- Metamorphic Ultramafic
- Weak Foliation
- Strong Foliation
- Marginal Alteration
- Pervasive Alteration
- Weakly Hornfelsic
- Strongly Hornfelsic

SYMBOLS

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

REMARKS

All depths from kelly bushing

KB = 28'

STEAM ENTRIES

Depth	Init	Sust
5735'	0#	0#
6478'	3#	1#
8996'	6#	6#
9230'	6#	6#
9292'	4#	2#
9460'	16#	10#
9524'	8#	7#
9540'	11#	11#
9565'	12#	11#
9597'	37#	42#
9630'	10#	10#

MUD LOSS ZONES

Depth	
1362'	70 bph
2125'	450 bph
2299'	700 bph
2944'	120 bph
3324'	200 bph

WATER ENTRIES

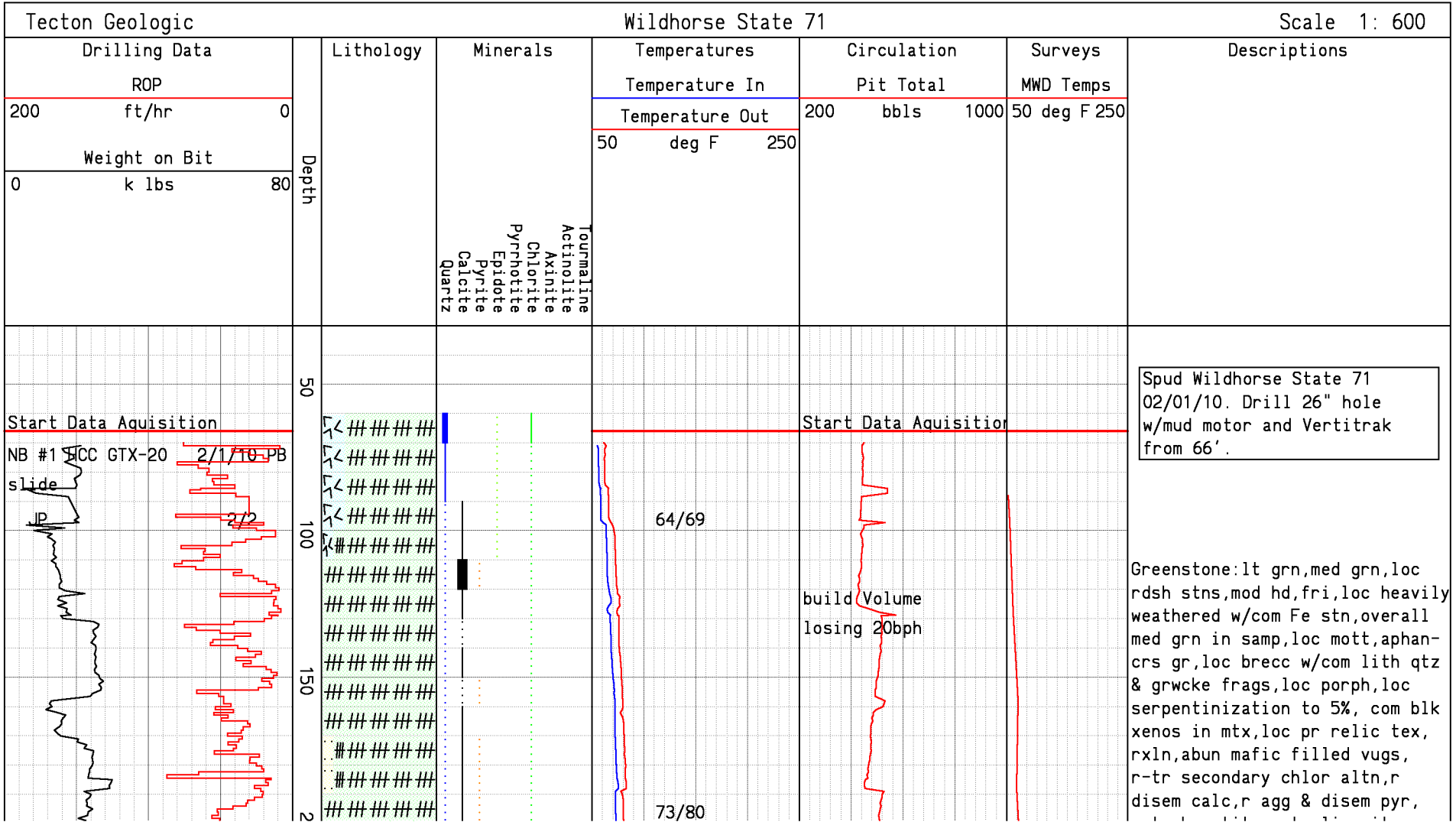
8428-9500'

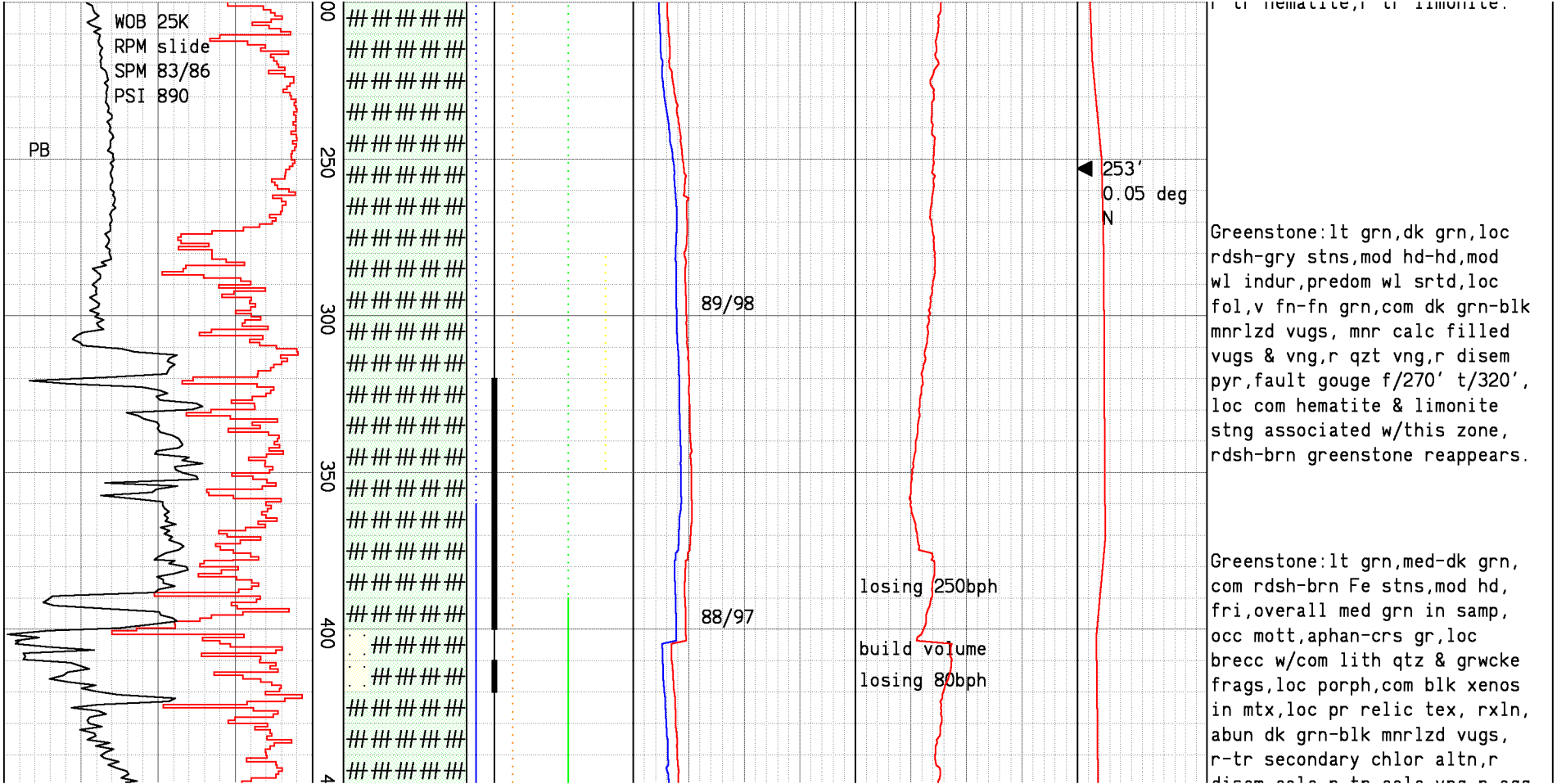
5-25bph

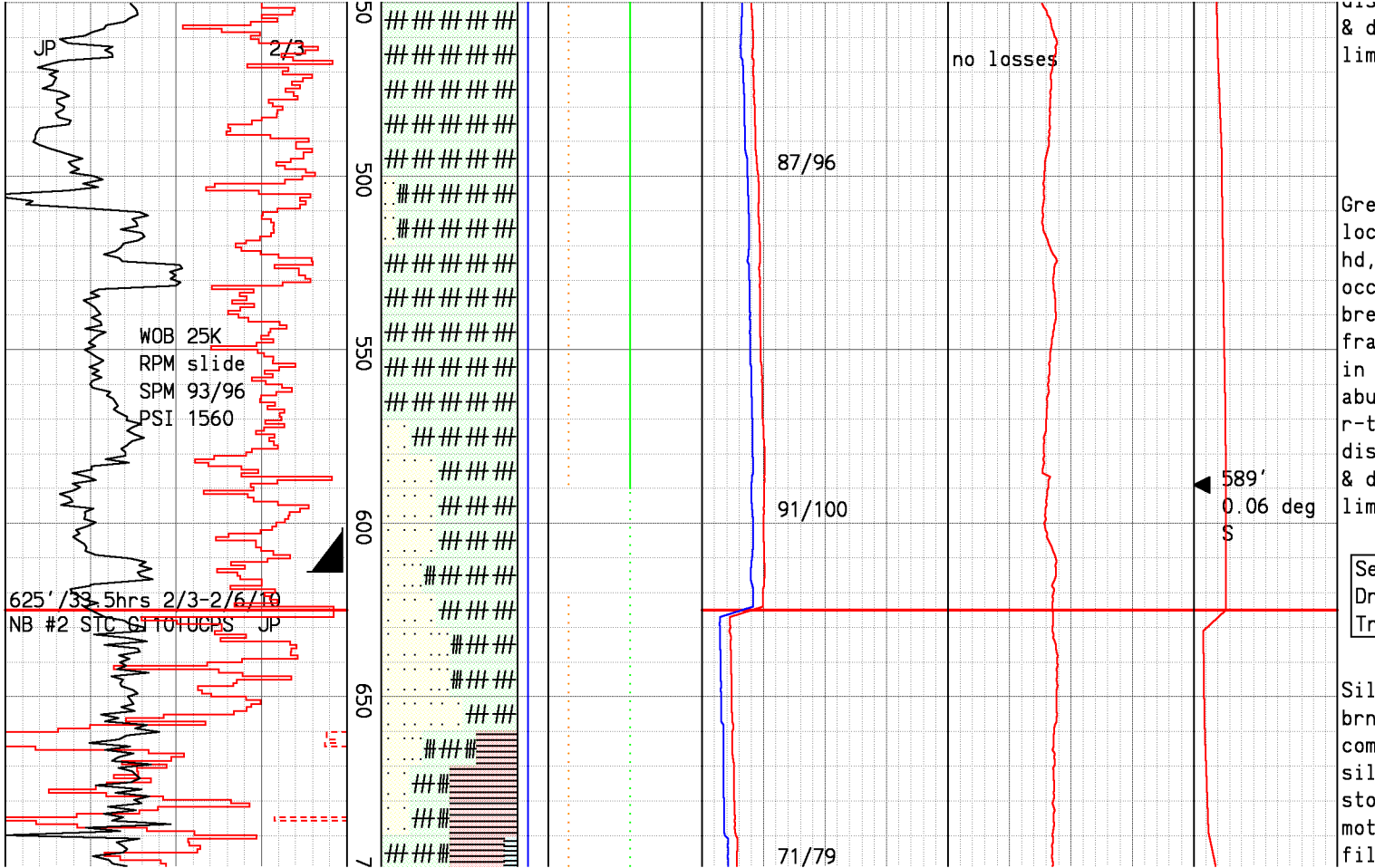
SECONDARY MINERALS

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%


Tecton Geologic
Wildhorse State 71
Scale 1: 600
Drilling Data
ROP
200 ft/hr 0
Weight on Bit
0 k lbs 80
Depth
Lithology
Minerals
Quartz
Calcite
Pyrite
Epidote
Pyrrhotite
Chlorite
Axinite
Actinolite
Tourmaline
Temperatures
Temperature In
Temperature Out
50 deg F 250
Circulation
Pit Total
200 bbls 1000
Surveys
MWD Temps
50 deg F 250
Descriptions
50
100
150
Start Data Aquisition
NB #1 HCC GTX-20 2/1/10 PB
slide
IP
2/2
64/69
73/80
Start Data Aquisitior
build Volume
losing 20bph
Spud Wildhorse State 71
02/01/10. Drill 26" hole
w/mud motor and Vertitrak
from 66'.
Greenstone:lt grn,med grn,loc
rdsh stns,mod hd,fri,loc heavily
weathered w/com Fe stn,overall
med grn in samp,loc mott,aphan-
crs gr,loc brecc w/com lith qtz
& grwcke frags,loc porph,loc
serpentinization to 5%, com blk
xenos in mtx,loc pr relic tex,
rxln,abun mafic filled vugs,
r-tr secondary chlor altn,r
disem calc,r agg & disem pyr,


WOB 25K
RPM slide
SPM 83/86
PSI 890
PB
200
250
300
350
400
89/98
88/97
losing 250bph
build volume
losing 80bph
253'
0.05 deg
N
r tr hematite,r tr limonite.
Greenstone:lt grn,dk grn,loc rdsh-gry stns,mod hd-hd,mod wl indur,predom wl srtd,loc fol,v fn-fn grn,com dk grn-blk mnrlzd vugs, mnr calc filled vugs & vng,r qzt vng,r disem pyr,fault gouge f/270' t/320', loc com hematite & limonite stng associated w/this zone, rdsh-brn greenstone reappears.
Greenstone:lt grn,med-dk grn, com rdsh-brn Fe stns,mod hd, fri,overall med grn in samp, occ mott,aphan-crs gr,loc brecc w/com lith qtz & grwcke frags,loc porph,com blk xenos in mtx,loc pr relic tex, rxln, abun dk grn-blk mnrlzd vugs, r-tr secondary chlor altn,r

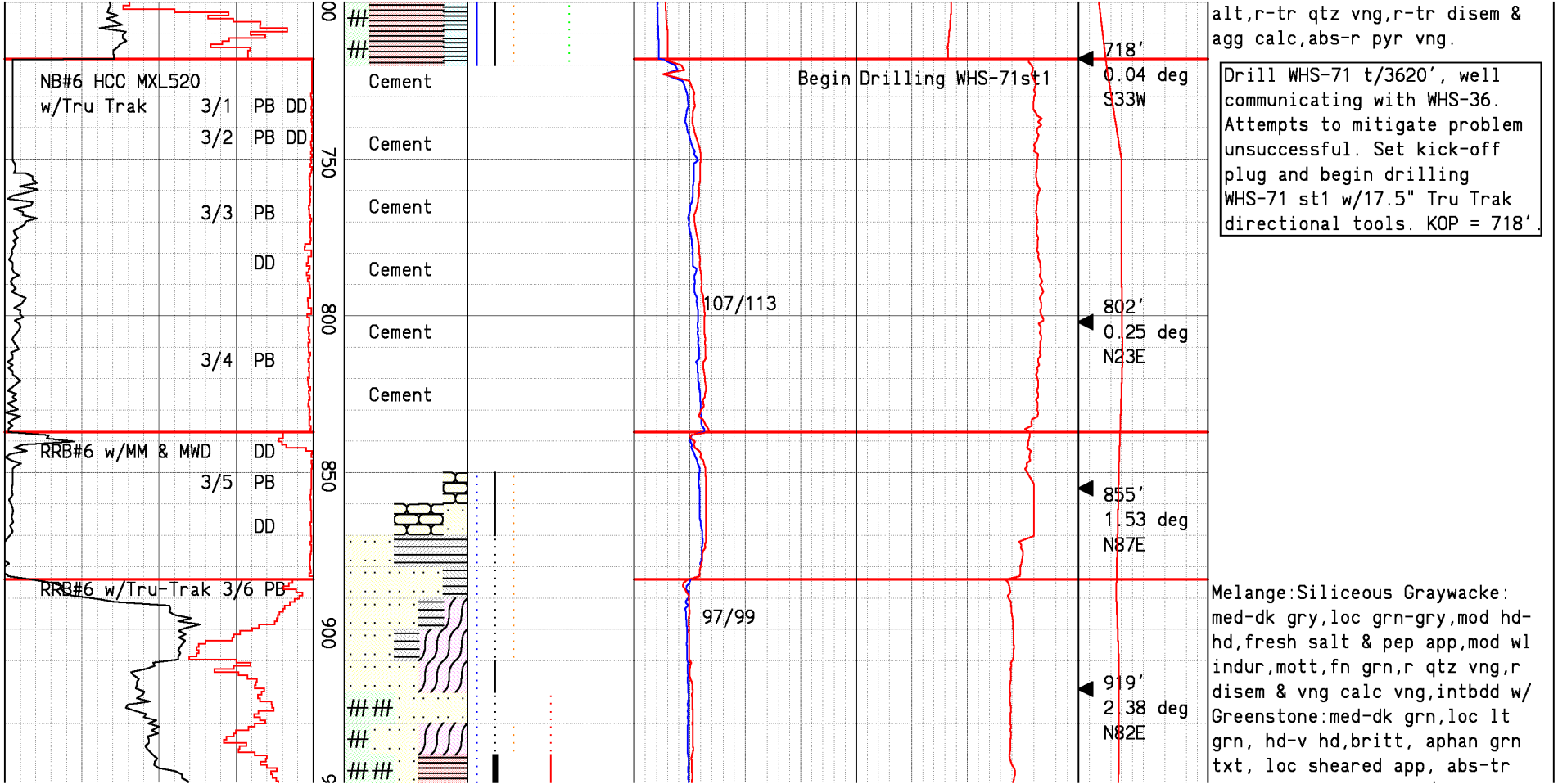


& disem pyr,r-tr hematite,r-tr limonite.

Greenstone:lt grn,med-dk grn, loc com rdsh-brn Fe stns,mod hd,fri,overall med grn in samp, occ mott,aphan-crs gr,loc brecc w/com lith qtz & grwcke frags,loc porph,com blk xenos in mtx,loc pr relic tex, rxln, abun dk grn-blk mnrlzd vugs, r-tr secondary chlor altn,r disem calc,r-tr calc vng,r agg & disem pyr,r-tr hematite,r-tr limonite.

Set 20" casing @ 614'.
Drill ahead w/17.5" bit & Tru-trak motor.

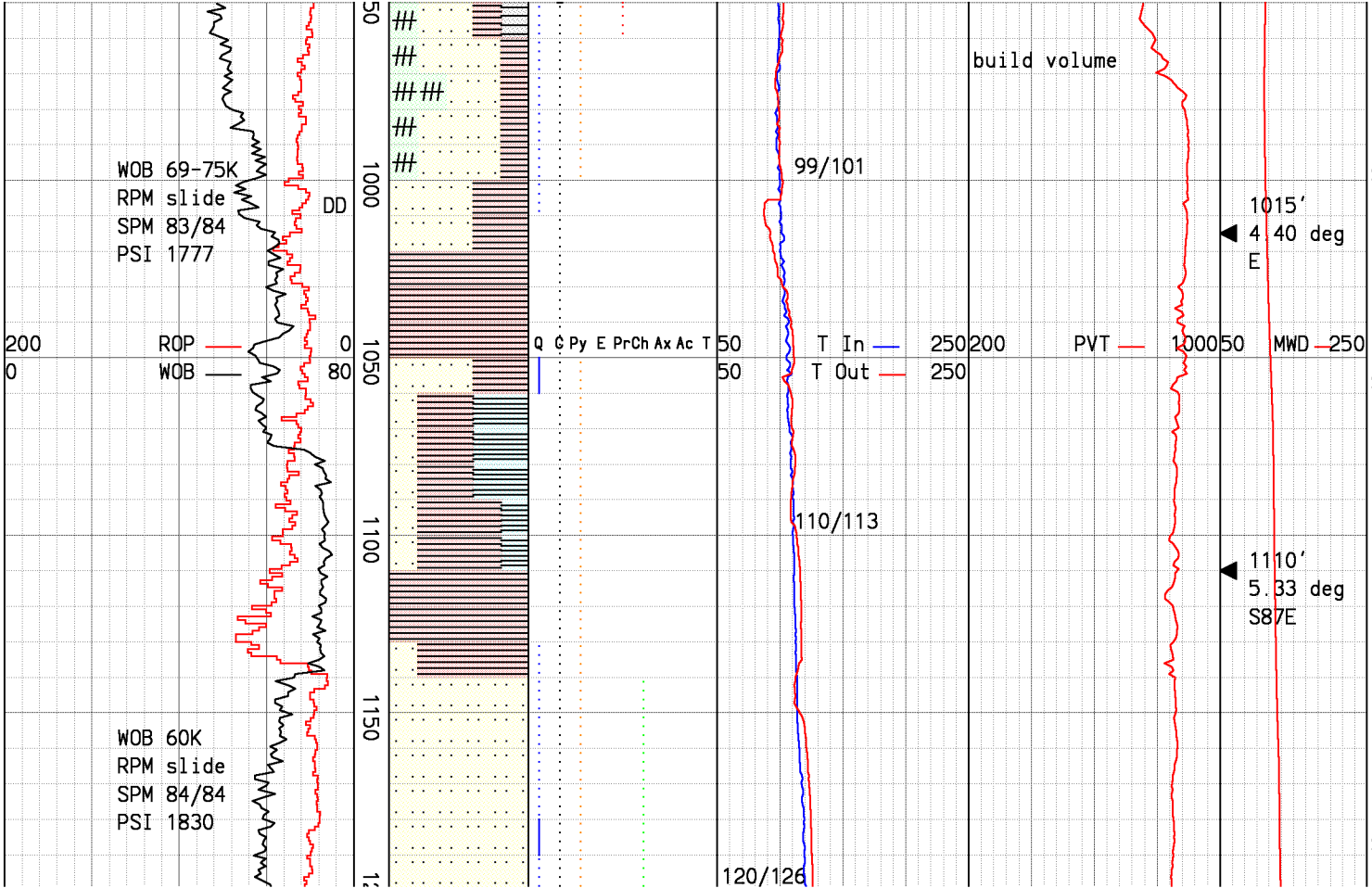
Siltstone:lt grn-gry,wht,rdsh brn,soft-hrd,com prtng planes, com-abun clay,occ relic txt, silty mtx w/com dk grn Green-stone frags:lt-dk grn,hd,occ mott,aphan,loc dk grn-blk filled vugs in mtx,tr mnr chlor



alt,r-tr qtz vng,r-tr disem & agg calc,abs-r pyr vng.

Drill WHS-71 t/3620', well communicating with WHS-36. Attempts to mitigate problem unsuccessful. Set kick-off plug and begin drilling WHS-71 st1 w/17.5" Tru Trak directional tools. KOP = 718'.

Melange:Siliceous Graywacke: med-dk gry,loc grn-gry,mod hd-hd,fresh salt & pep app,mod wl indur,mott,fn grn,r qtz vng,r disem & vng calc vng,intbdd w/ Greenstone:med-dk grn,loc lt grn, hd-v hd,britt, aphan grn txt, loc sheared app, abs-tr

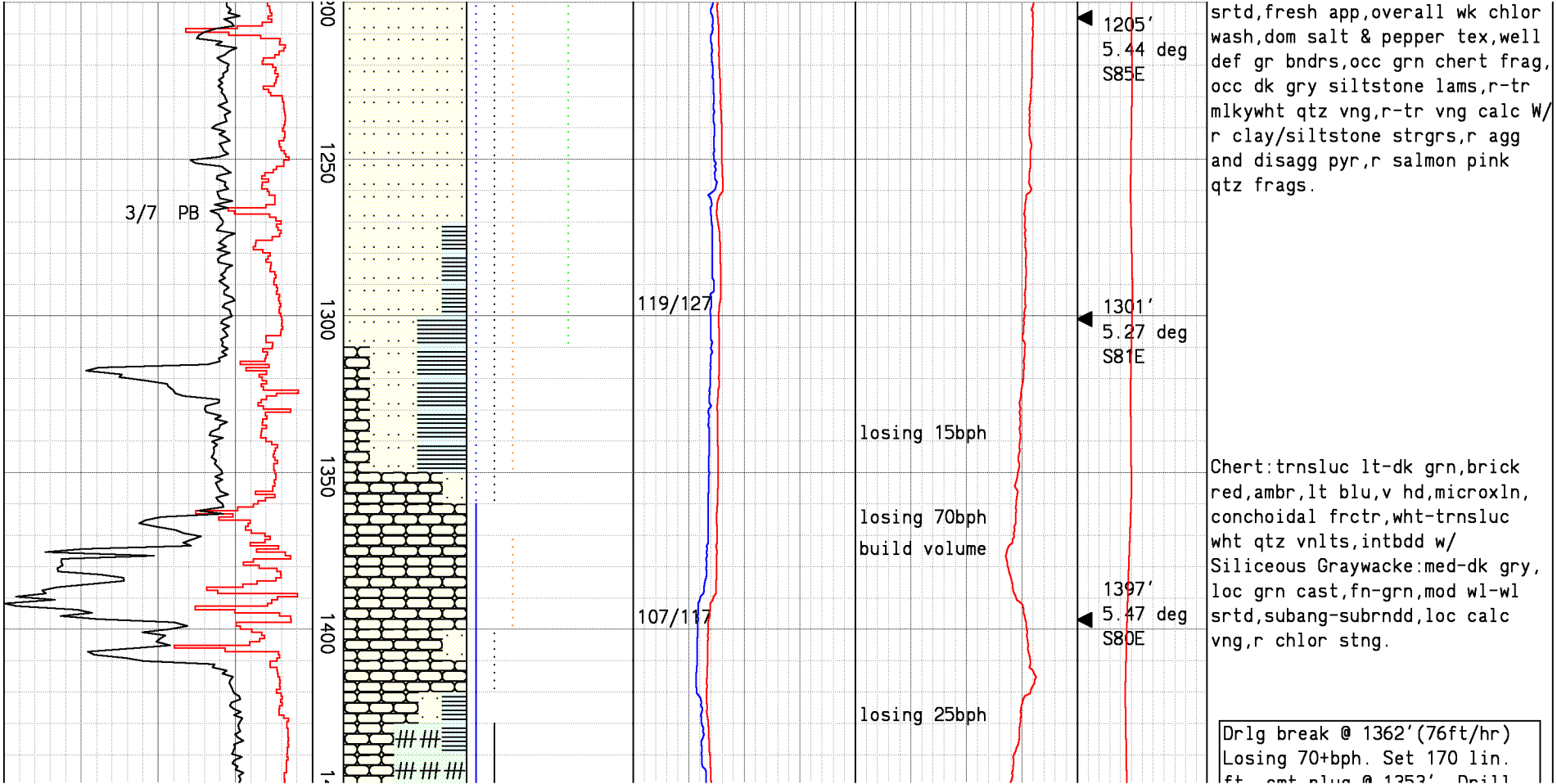


pyrrohtite, intbdd w/Siltstone: lt grn-gry, rdsh brn, gry-brn, soft-firm,loc phyll shn,silty-v fn grn,Mudstone:med-gry,sft, loc stiff tex,loc clayey,r prtg planes,poss ashy mtx,v sndy w/ Serp,t/40% f/900't/940',lt-dk grn,sft-frm,grsy tex,loc trnsl, occ bluschist frag,com slicken sides,r qtz druse on Graywacke.

Siltstone:med gry,loc dk gry r rdsh brn strgrs,soft,pred sndy,r relic bddg plns,sl-mod calcareous,r wht ashy strngrs, loc intbdd w/fn-med gr sand of varied orig,intcltd f/1070' t/1090' w/expans gry stky clay, r calc frags,r disagg pyr.

Note:Occasional pumping of catch basin rain water into shaker possum belly depresses Temp Out.

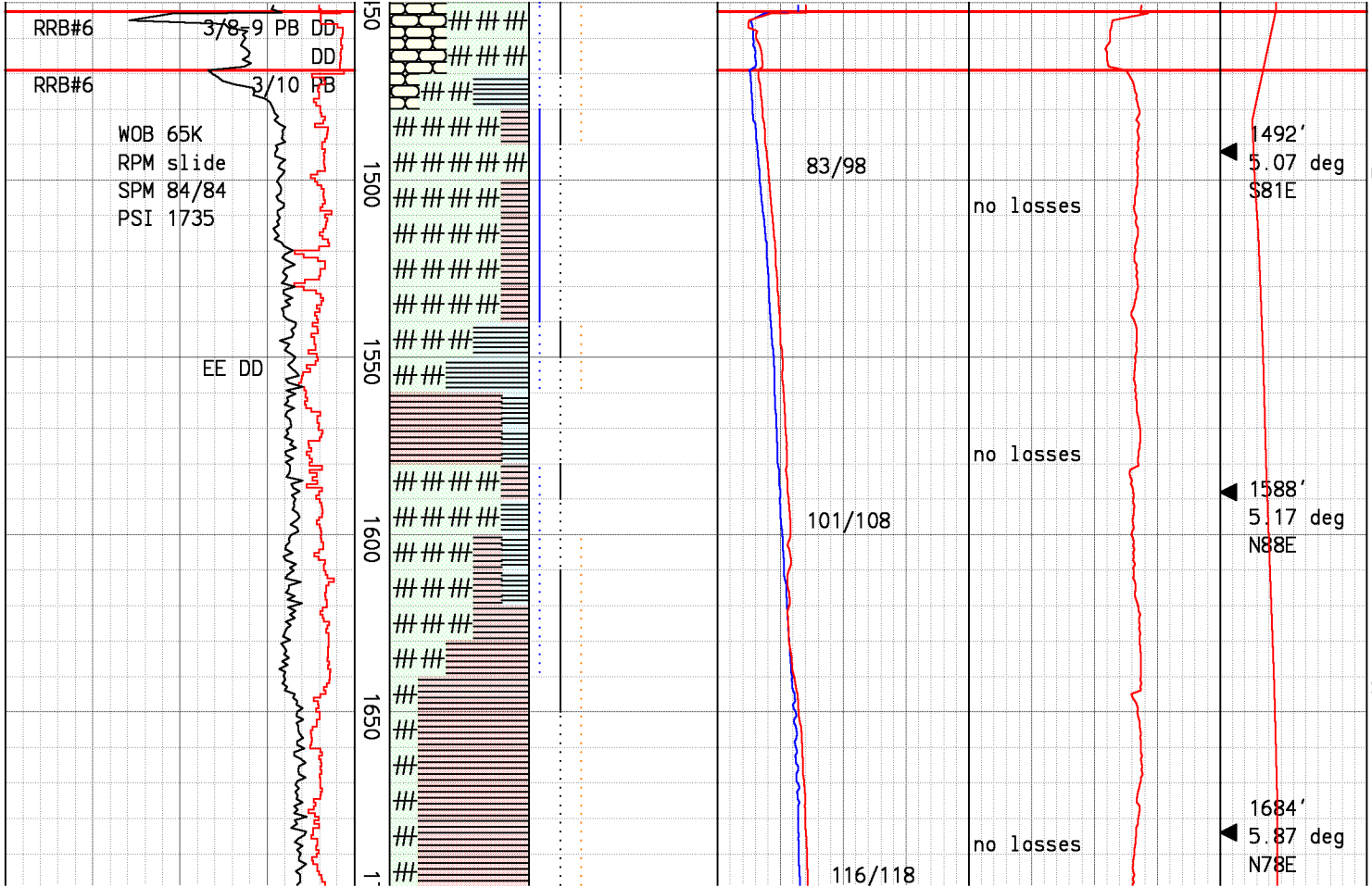
Siliceous Graywacke:lt-med gry, fm-hd,loc brit,fn gr,sub well



srtd,fresh app,overall wk chlor wash,dom salt & pepper tex,well def gr bndrs,occ grn chert frag, occ dk gry siltstone lams,r-tr mlkywht qtz vng,r-tr vng calc W/ r clay/siltstone strgrs,r agg and disagg pyr,r salmon pink qtz frags.

Chert:trnsluc lt-dk grn,brick red,ambr,lt blu,v hd,microxln, conchoidal frctr,wht-trnsluc wht qtz vnlts,intbdd w/ Siliceous Graywacke:med-dk gry, loc grn cast,fn-grn,mod wl-wl srtd,subang-subrndd,loc calc vng,r chlor stng.

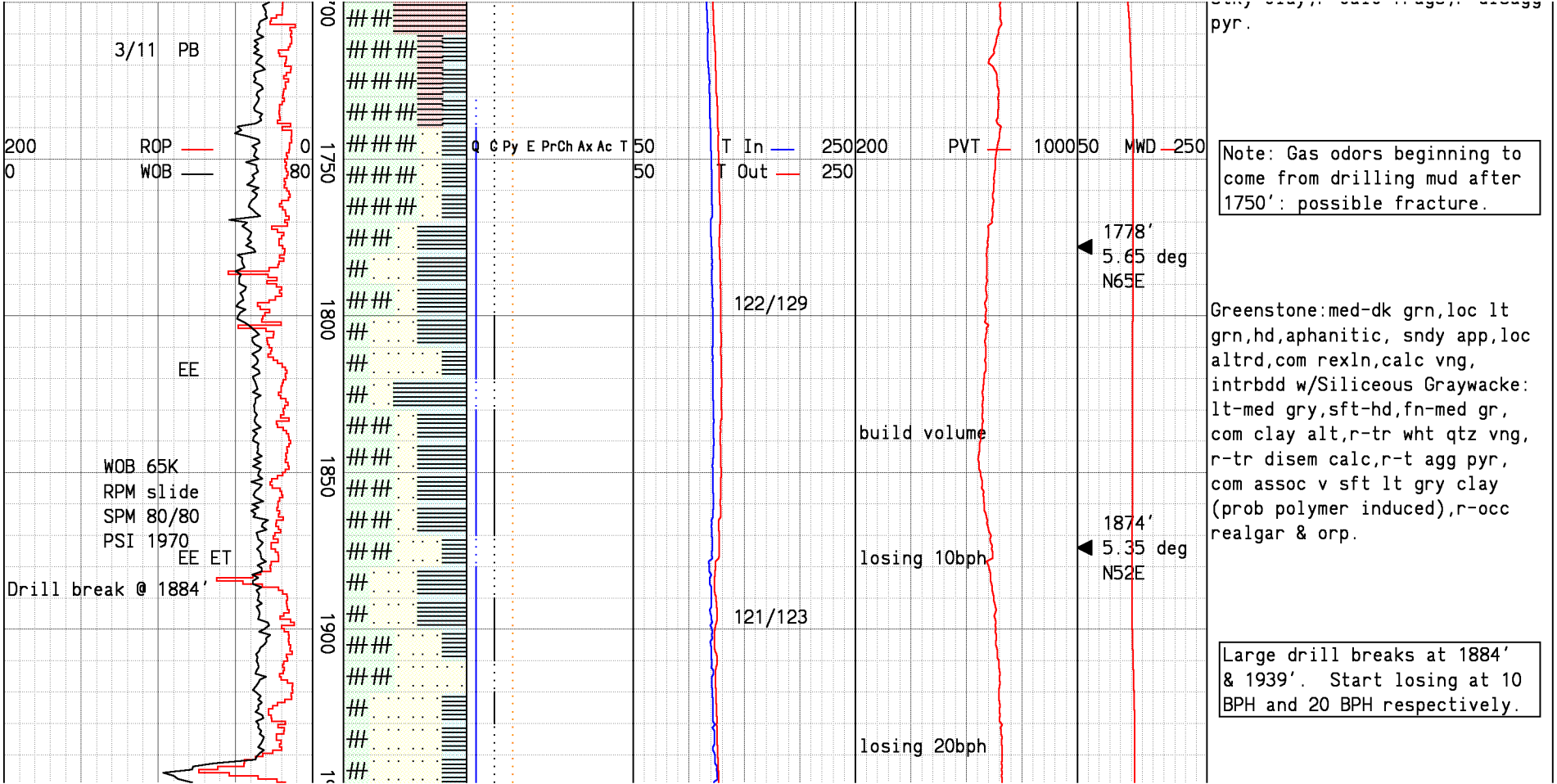
Drlg break @ 1362'(76ft/hr) Losing 70+bph. Set 170 lin. ft. cmt plug @ 1353'. Drill



out plug and lose returns @ 1451'. Set 100 lin. ft. cmt plug #8 @ 1430'.

Greenstone:med-dk grn,loc lt grn,fri-hd,fn grnd,sndy app, loc altrd,rexln,loc hyalop tex, com argil altrn fldsp xls,rare relic tex,r mlky wht qtz vng, r-tr calc vng,r agg pyr,com intrbdd w/Siltstone:lt gry,pale grysh grn,tan,rdsh brn,sft-frm, loc vry sndy-grvly,r wht ashy strngrs,intrcltd w/ pale grnsh gry clay t/60%:v sft,sticky, expans,sol,w/com red-brn firm fault gouge.

Siltstone:lt gry,loc pale grn, gry,r rdsh brn strgrs,soft,pred sndy:gr sz incr w/depth,r relic bddg plns,sl-mod calc,r white ashy strngrs,loc intbdd w/med-crs gr sand of altd Greenstone orig,r intcltd w/expans gry stky clay,r calc frags,r disagg

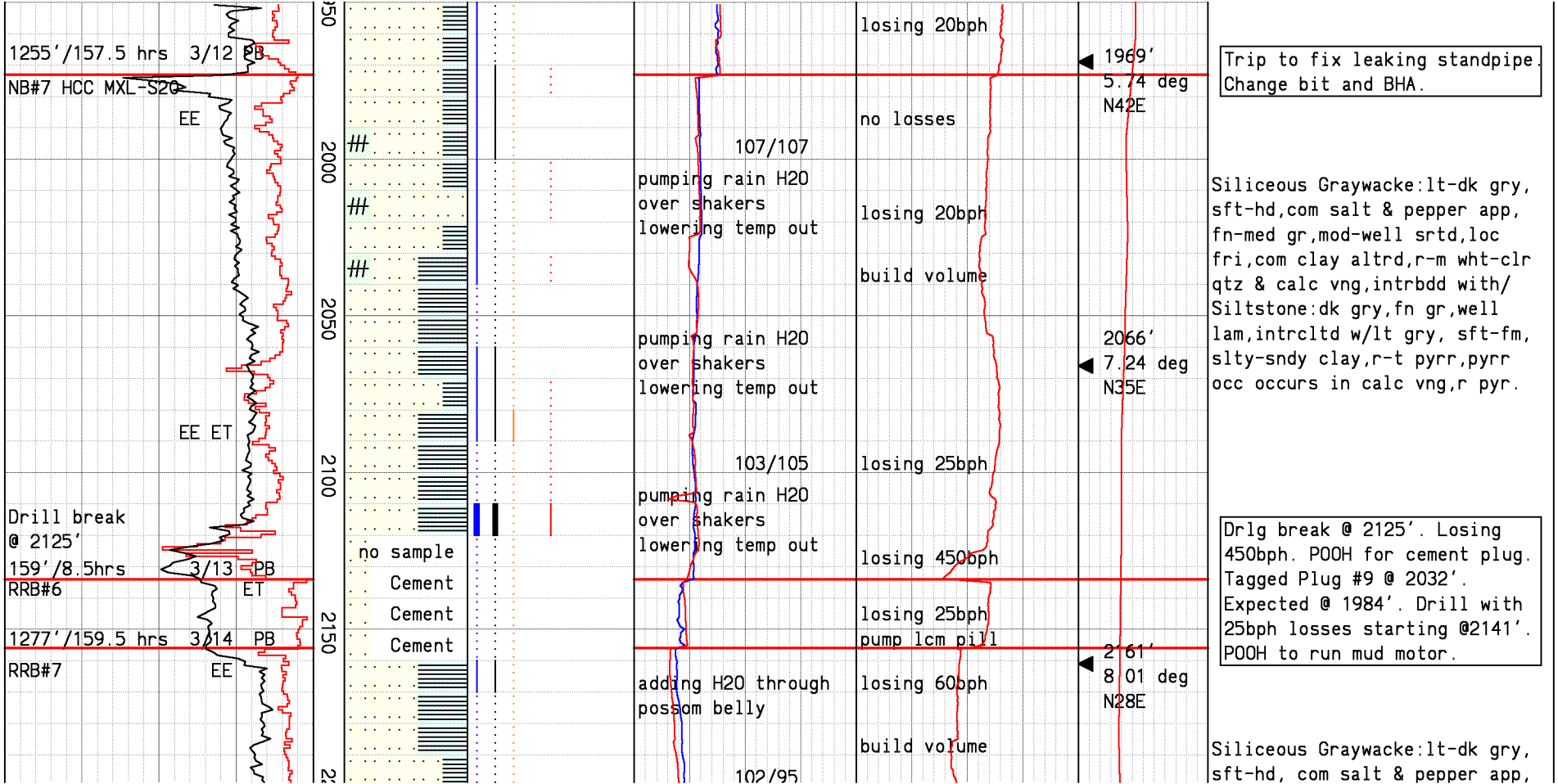


pyr.

Note: Gas odors beginning to come from drilling mud after 1750': possible fracture.

Greenstone:med-dk grn,loc lt grn,hd,aphanitic, sndy app,loc altrd,com rexln,calc vng, intrbdd w/Siliceous Graywacke: lt-med gry,sft-hd,fn-med gr, com clay alt,r-tr wht qtz vng, r-tr disem calc,r-t agg pyr, com assoc v sft lt gry clay (prob polymer induced),r-occ realgar & orp.

Large drill breaks at 1884' & 1939'. Start losing at 10 BPH and 20 BPH respectively.

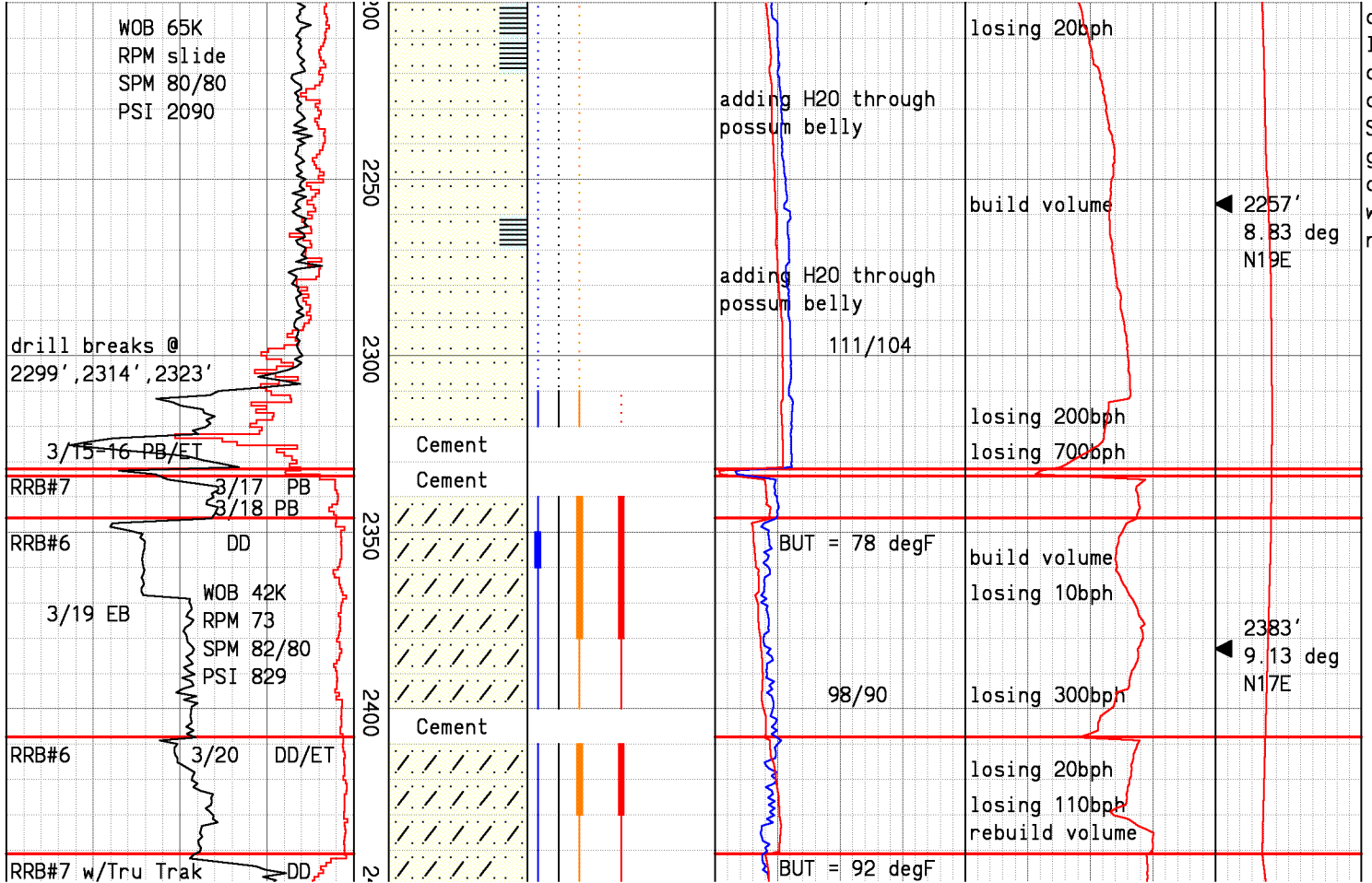


Trip to fix leaking standpipe. Change bit and BHA.

Siliceous Graywacke:lt-dk gry, sft-hd,com salt & pepper app, fn-med gr,mod-well srtd,loc fri,com clay altrd,r-m wht-clr qtz & calc vng,intrbdd with/ Siltstone:dk gry,fn gr,well lam,intrcltd w/lt gry, sft-fm, slty-sndy clay,r-t pyrr,pyrr occ occurs in calc vng,r pyr.

Drlg break @ 2125'. Losing 450bph. POOH for cement plug. Tagged Plug #9 @ 2032'. Expected @ 1984'. Drill with 25bph losses starting @2141'. POOH to run mud motor.

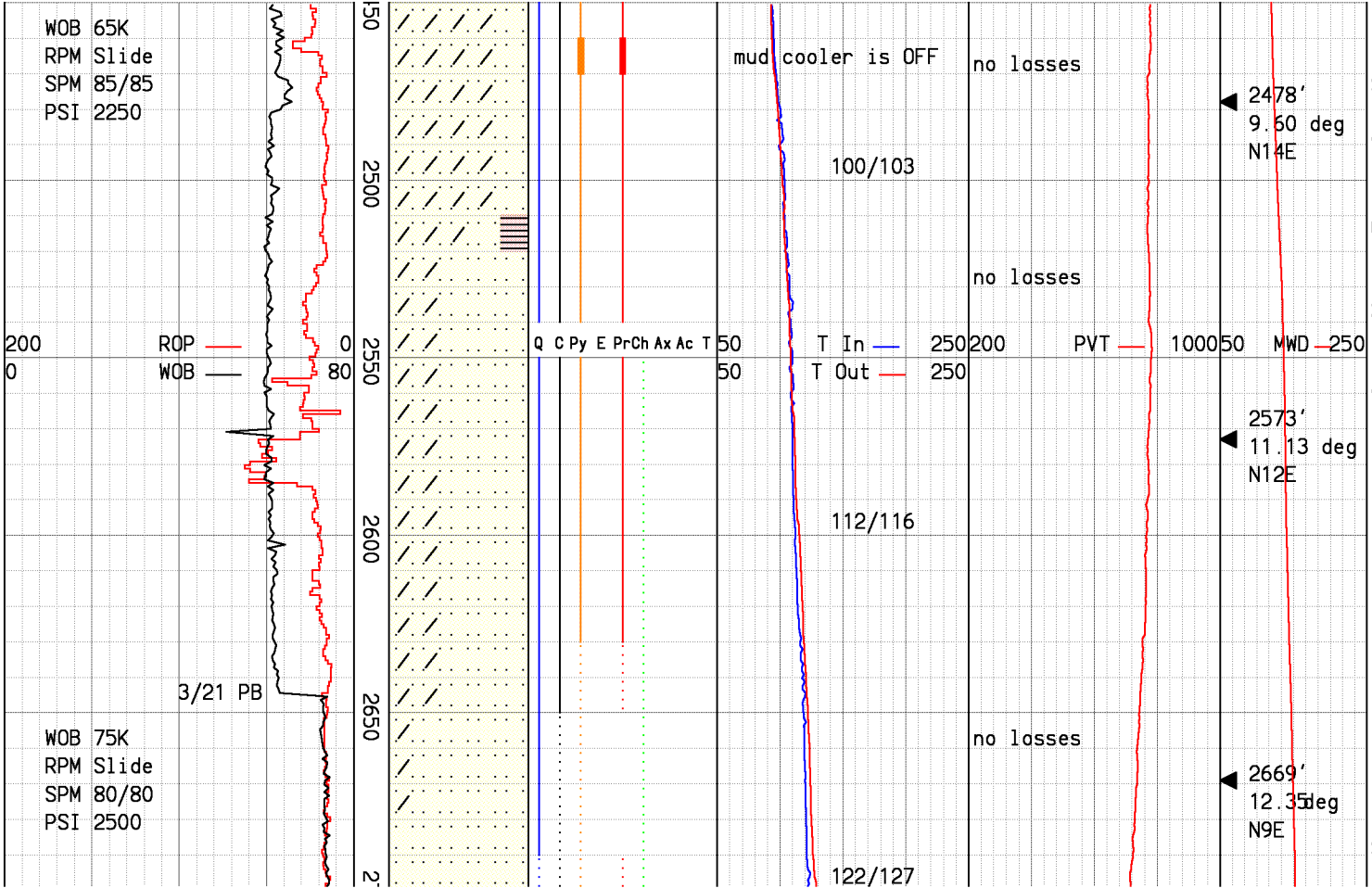
Siliceous Graywacke:lt-dk gry, sft-hd, com salt & pepper app,



dkng w/depth, mod-well srtd, loc fri, com clay altrd,less clay w/depth,r-t wht-clr qtz & calc vng,intrbdd w/minor Siltstone:dk-med dk red-brn,fn gr,intrbdd w/minor Argillite: dk gry,fn gr,well lam,intrcltd w/lt gry,sft-fm,slty-sndy clay, r-t pyrr & pyr.

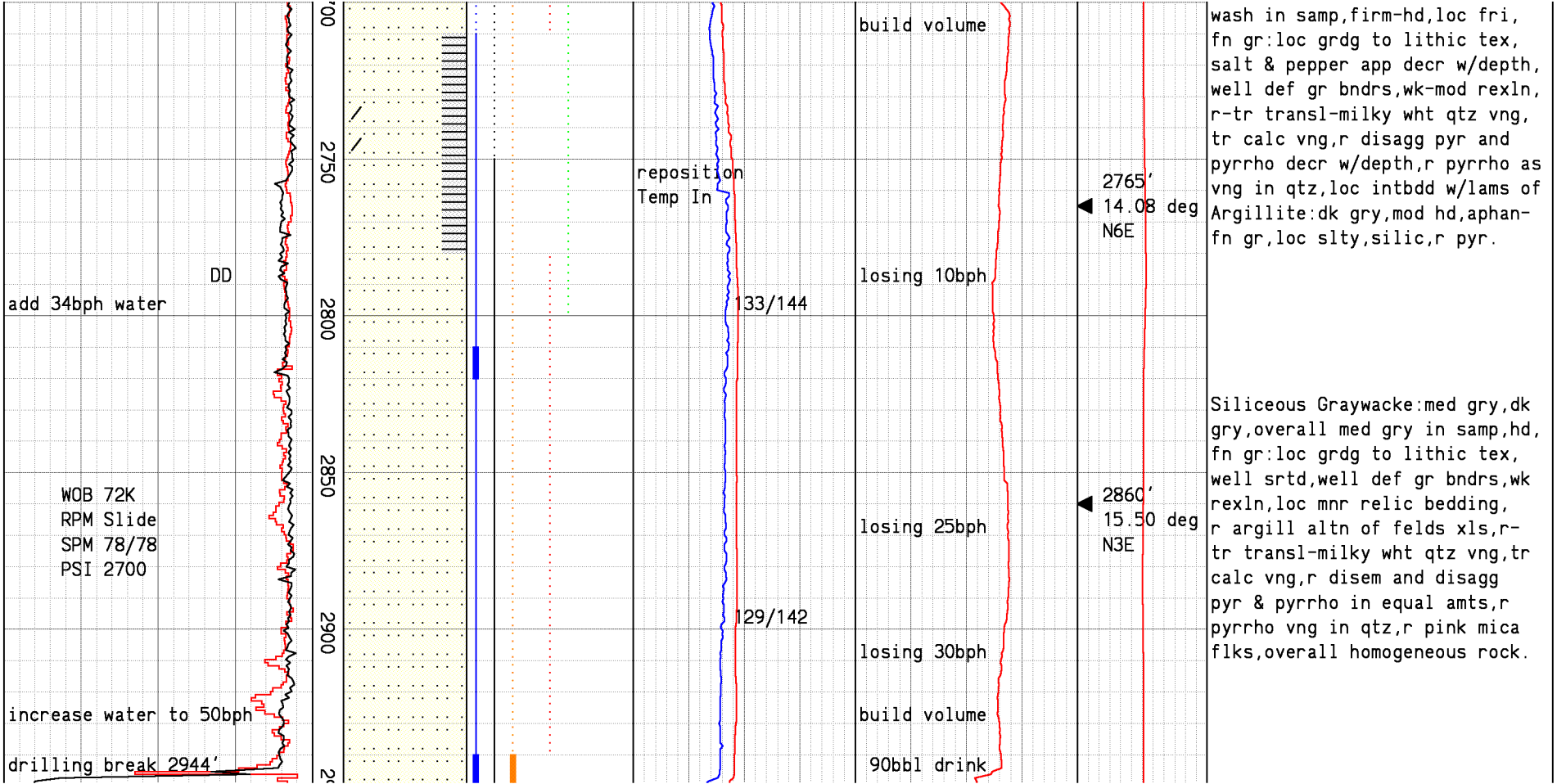
Losing 700bph. POH for cement plug. Drill out plug with no returns. Set 3 more plugs.Drl breaks @ 2299',2314',2323'.

Losing 300bph @ 2394'. POH and set cement plug #14. Tag @ 2310', c/o cement and drill ahead with conventional setup. Start losing 110bph @ 2427'. Losses healed by 2433'.Drill ahead t/2441' and POOH for MWD tools.



Siliceous Graywacke:lt gry,med gry,overall med gry w/wk chlor wash in samp,loc mott,fri-hd, fn gr,well srtd,dom spkld salt and pepper tex,com blchd devit mtx,wk rexln,well defined grain bndrs,com argill altn felds, loc com disagg pyr & pyrrho to 2% f/2350' t/2450',loc r-com amorph vn pyrrho in qtz veins, r-mnr wht qtz vng,vn calc-decr w/depth,v r realgar/orpim,loc intbdd w/gry silty clay 2520'.

Siliceous Graywacke:lt gry,med gry,overall med gry w/wk chlor



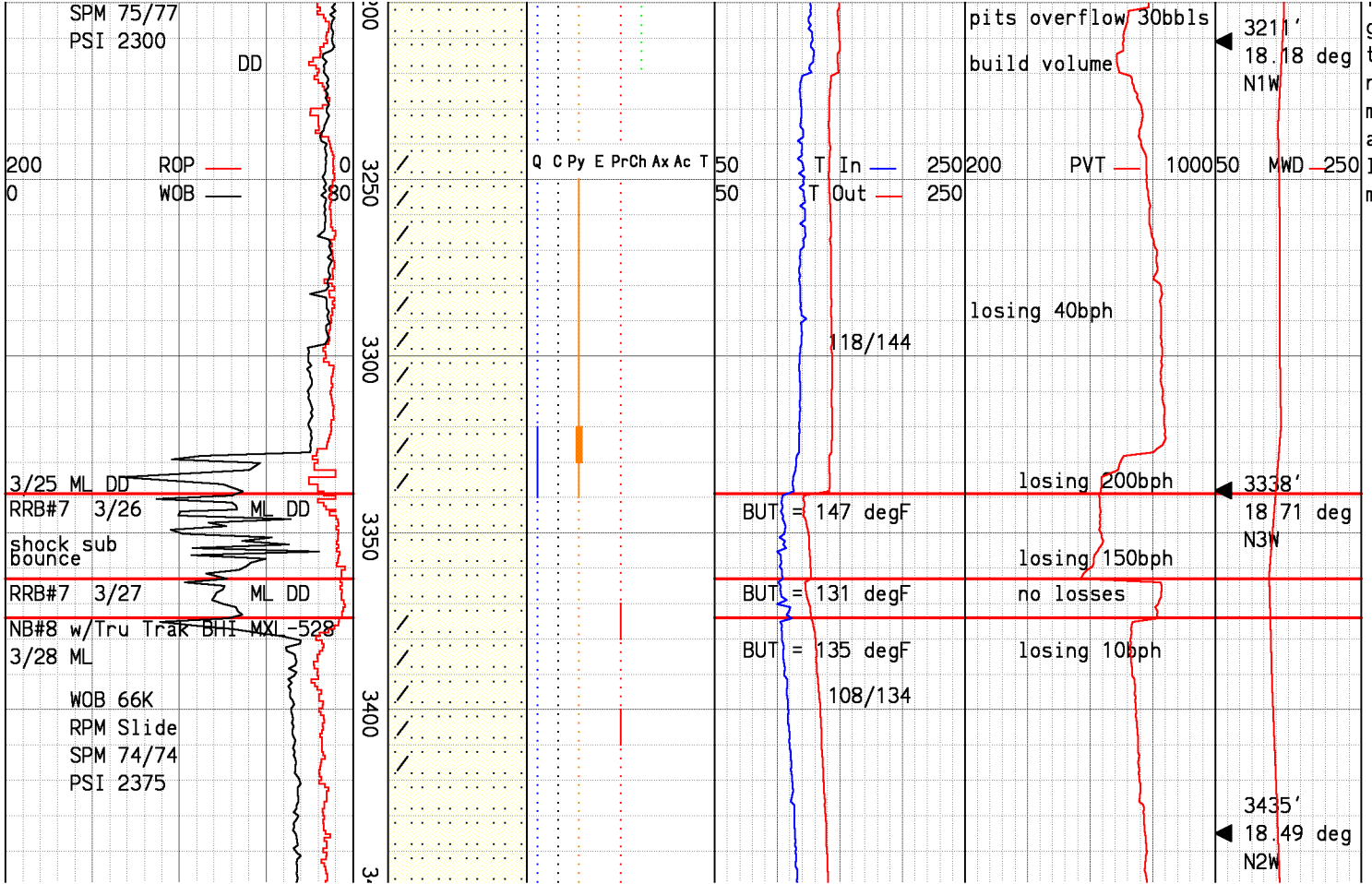
wash in samp,firm-hd,loc fri, fn gr:loc grdg to lithic tex, salt & pepper app decr w/depth, well def gr bndrs,wk-mod rexln, r-tr transl-milky wht qtz vng, tr calc vng,r disagg pyr and pyrrho decr w/depth,r pyrrho as vng in qtz,loc intbdd w/lams of Argillite:dk gry,mod hd,aphan-fn gr,loc slty,silic,r pyr.

Siliceous Graywacke:med gry,dk gry,overall med gry in samp,hd, fn gr:loc grdg to lithic tex, well srtd,well def gr bndrs,wk rexln,loc mnr relic bedding, r argill altn of felds xls,r-tr transl-milky wht qtz vng,tr calc vng,r disem and disagg pyr & pyrrho in equal amts,r pyrrho vng in qtz,r pink mica flks,overall homogeneous rock.

Drlg break @ 2944':90bbl drink w/120bph losses. Drill to 2970', POH and set 100 lin ft cement plug #15 @ 2960', tag @ 2900',c/o cmt and drill ahead conventional to 3005', m/u Tru Trak & drill ahead.

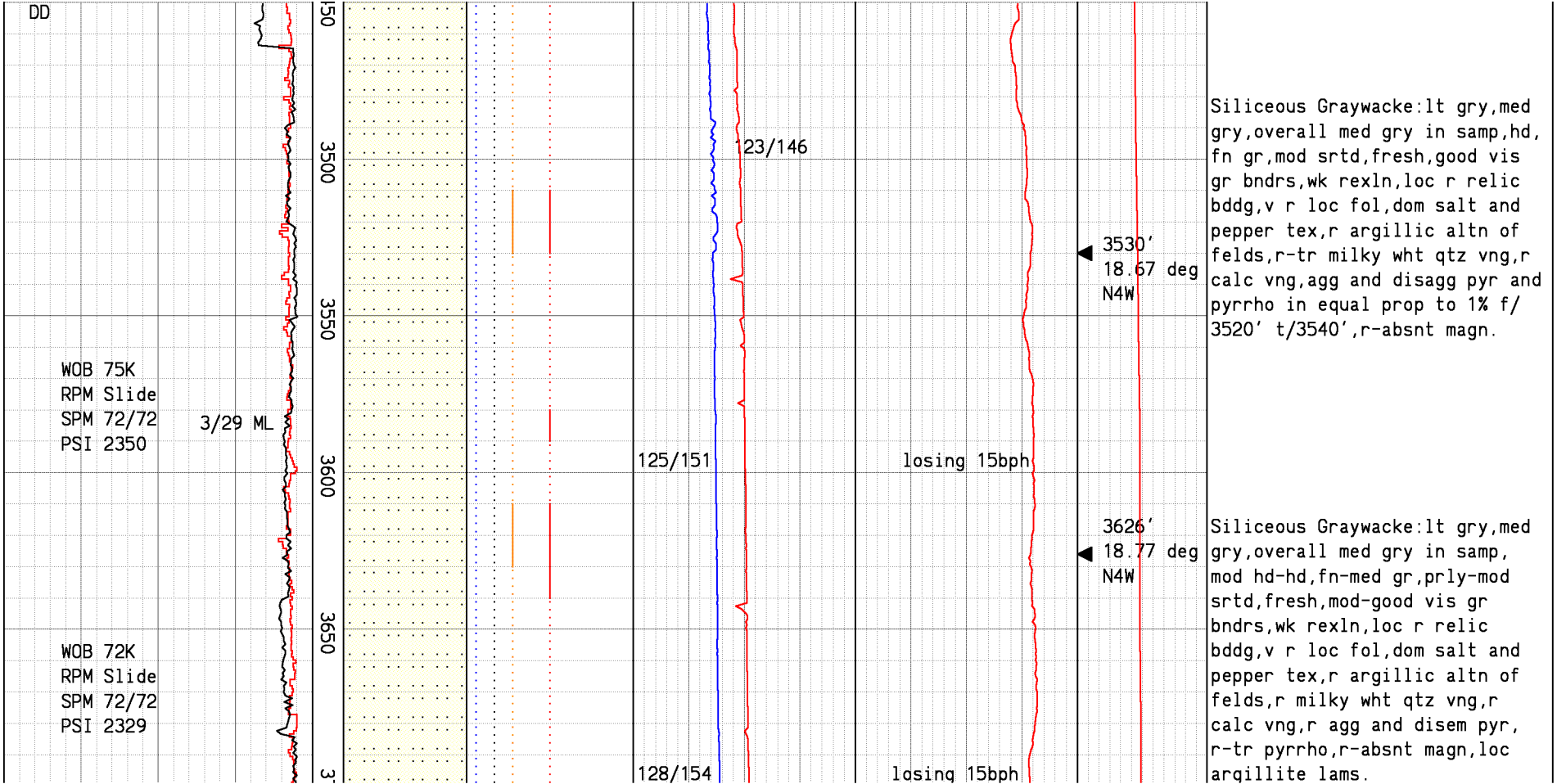
Siliceous Graywacke:lt gry,med gry,overall med gry in samp,hd, fn gr,well srtd,fresh,good vis gr bndrs,wk rexln,loc r relic bedding,dom salt & pepper tex, r argill altn of felds xls,r-tr clr/transl/milky wht qtz vng,r calc vng,r disem and disagg pyr,loc r-tr pyrrho vng in qtz, r pink mica flks,r-absnt mag.

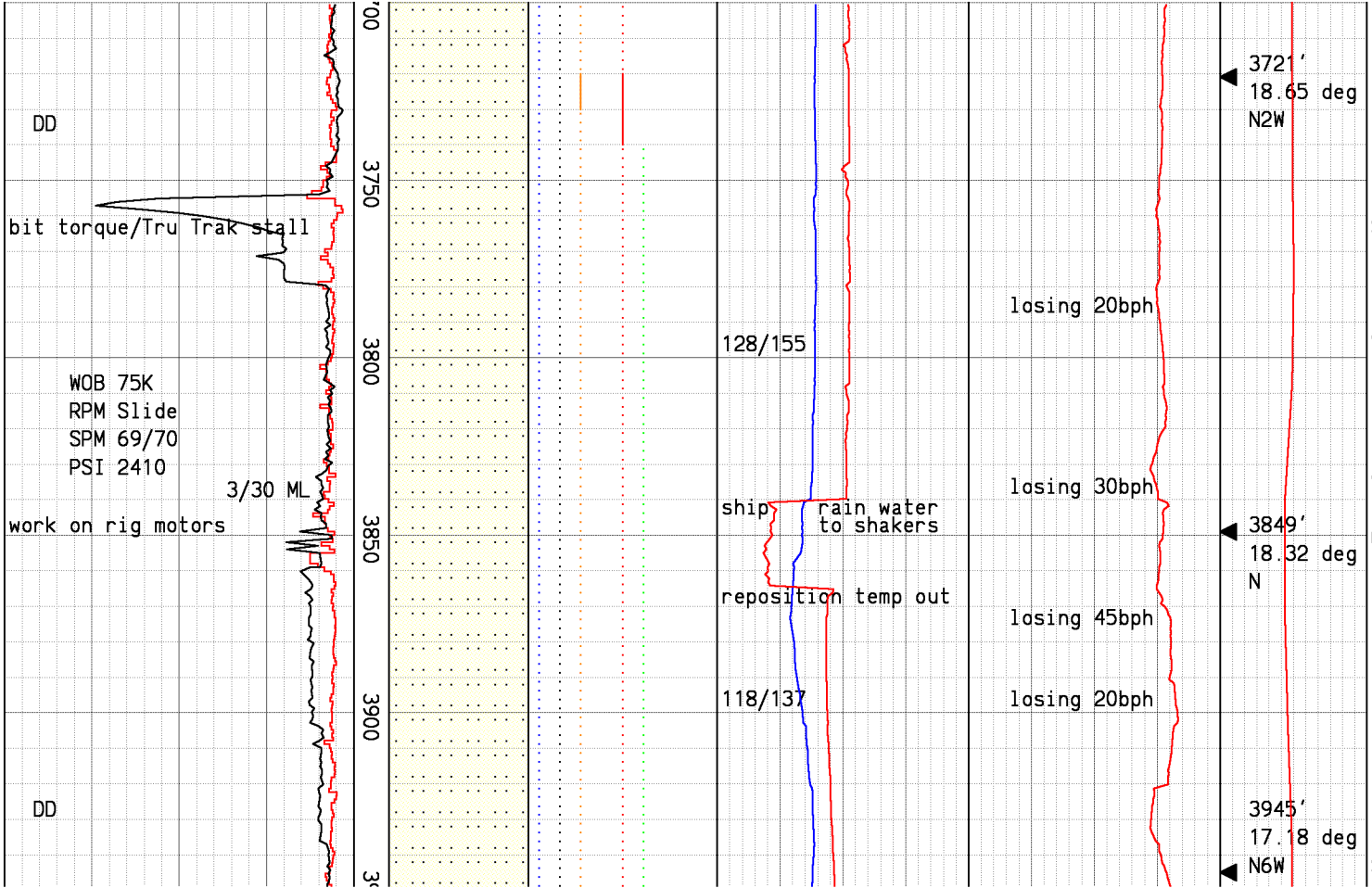
Siliceous Graywacke:lt gry,med gry,overall med gry in samp,hd, fn gr,well srtd,fresh,well def



gr bndrs,wk rexln,loc r relic textures,dom salt & pepper tex, r argill altn of felds xls,r-tr milky wht qtz vng,r calc vng, agg and disagg pyr to 1% 3250', loc r pyrrho vng in qtz,r-absnt magnetite.

Lost partial rtns at 3324': 50bbl drink with 200bph loss. drill to 3339', POH and set 125 linear ft cement plug at 3312',tag @ 3243', c/o cement and drill ahead conventional t/3363',begin losing 150bph, POH and set cement plug:125 lin ft @ 3343'. Tag @ 3265', c/o cmt & drill ahead t/3374'. P/U Tru Trak BHA and dir drill ahead.

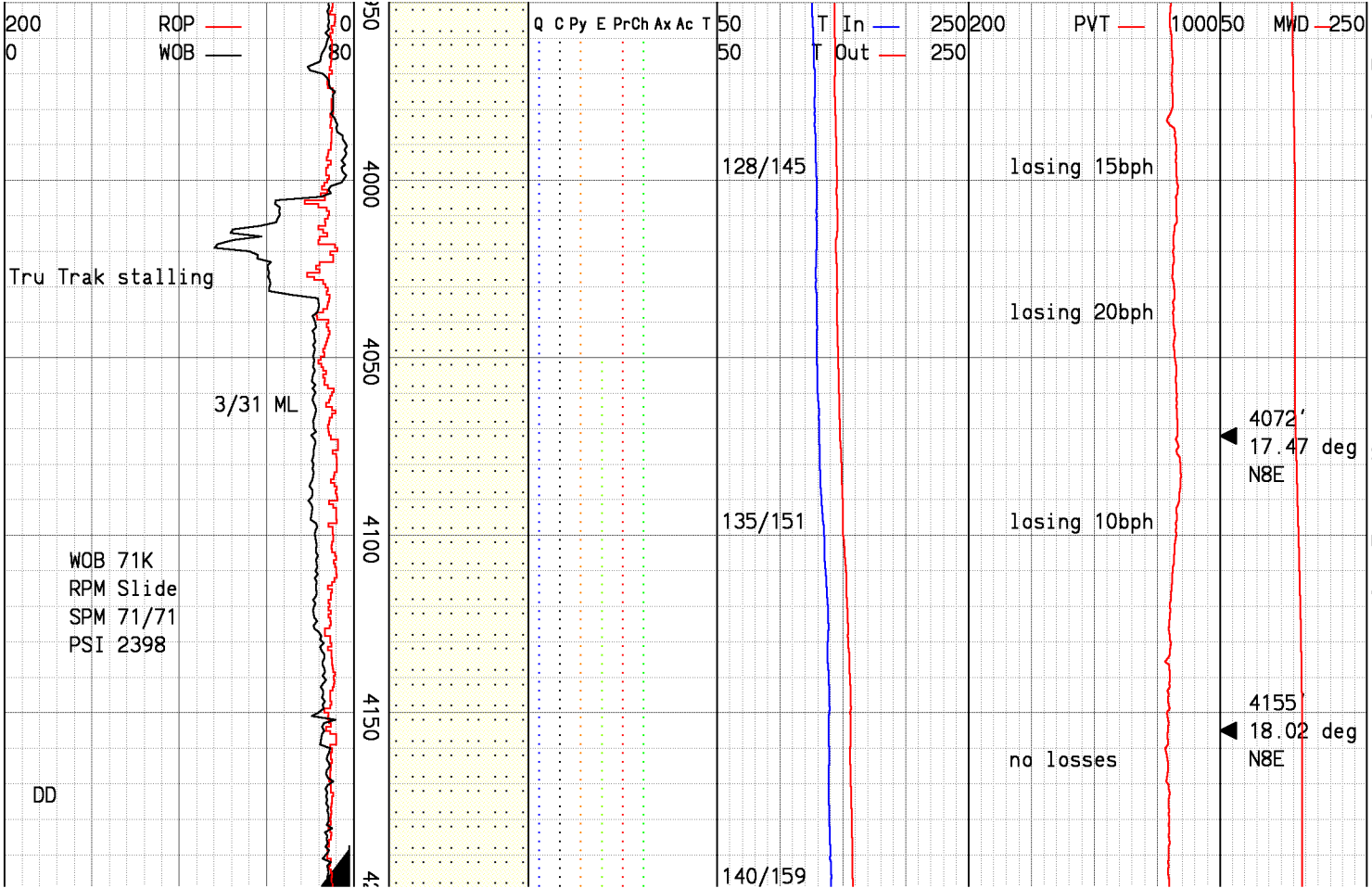

DD
3500
3550
3600
3650
WOB 75K
RPM Slide
SPM 72/72
PSI 2350
3/29 ML
123/146
125/151
losing 15bph
3530'
18.67 deg
N4W
Siliceous Graywacke:lt gry,med gry,overall med gry in samp,hd, fn gr,mod srtd,fresh,good vis gr bndrs,wk rexln,loc r relic bddg,v r loc fol,dom salt and pepper tex,r argillic altn of felds,r-tr milky wht qtz vng,r calc vng,agg and disagg pyr and pyrrho in equal prop to 1% f/ 3520' t/3540',r-absnt magn.
3626'
18.77 deg
N4W
WOB 72K
RPM Slide
SPM 72/72
PSI 2329
128/154
losing 15bph
Siliceous Graywacke:lt gry,med gry,overall med gry in samp, mod hd-hd,fn-med gr,prly-mod srtd,fresh,mod-good vis gr bndrs,wk rexln,loc r relic bddg,v r loc fol,dom salt and pepper tex,r argillic altn of felds,r milky wht qtz vng,r calc vng,r agg and disem pyr, r-tr pyrrho,r-absnt magn,loc argillite lams.



Siliceous Graywacke:med gry, loc lt gry,loc pale grn tint, overall med gry in samp,mod hd, fn-med gr,mod srtd,pred fresh w/wk chlor wash,mod-good vis gr bndrs,wk rexln,loc r relic bddg,r loc fol,dom salt and pepper tex:decr w/depth,r argil altn of felds xl edges,r milky wht qtz vng,r calc vng,r-tr agg and disem pyr,r-tr agg pyrrho,r magn tetras,r argillite frags.

Drill to 3858', ream tight hole f/3834-3858' while losing 30-60bph, drill ahead.

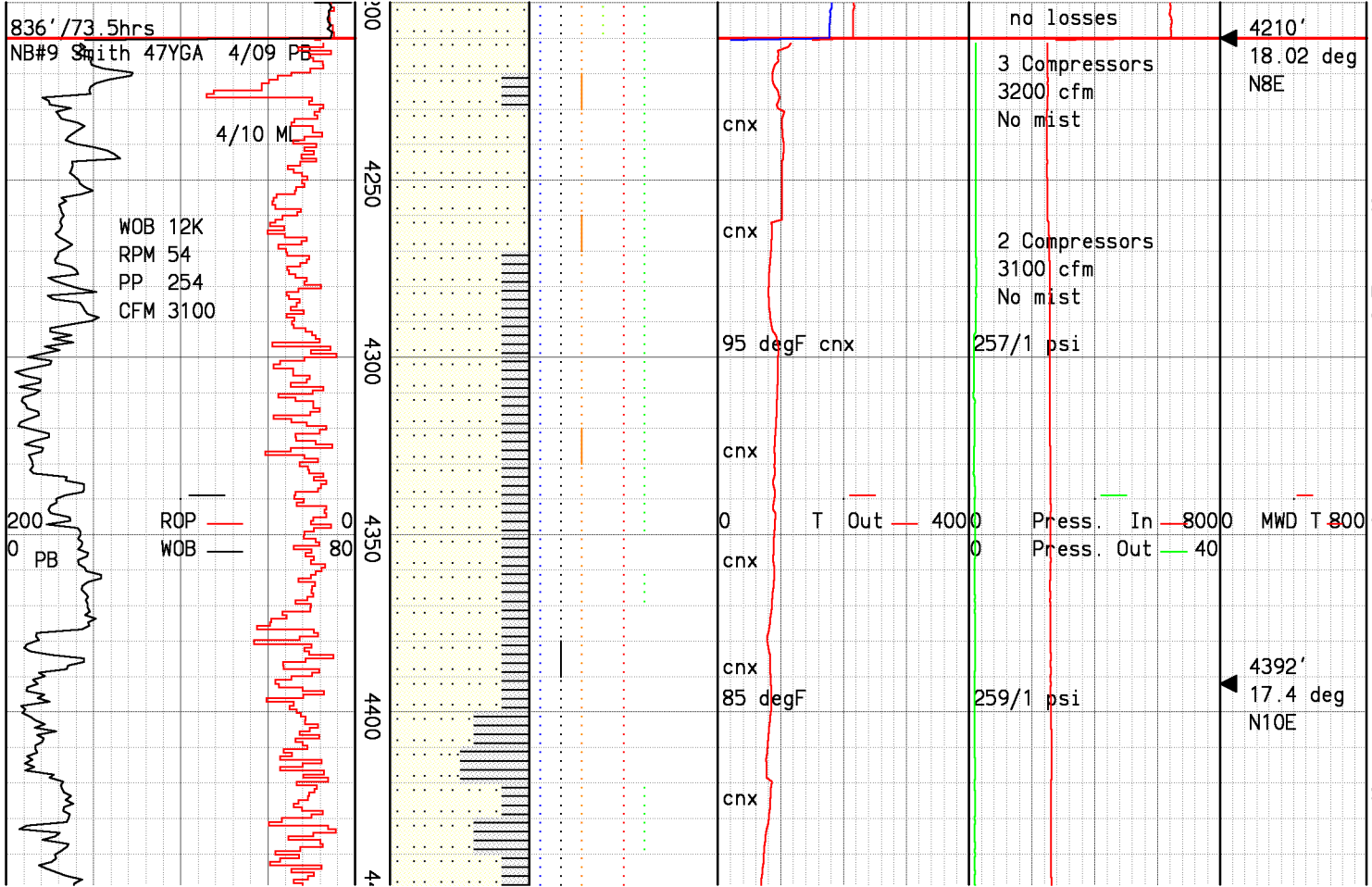
Siliceous Graywacke:med gry,



loc lt gry,loc pale grn tint, overall med gry in samp,mott, mod hd-hd,med gr,mod srtd,loc grdg to lith tex,pred fresh w/wk chlor wash,mod-well def gr bndrs,wk rexln,loc r relic bddg,r loc fol,loc salt and pepper tex,r argillic altn of felds xl edges,r milky wht qtz vng,r calc vng,r agg and disem pyr,r agg pyrrho,r magn tetras, r argillite frags:incr w/depth.

Siliceous Graywacke:med gry, loc lt gry,r pale grn tint, overall med gry in samp,mott, mod hd-hd,med gr,mod srtd,loc grdg to lith tex,pred fresh w/wk chlor wash,mod-well def gr bndrs,wk rexln,loc r relic bddg,r loc fol,loc salt and pepper tex,r argillic altn of felds xl edges,r milky wht & translu qtz vng,r calc vng,r agg and disem pyr,r agg pyrrho, r magn tetras,abund argillite frags,r epidote.

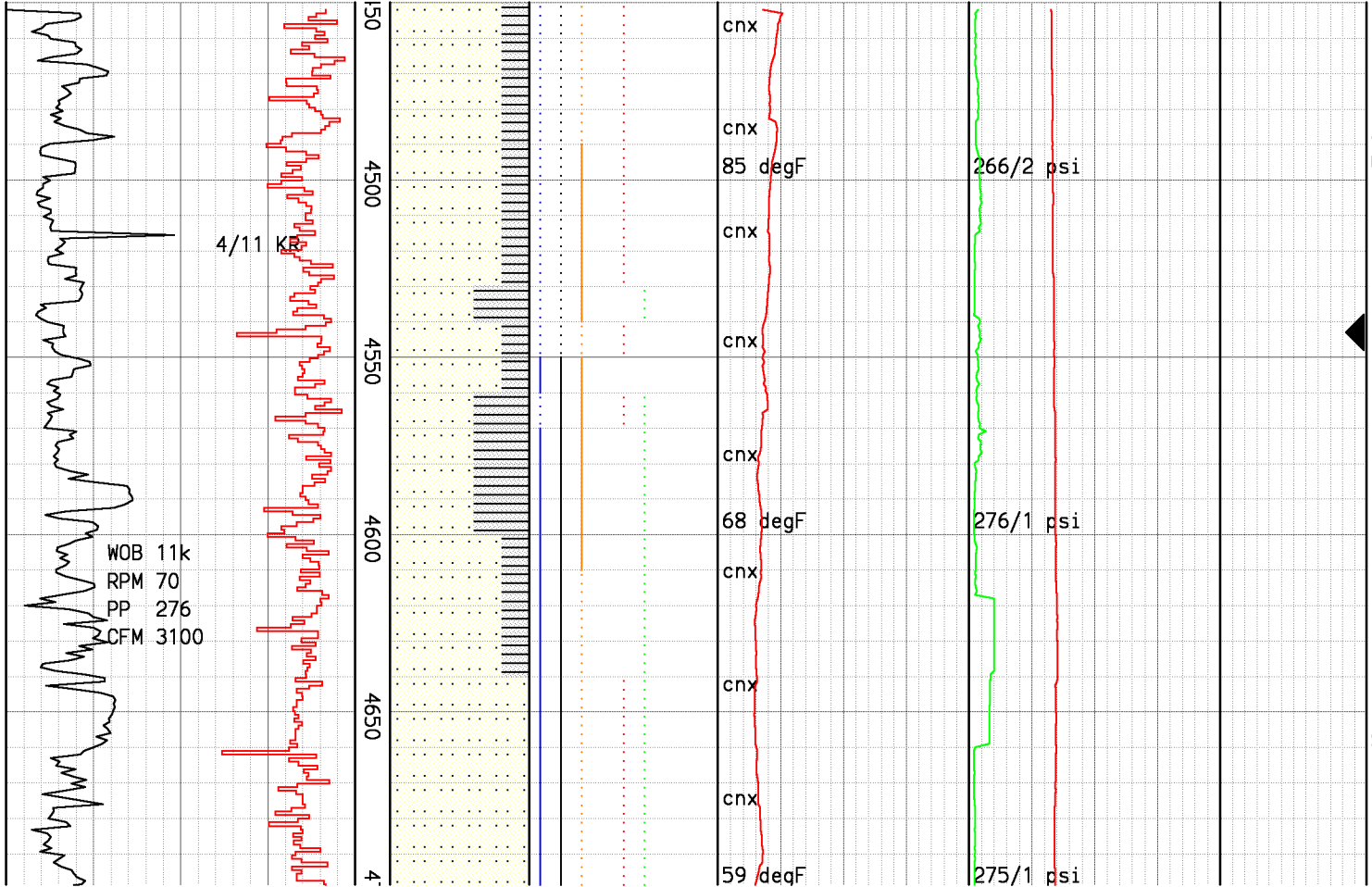
Drill 17.5" hole t/4210'. Set



13.375" casing f/surface t/ 4200'. Drill ahead on air with 12.25" bit f/4210' on 4/09/10.

Siliceous Graywacke:lt-med gry, r pale grn tint,overall med gry in samp,mott,hd-v hd,fn-med gr,mod srtd,pred fresh w/loc wk chlor wash,mod def gr bndrs,wk rexln,loc r relic bddg,r fol,loc salt and pepper tex,r argillic altn of felds xl edges,r milky wht & translu qtz vng,r calc vng,r agg and disem pyr,r agg pyrrho,interbdd w/ Argillite:gry-dk gry,mod hd, slty-aphan,loc friable,r phyll shn,r qtz & calc vng,r disem & agg pyr,r chlor,r loc epid xls.

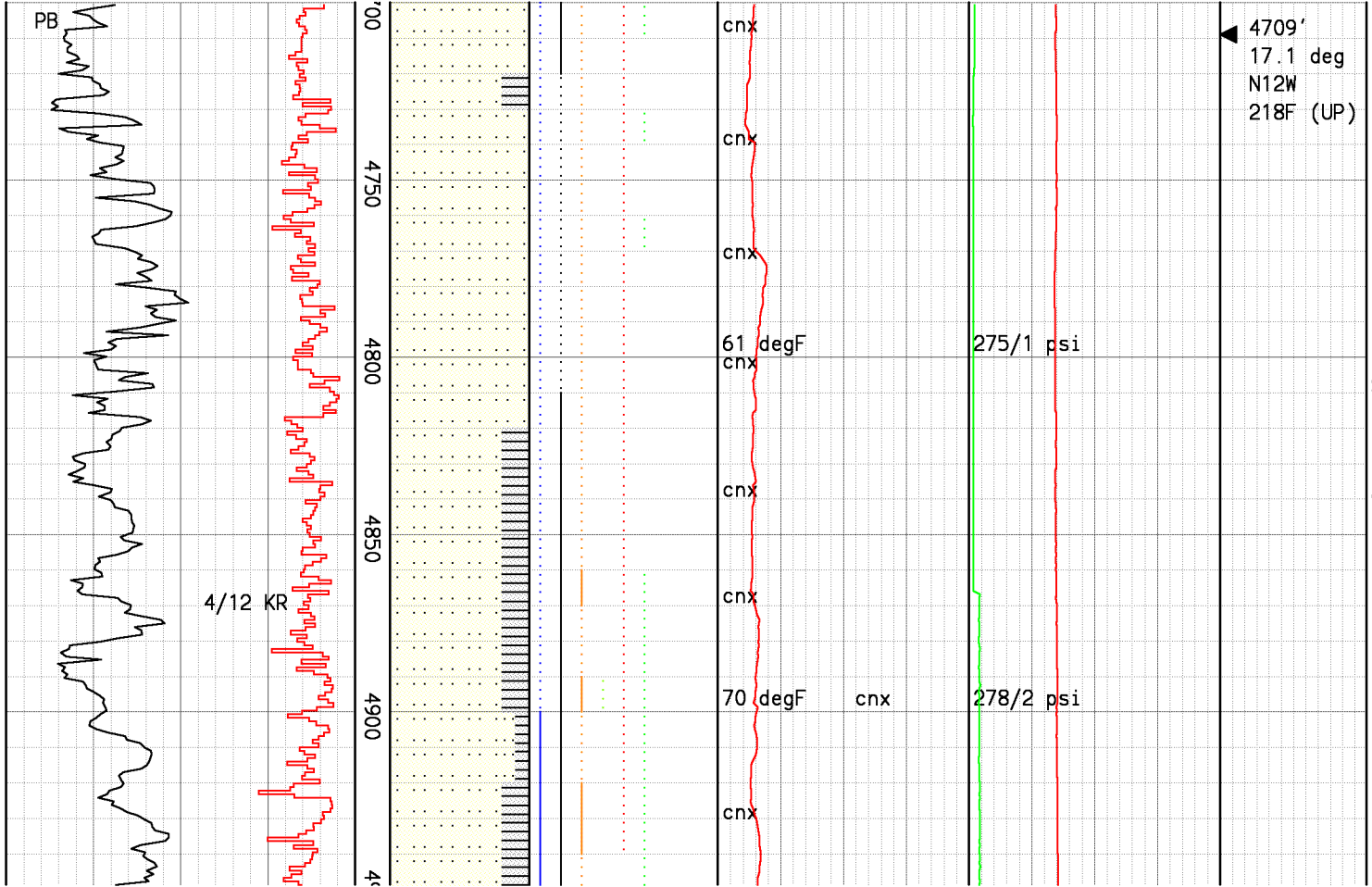
Siliceous Graywacke:lt-med gry, overall med-dk gry in samp,mott, hd-v hd,fn-med gr,prly-mod srtd, pred fresh app,felds incrngly



altrd w/depth,mod wl-wl def gr bndrs,r milky wht qtz vng,loc r agg & vng calc,r-tr agg & vng pyr,r agg pyrrho,intbdd w/ Argillite:dk gry,occ med gry, mod hd,microxln-slty,occ phyll shn,friable,r qtz & pyr vng.

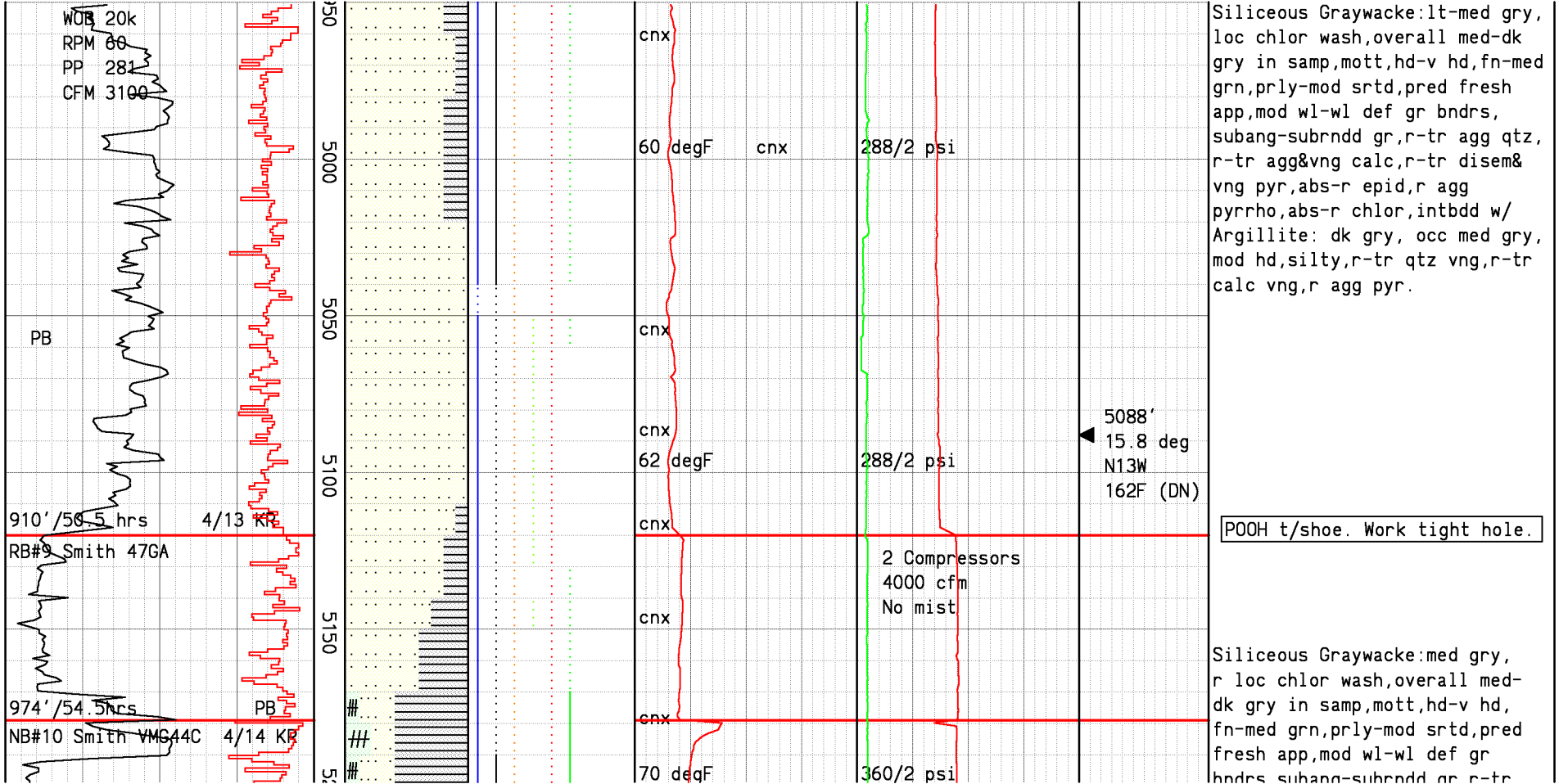
Possible steam entry f/4540-4545',ROP t/67 ft/hr,7psi initial press incr.,0psi sustained,no temp incr.

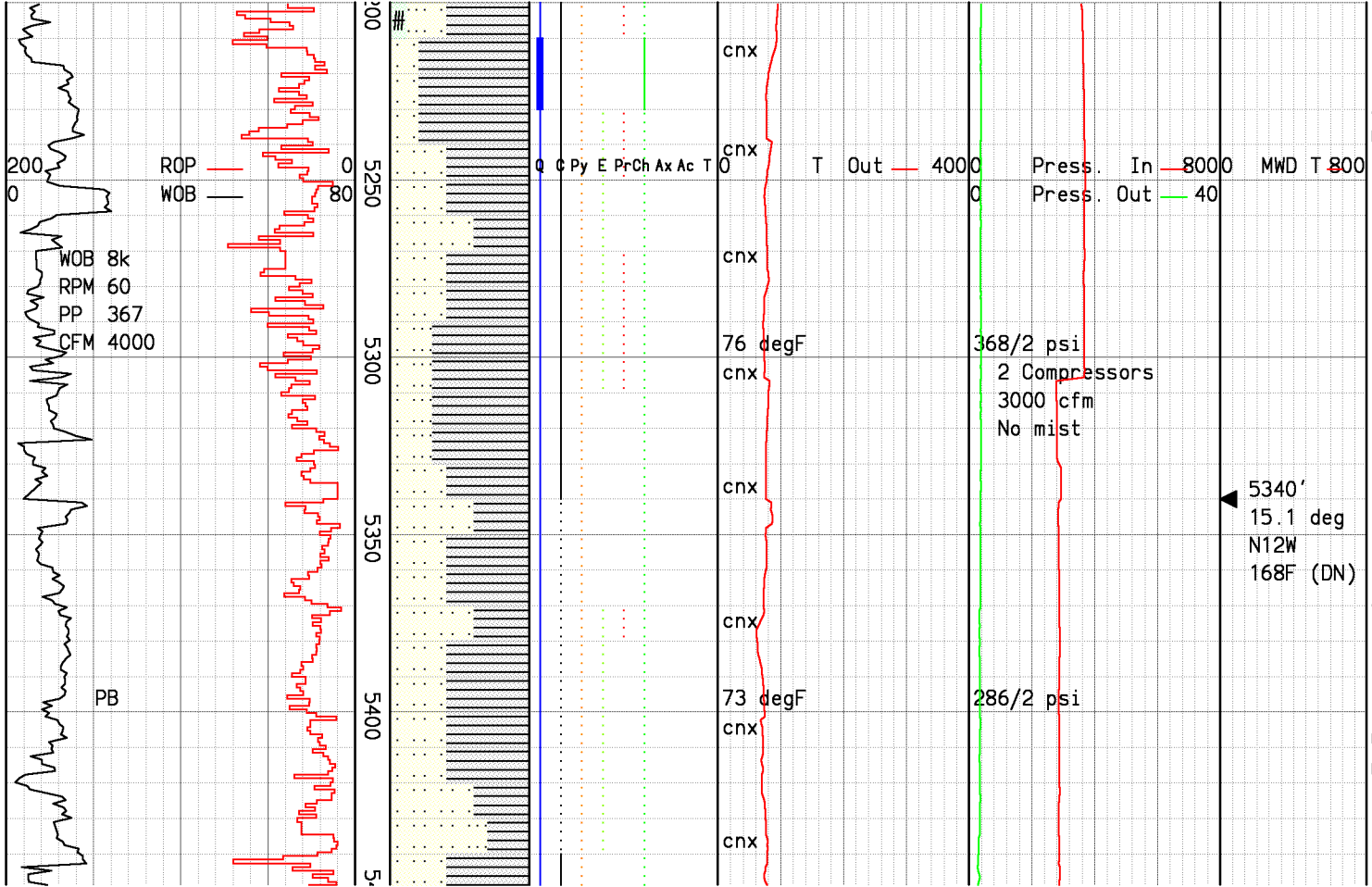
Siliceous Graywacke:lt-med gry, occ chlor wash,overall med-dk gry in samp,mott,hd-v hd,fn-med grn,prly-mod srtd,pred fresh app,mod wl-wl def gr bndrs,



r-tr agg calc,loc-r pyr vng,r agg pyrrho, intbdd w/Argillite: dk gry, occ med gry, mod hd, silty,r qtz vng,r calc vng, loc-r agg pyr.

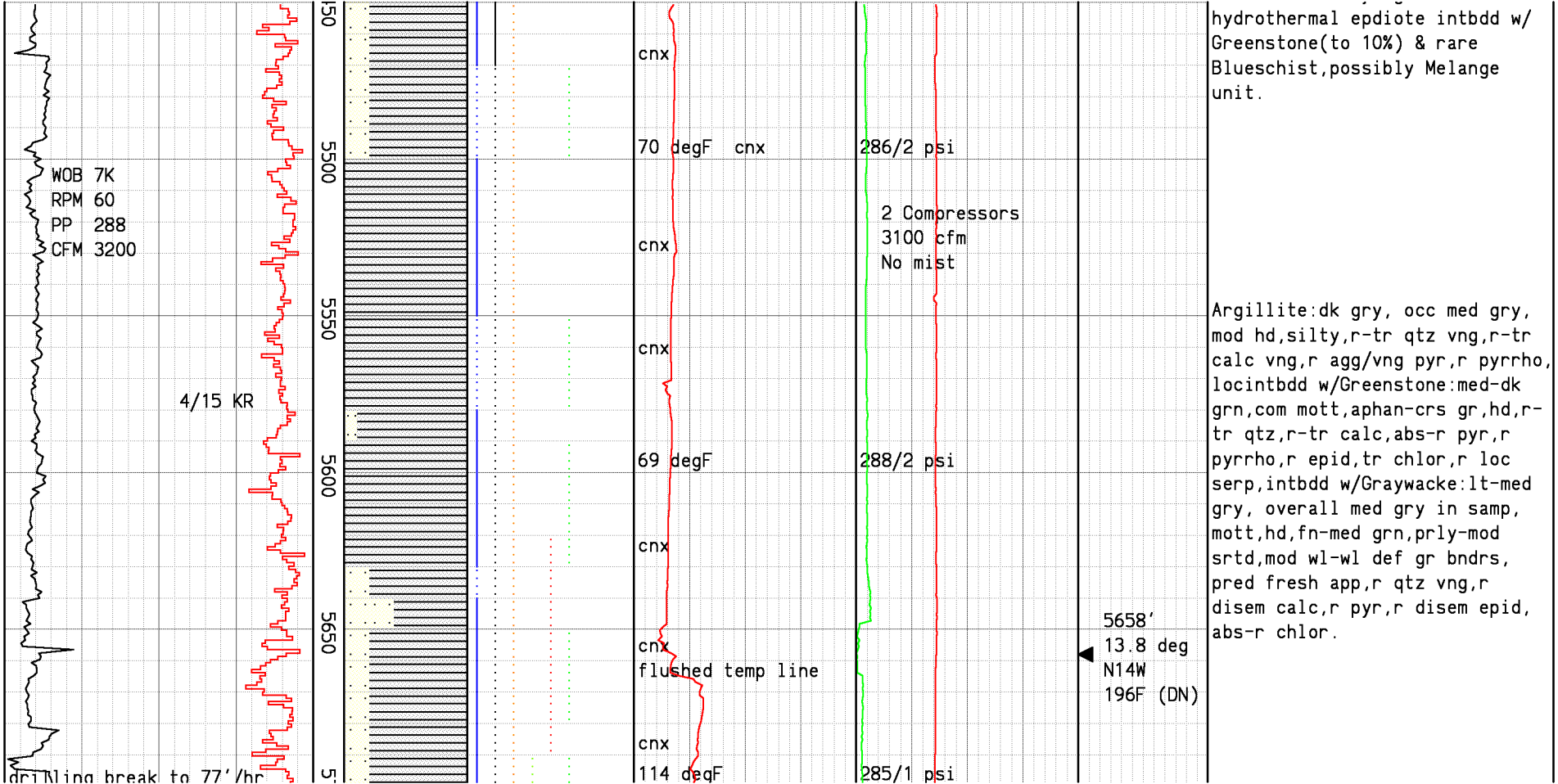
Siliceous Graywacke:lt-med gry, loc chlor wash,overall med-dk gry in samp,mott,hd-v hd,fn-med grn,mod srtd,pred fresh app,mod wl-wl def gr bndrs,subang-subrndd gr,r-tr agg qtz,r-tr agg&vng calc,r-tr disem&vng pyr, r agg pyrrho,intbdd w/Argillite: dk gry, occ med gry, mod hd, silty,r-tr qtz vng,r-tr calc vng,r agg pyr.

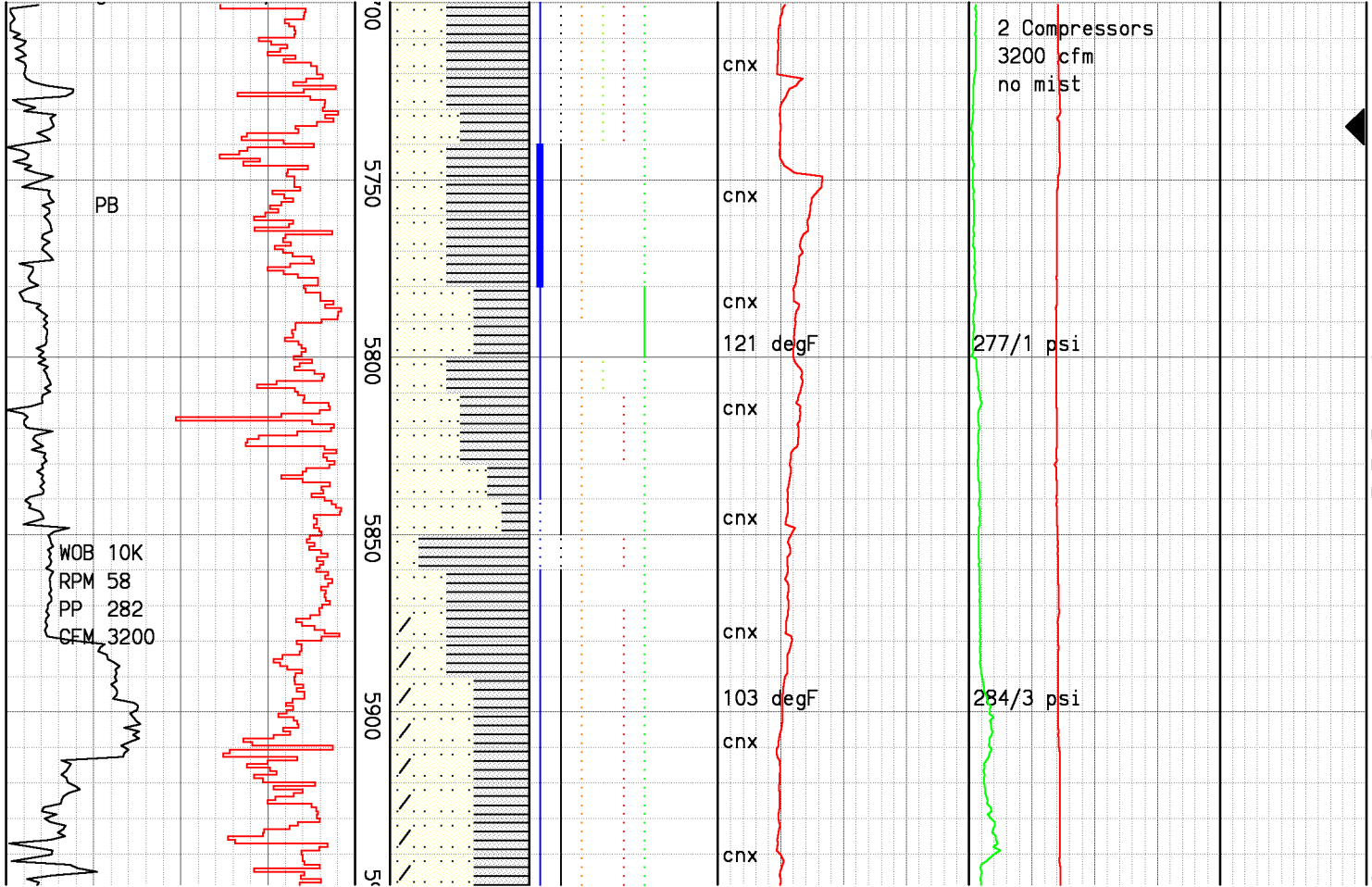

WOB 20k
RPM 60
PP 281
CFM 3100
PB
910'/50.5 hrs
4/13 KR
RB#9 Smith 47GA
974'/54.5hrs
PB
NB#10 Smith VMG44C
4/14 KR
5000
5050
5100
5150
cnx
60 degF
cnx
288/2 psi
cnx
cnx
62 degF
288/2 psi
cnx
cnx
cnx
70 degF
360/2 psi
5088'
15.8 deg
N13W
162F (DN)
2 Compressors
4000 cfm
No mist
Siliceous Graywacke:lt-med gry, loc chlor wash,overall med-dk gry in samp,mott,hd-v hd,fn-med grn,prly-mod srtd,pred fresh app,mod wl-wl def gr bndrs, subang-subrndd gr,r-tr agg qtz, r-tr agg&vng calc,r-tr disem& vng pyr,abs-r epid,r agg pyrrho,abs-r chlor,intbdd w/ Argillite: dk gry, occ med gry, mod hd,silty,r-tr qtz vng,r-tr calc vng,r agg pyr.
POOH t/shoe. Work tight hole.
Siliceous Graywacke:med gry, r loc chlor wash,overall med-dk gry in samp,mott,hd-v hd, fn-med grn,prly-mod srtd,pred fresh app,mod wl-wl def gr bndrs,subang-subrndd gr,r-tr



agg&vng qtz,r calc,r-tr disem& vng pyr,abs-r epid,r agg pyrrho, abs-r chlor,intbdd w/ Argillite: dk gry, occ med gry, mod hd,silty,r-tr qtz vng,r-tr calc vng,r agg pyr,r pyrrho,loc intbdd w/Greenstone:med-dk grn, com mott,aphan-crs gr,hd,r-tr qtz,r-tr calc,abs-r pyr,r pyrrho,r epid,tr chlor,r loc serp.

Argillite:dk gry,occ med gry, overall dk gry in samp,mod hd, fri,silty,wl srtd,loc phyll shn, r-tr qtz & calc vng,r agg & vng pyr, intbdd w/Siliceous Graywacke:lt-med gry, overall med gry in samp,mott,hd,fn-med grn,prly-mod srtd,mod wl-wl def gr bndrs,pred fresh app,r qtz vng,r disem calc,r disem epid, abs-r chlor,r yl-grn

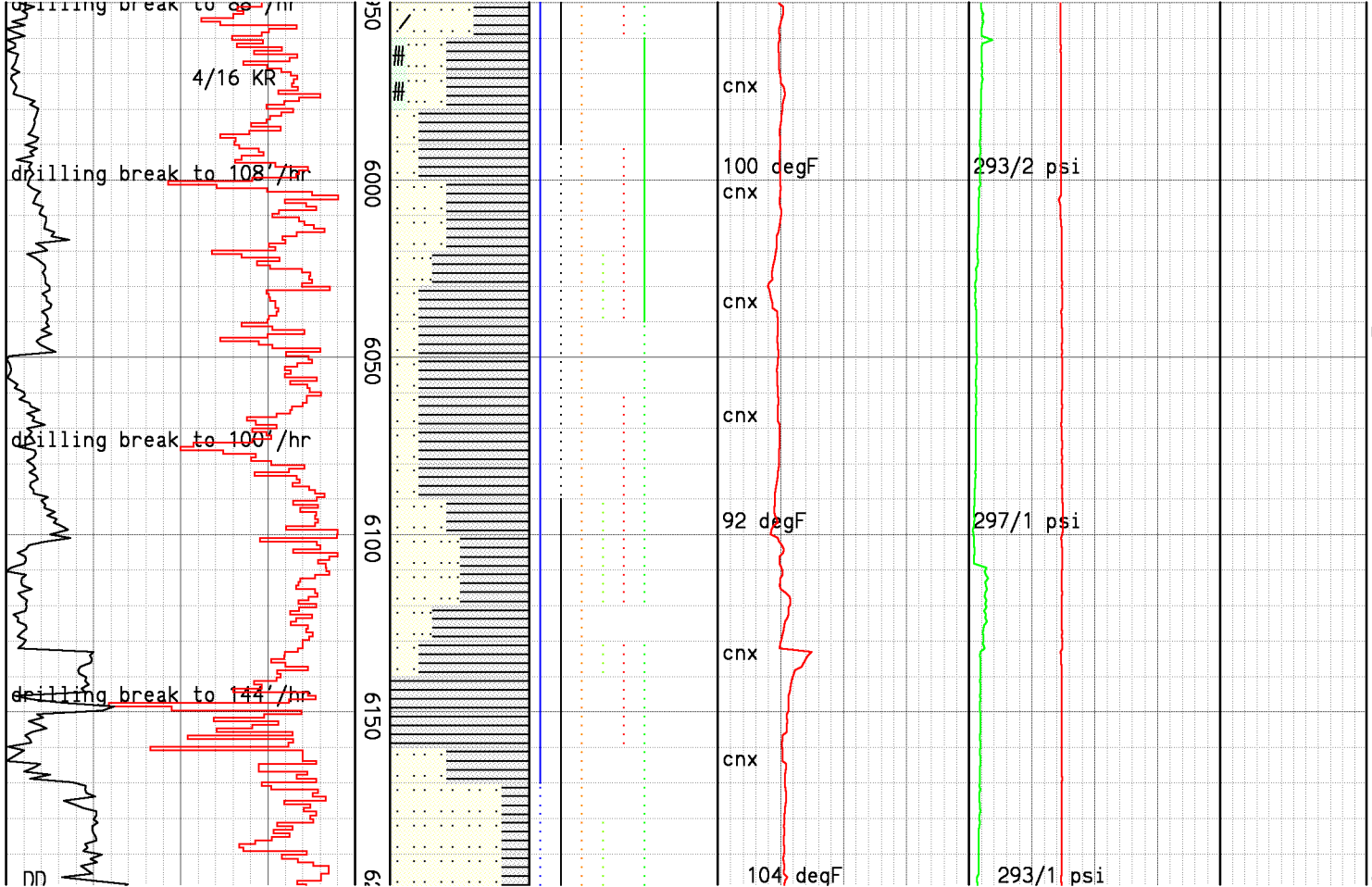

WOB 7K
RPM 60
PP 288
CFM 3200
4/15 KR
drilling break to 77'/hr
5450
5500
5550
5600
5650
cnx
70 degF cnx
cnx
cnx
69 degF
cnx
cnx
flushed temp line
cnx
114 degF
286/2 psi
2 Compressors
3100 cfm
No mist
288/2 psi
285/1 psi
5658'
13.8 deg
N14W
196F (DN)
hydrothermal epdiote intbdd w/ Greenstone(to 10%) & rare Blueschist,possibly Melange unit.
Argillite:dk gry, occ med gry, mod hd,silty,r-tr qtz vng,r-tr calc vng,r agg/vng pyr,r pyrrho, locintbdd w/Greenstone:med-dk grn,com mott,aphan-crs gr,hd,r-tr qtz,r-tr calc,abs-r pyr,r pyrrho,r epid,tr chlor,r loc serp,intbdd w/Graywacke:lt-med gry, overall med gry in samp, mott,hd,fn-med grn,prly-mod srtd,mod wl-wl def gr bndrs, pred fresh app,r qtz vng,r disem calc,r pyr,r disem epid, abs-r chlor.



Steam Entry @ 5735': No pressure increase,initial temp out increase of 50 degF, sustained increase of 40 deg F, drill break from 5735' to 5748': ROP max 77 ft/hr.

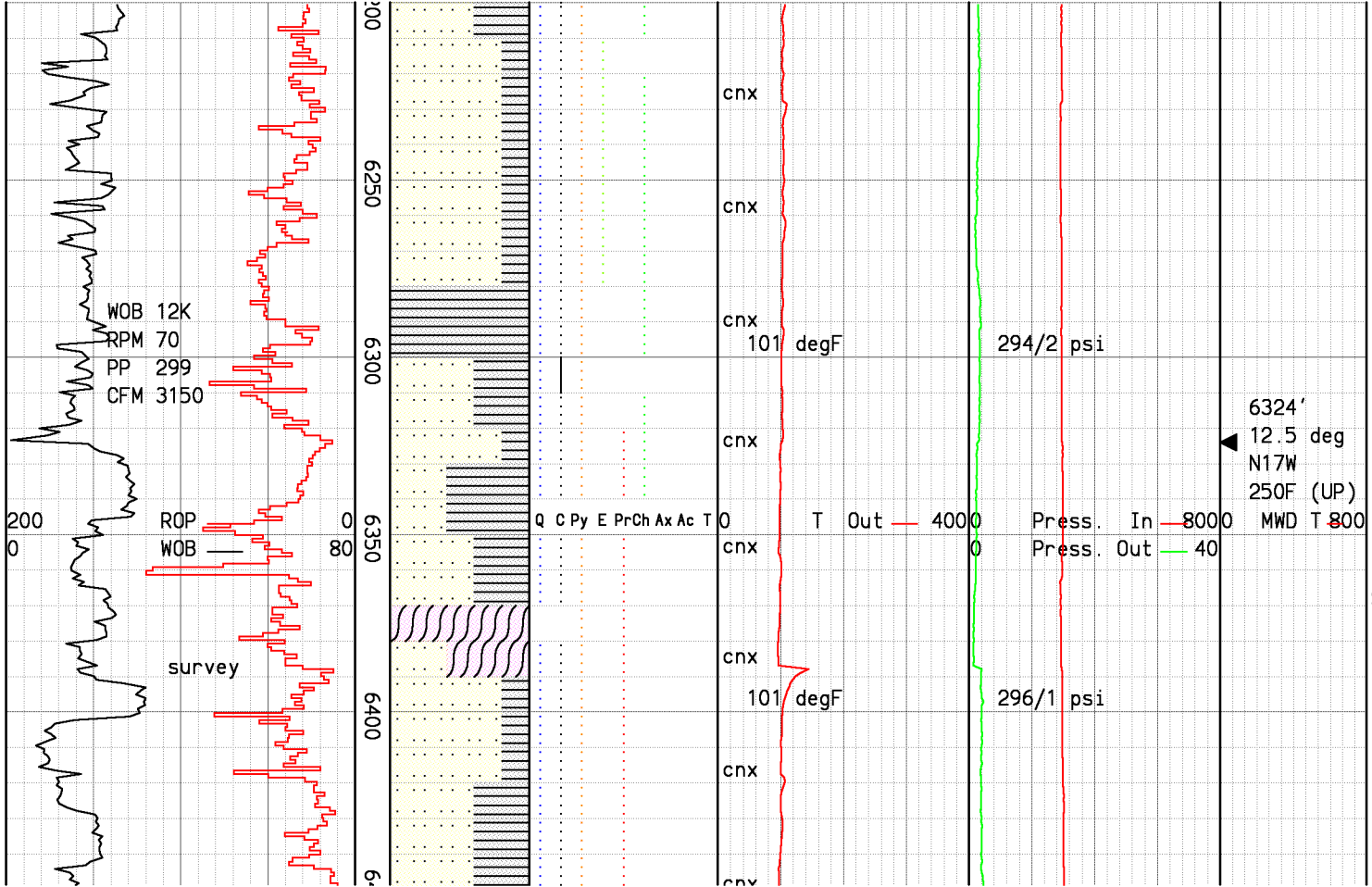
Argillite:lt-dk gry,lt brn,mod hd,silty,r phyll shn,r-tr qtz vng,r agg/vng pyr intbdd w/ Graywacke:lt-dk gry,overall med gry in sample,v fn-fn gr, mod wl-wl def grn bndrs,pred fresh app,loc blchd appr,r-tr calc vng,r agg pyr,occ dissem epi,loc chlor wsh,occ blueschist,chert, & serpentine frag.

Siliceous Graywacke:med gry



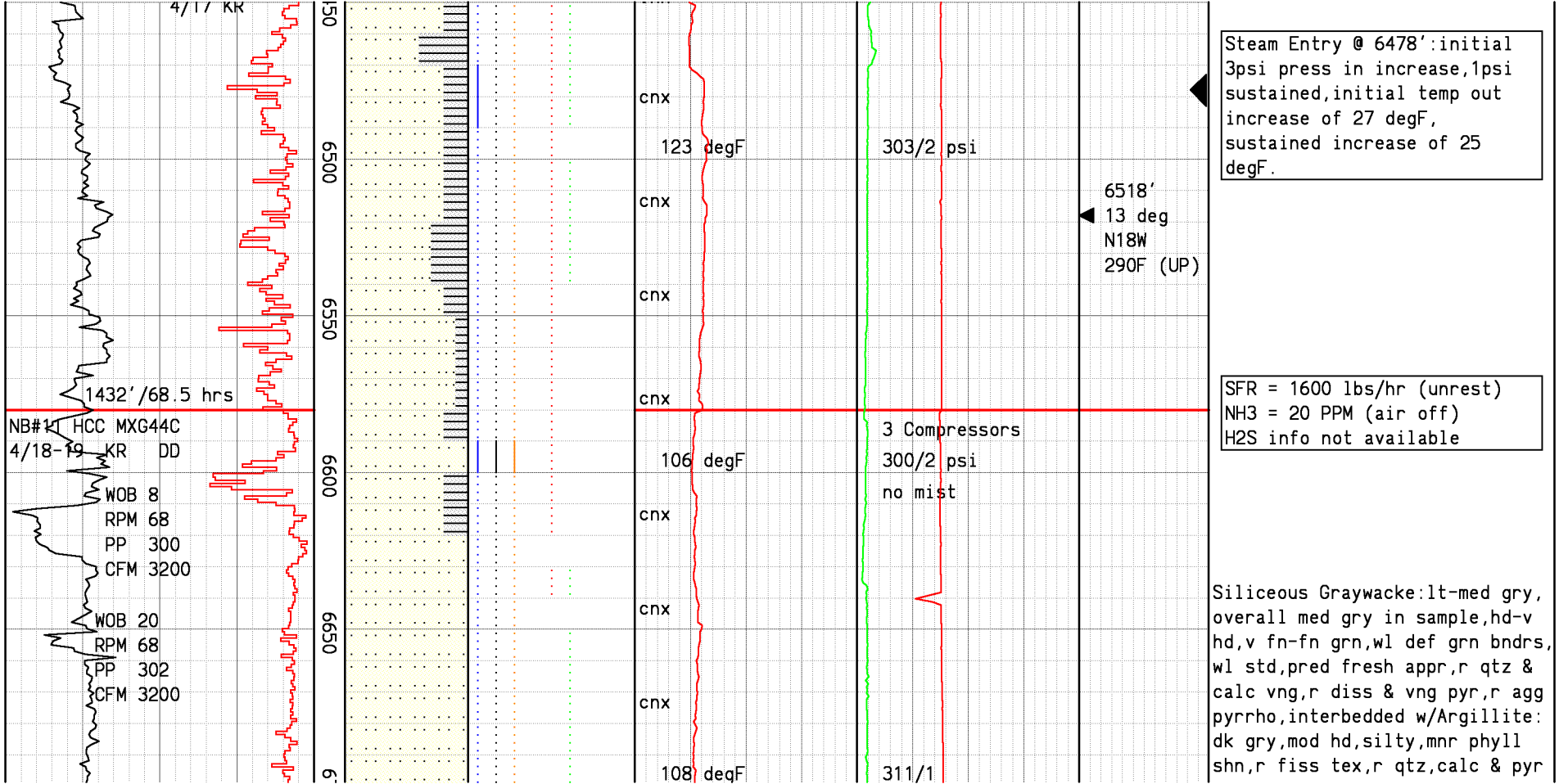
r loc chlor wash,overall med-dk gry in samp,mott,hd-v hd, fn-med grn,prly-mod srtd,pred fresh app,prly-mod def gr bndrs,subang-subrndd gr,r-tr agg&vng qtz,tr calc,r disem & vng pyr,r agg pyrrho,r chlor, intbdd w/Argillite: dk gry, occ med gry, mod hd,silty,r-tr qtz vng,r-tr calc vng,r agg pyr,r pyrrho,intrbdd w/ Greenstone(up to 10%):med-dk grn,com mott,aphan-crs gr,hd, r-tr qtz,r-tr calc,r pyr,r pyrrho,tr chlor,r loc serp.

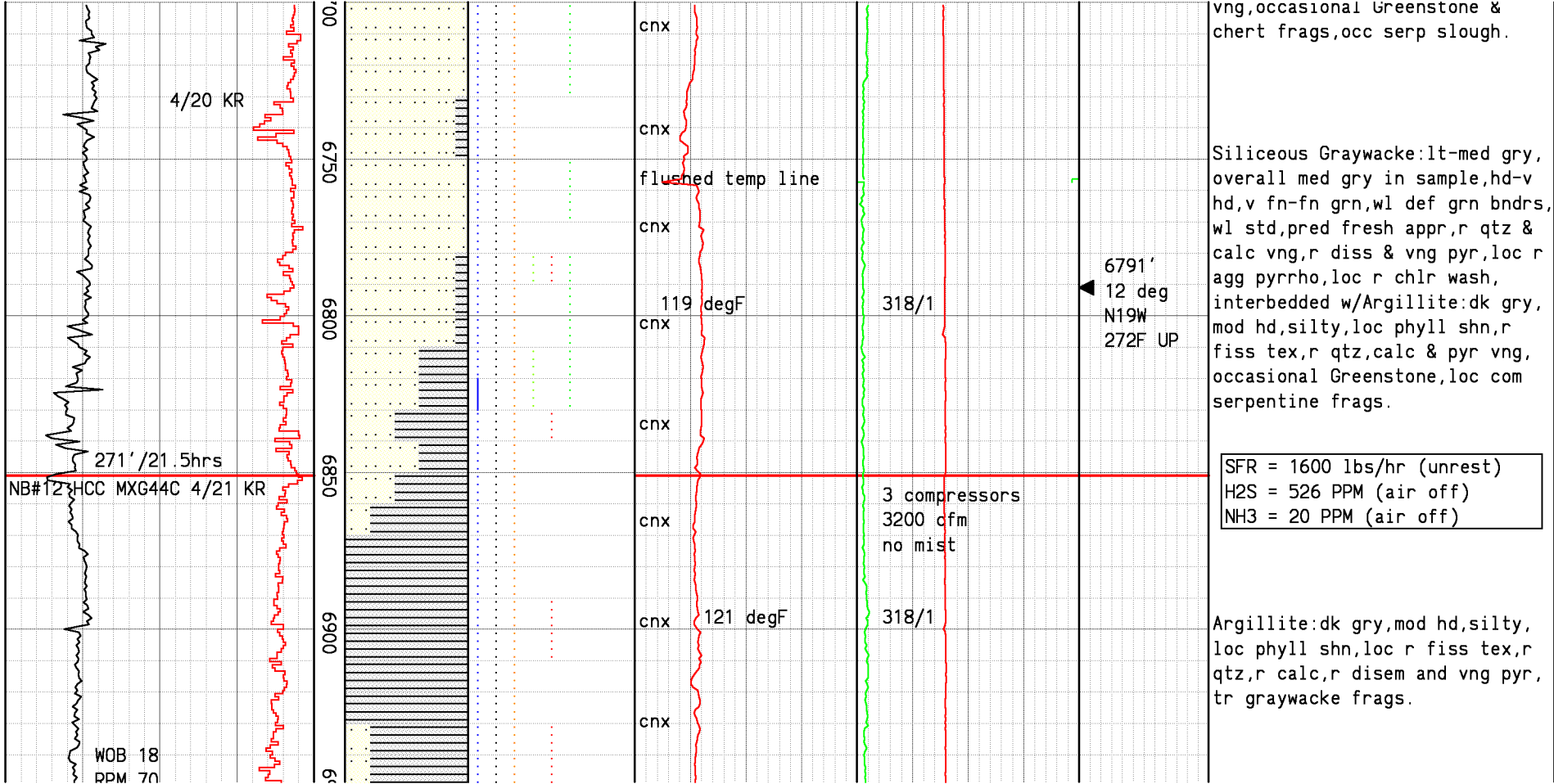
Siliceous Graywacke:med gry



overall med-dk gry in sample, hd-v hd,v fn-fn grn,mod wl-wl def gr bndrs,wl std,pred fresh appr,loc grdg to lithic tex, loc blchd appr,tr calc vng,loc diss & agg pyr,occ chlor wash interbedded w/Argillite:dk gry, blk,mod hd,silty,tr phyll shn, tr fiss tex,r qtz,calc & pyr vng,r agg pyrrho & pyr,r Grnstn slough.

Serpentine:dk grn,emerald grn, apple grn,com transl-clear,frm, dom greasy tex,com pyr & pyrrho inclusions,tr fibr Chrysotile.


4/17 KR
1432'/68.5 hrs
NB#1 HCC MXG44C
4/18-19 KR DD
WOB 8
RPM 68
PP 300
CFM 3200
WOB 20
RPM 68
PP 302
CFM 3200
6500
6550
6600
6650
cnx
123 degF
cnx
cnx
cnx
106 degF
cnx
cnx
cnx
108 degF
303/2 psi
6518'
13 deg
N18W
290F (UP)
3 Compressors
300/2 psi
no mist
311/1
Steam Entry @ 6478':initial 3psi press in increase,1psi sustained,initial temp out increase of 27 degF, sustained increase of 25 degF.
SFR = 1600 lbs/hr (unrest)
NH3 = 20 PPM (air off)
H2S info not available
Siliceous Graywacke:lt-med gry, overall med gry in sample,hd-v hd,v fn-fn grn,wl def grn bndrs, wl std,pred fresh appr,r qtz & calc vng,r diss & vng pyr,r agg pyrrho,interbedded w/Argillite: dk gry,mod hd,silty,mnr phyll shn,r fiss tex,r qtz,calc & pyr

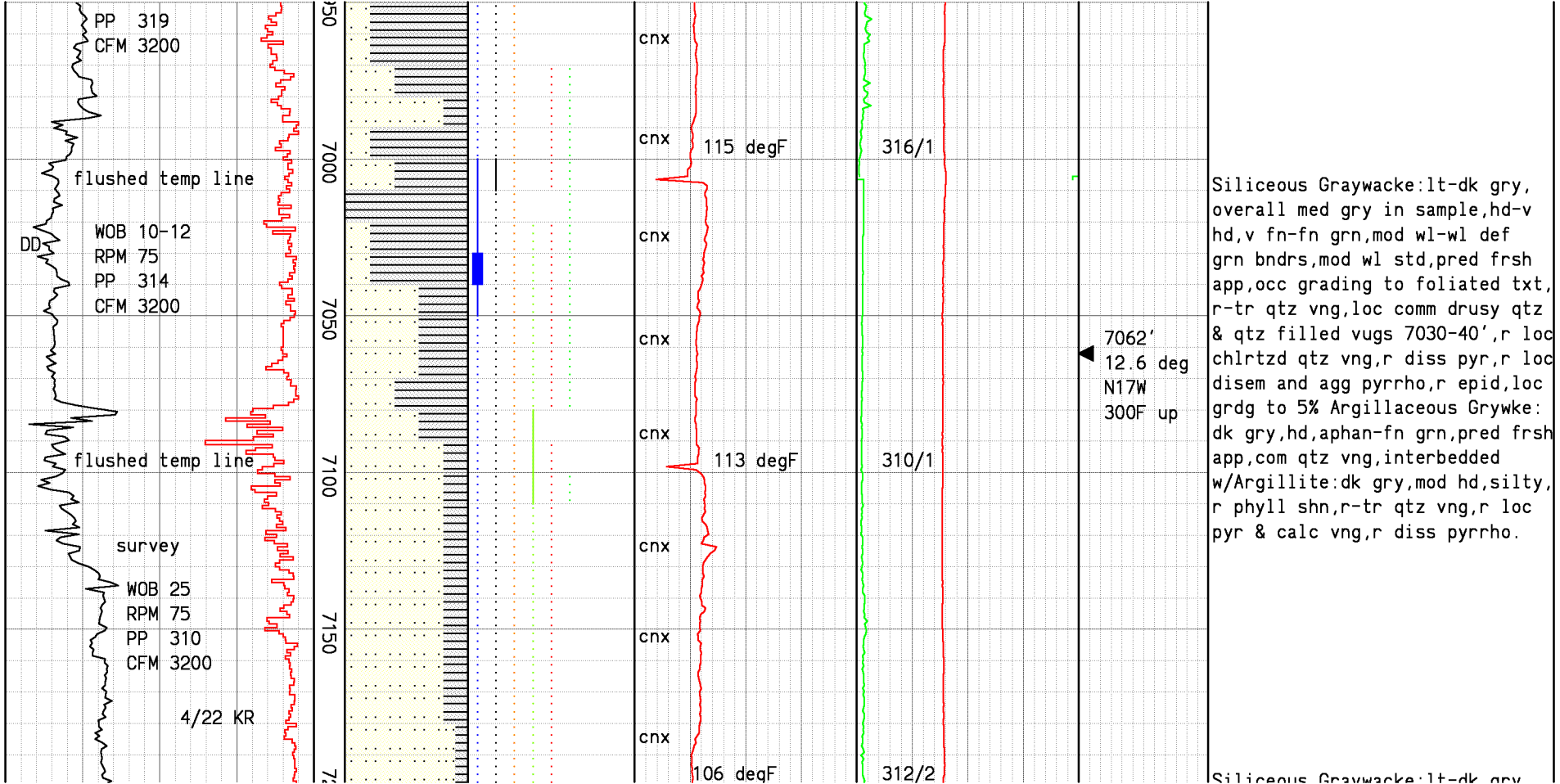


vng,occasional Greenstone & chert frags,occ serp slough.

Siliceous Graywacke:lt-med gry, overall med gry in sample,hd-v hd,v fn-fn grn,wl def grn bndrs, wl std,pred fresh appr,r qtz & calc vng,r diss & vng pyr,loc r agg pyrrho,loc r chlr wash, interbedded w/Argillite:dk gry, mod hd,silty,loc phyll shn,r fiss tex,r qtz,calc & pyr vng, occasional Greenstone,loc com serpentine frags.

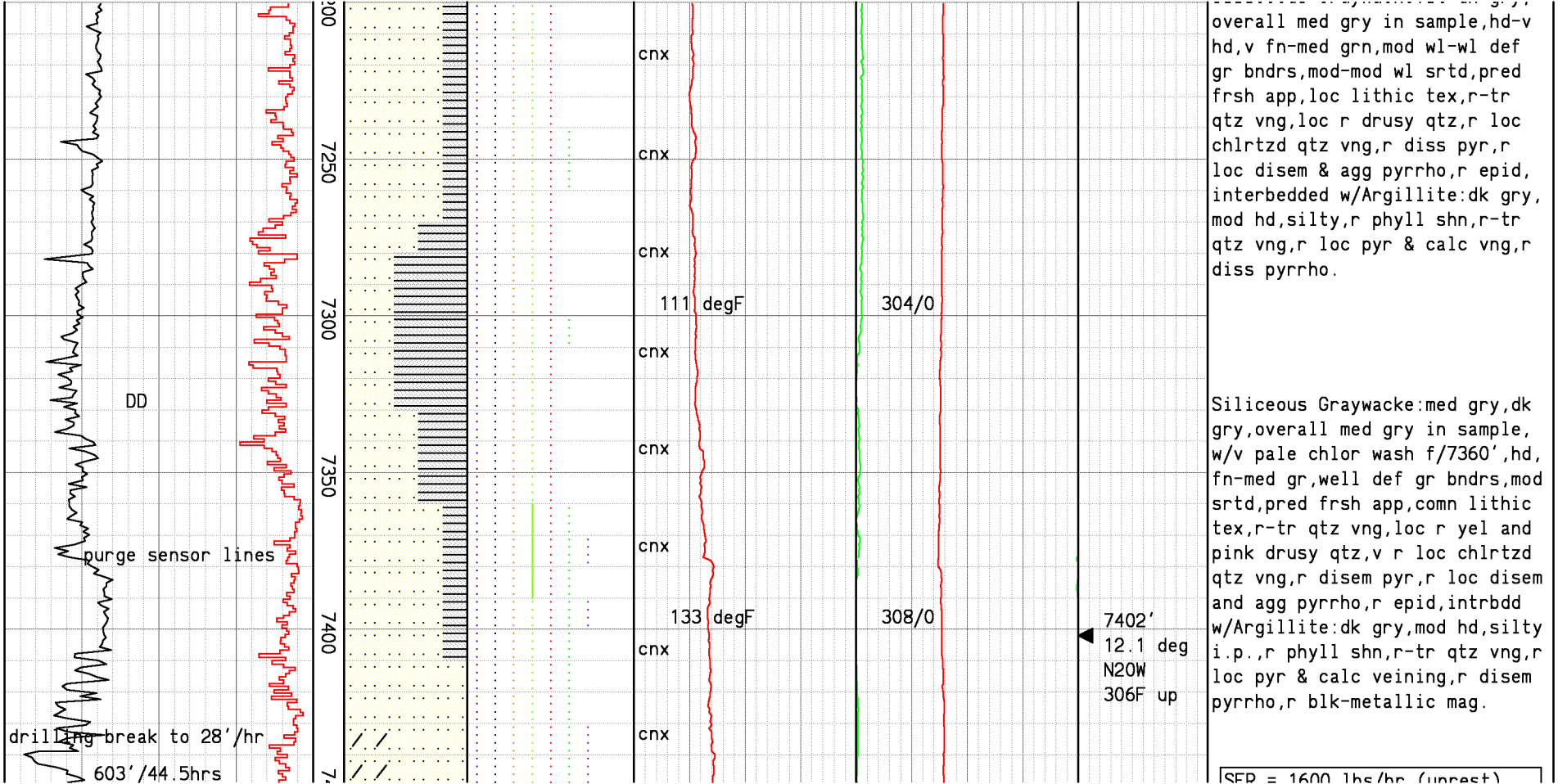
SFR = 1600 lbs/hr (unrest)
H2S = 526 PPM (air off)
NH3 = 20 PPM (air off)

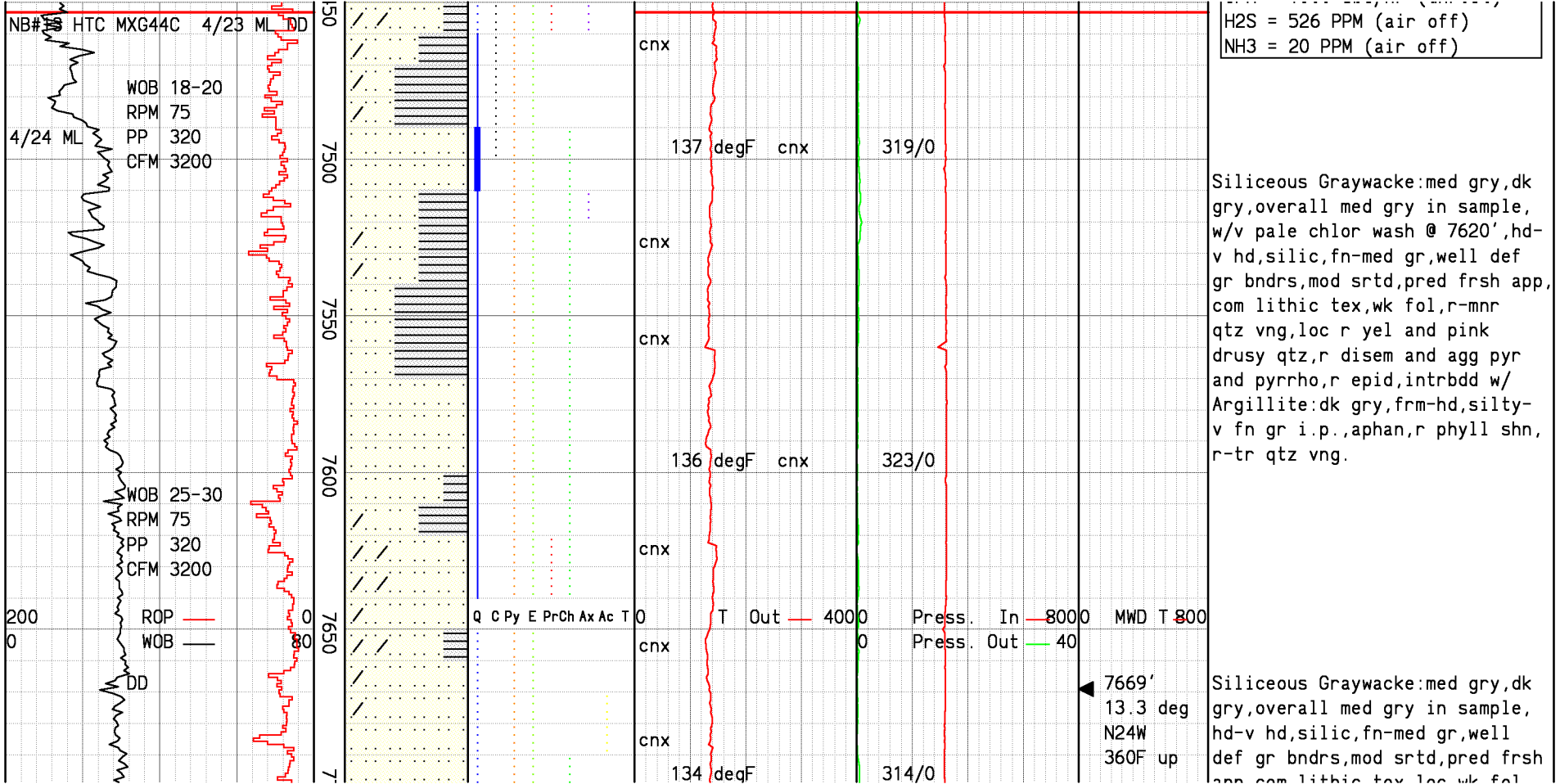
Argillite:dk gry,mod hd,silty, loc phyll shn,loc r fiss tex,r qtz,r calc,r disem and vng pyr, tr graywacke frags.

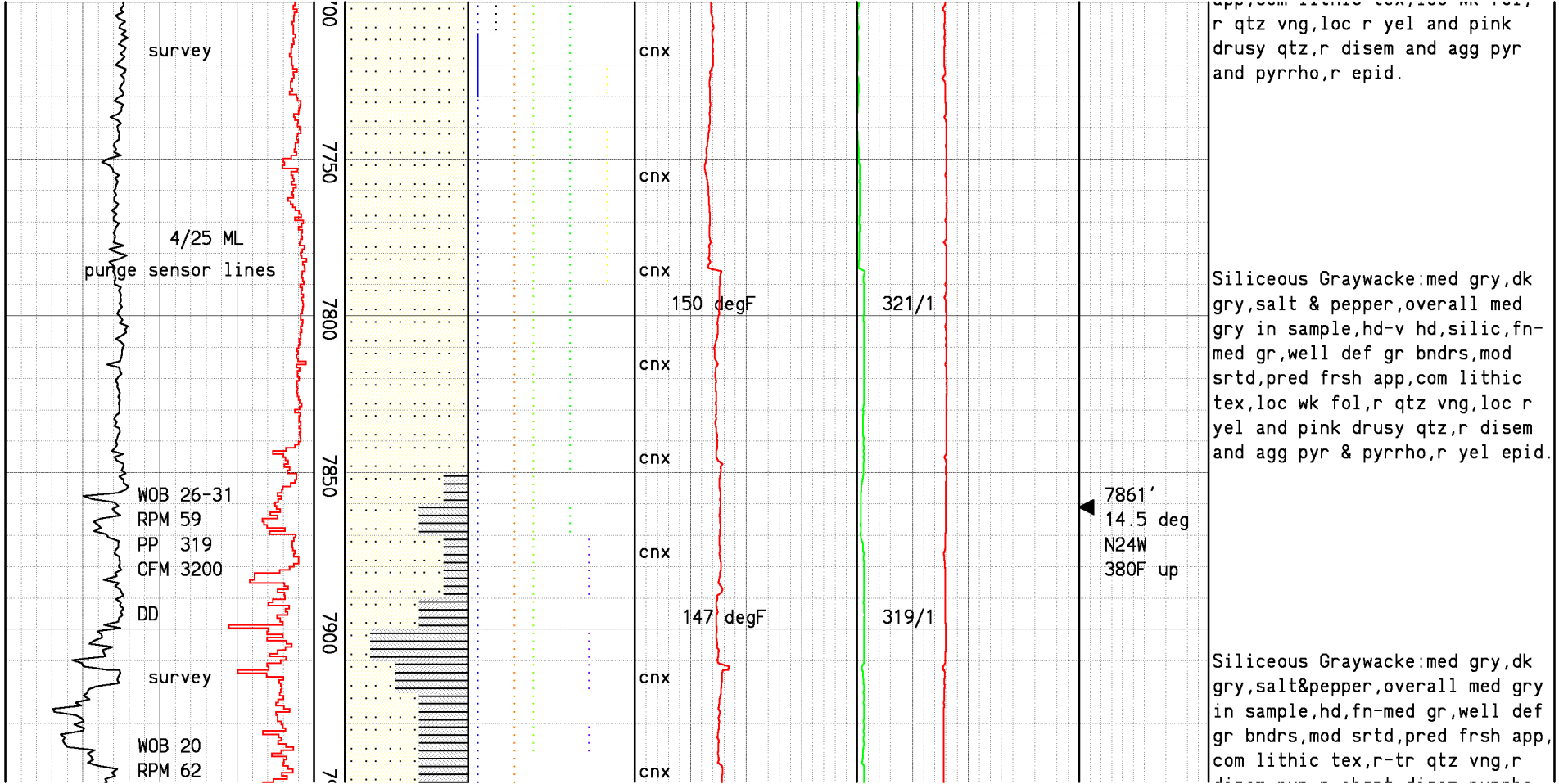


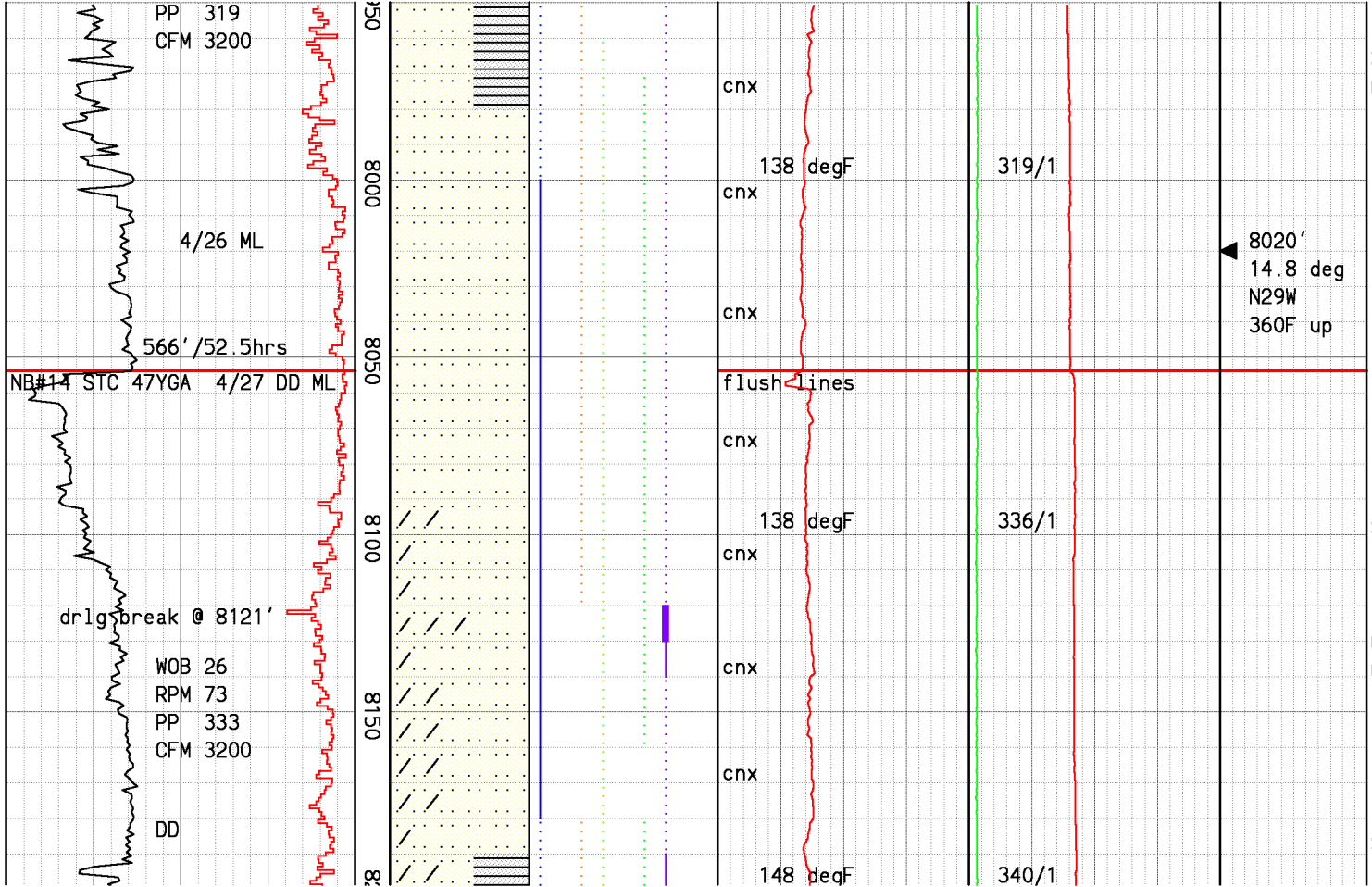
Siliceous Graywacke:lt-dk gry, overall med gry in sample,hd-v hd,v fn-fn grn,mod wl-wl def grn bndrs,mod wl std,pred frsh app,occ grading to foliated txt, r-tr qtz vng,loc comm drusy qtz & qtz filled vugs 7030-40',r loc chlrtzd qtz vng,r diss pyr,r loc disem and agg pyrrho,r epid,loc grdg to 5% Argillaceous Grywke: dk gry,hd,aphan-fn grn,pred frsh app,com qtz vng,interbedded w/Argillite:dk gry,mod hd,silty, r phyll shn,r-tr qtz vng,r loc pyr & calc vng,r diss pyrrho.

Siliceous Graywacke:lt-dk gry,


overall med gry in sample,hd-v hd,v fn-med grn,mod wl-wl def gr bndrs,mod-mod wl srtd,pred frsh app,loc lithic tex,r-tr qtz vng,loc r drusy qtz,r loc chlrtzd qtz vng,r diss pyr,r loc disem & agg pyrrho,r epid, interbedded w/Argillite:dk gry, mod hd,silty,r phyll shn,r-tr qtz vng,r loc pyr & calc vng,r diss pyrrho.
Siliceous Graywacke:med gry,dk gry,overall med gry in sample, w/v pale chlor wash f/7360',hd, fn-med gr,well def gr bndrs,mod srtd,pred frsh app,comn lithic tex,r-tr qtz vng,loc r yel and pink drusy qtz,v r loc chlrtzd qtz vng,r disem pyr,r loc disem and agg pyrrho,r epid,intrbdd w/Argillite:dk gry,mod hd,silty i.p.,r phyll shn,r-tr qtz vng,r loc pyr & calc veining,r disem pyrrho,r blk-metallic mag.
SFR = 1600 lbs/hr (unrest)
7250
7300
7350
7400
cnx
111 degF
133 degF
304/0
308/0
7402'
12.1 deg
N20W
306F up
DD
purge sensor lines
drilling break to 28'/hr
603'/44.5hrs


NB#1S HTC MXG44C 4/23 ML DD
WOB 18-20
RPM 75
PP 320
CFM 3200
4/24 ML
WOB 25-30
RPM 75
PP 320
CFM 3200
200 ROP 0
0 WOB 80
DD
7500
7550
7600
7650
Q C Py E PrCh Ax Ac T
cnx
137 degF cnx
319/0
136 degF cnx
323/0
134 degF
314/0
0 T Out 400
0 Press. In 8000
0 Press. Out 40
0 MWD T 800
H2S = 526 PPM (air off)
NH3 = 20 PPM (air off)
Siliceous Graywacke:med gry,dk gry,overall med gry in sample, w/v pale chlor wash @ 7620',hd-v hd,silic,fn-med gr,well def gr bndrs,mod srtd,pred frsh app, com lithic tex,wk fol,r-mnr qtz vng,loc r yel and pink drusy qtz,r disem and agg pyr and pyrrho,r epid,intrbdd w/ Argillite:dk gry,frm-hd,silty-v fn gr i.p.,aphan,r phyll shn, r-tr qtz vng.
7669'
13.3 deg
N24W
360F up
Siliceous Graywacke:med gry,dk gry,overall med gry in sample, hd-v hd,silic,fn-med gr,well def gr bndrs,mod srtd,pred frsh


survey
4/25 ML
purge sensor lines
WOB 26-31
RPM 59
PP 319
CFM 3200
DD
survey
WOB 20
RPM 62
7750
7800
7850
7900
cnx
cnx
cnx
150 degF
321/1
cnx
cnx
7861'
14.5 deg
N24W
380F up
cnx
147 degF
319/1
cnx
cnx
r qtz vng,loc r yel and pink drusy qtz,r disem and agg pyr and pyrrho,r epid.
Siliceous Graywacke:med gry,dk gry,salt & pepper,overall med gry in sample,hd-v hd,silic,fn-med gr,well def gr bndrs,mod srtd,pred frsh app,com lithic tex,loc wk fol,r qtz vng,loc r yel and pink drusy qtz,r disem and agg pyr & pyrrho,r yel epid.
Siliceous Graywacke:med gry,dk gry,salt&pepper,overall med gry in sample,hd,fn-med gr,well def gr bndrs,mod srtd,pred frsh app, com lithic tex,r-tr qtz vng,r



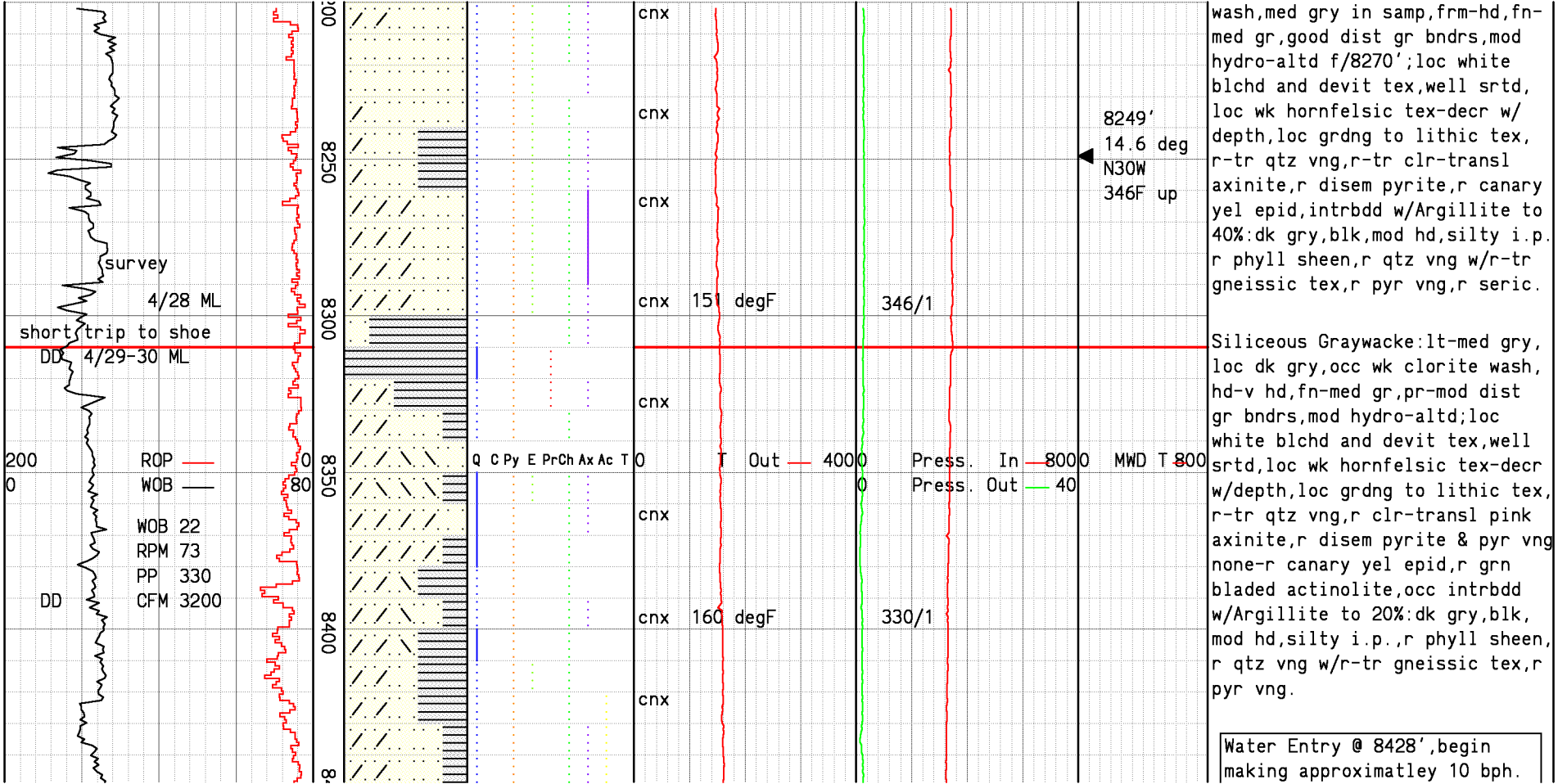
disem pyr,r absnt disem pyrrho,
r yel epid,grdg to Arg Gywke 10-
20%,intrbdd w/Argillite:dk gry,
mod hd,silty i.p.,r v sl phyll
shn,r qtz vng,r loc pyr.

Drill 12 1/4" hole t/8045',
reduce hole size to 10 5/8"
from 8045'.

SFR = 1600 lbs/hr (unrest)
H2S = 526 PPM (air off)
NH3 = 20 PPM (air off)

Siliceous Graywacke:lt-med gry,
salt & pepper,occ blched app,
pred blchd @ 8130' with minor
axinite;decr w/depth,hd-v hd,fn-
med gr,prly-mod def gr bndrs,
mod srtd,pred frsh app,loc com
lithic tex,r-tr qtz vng,r-absnt
disem pyr,v r-r yel epid,v r
chlor,r seric alt.

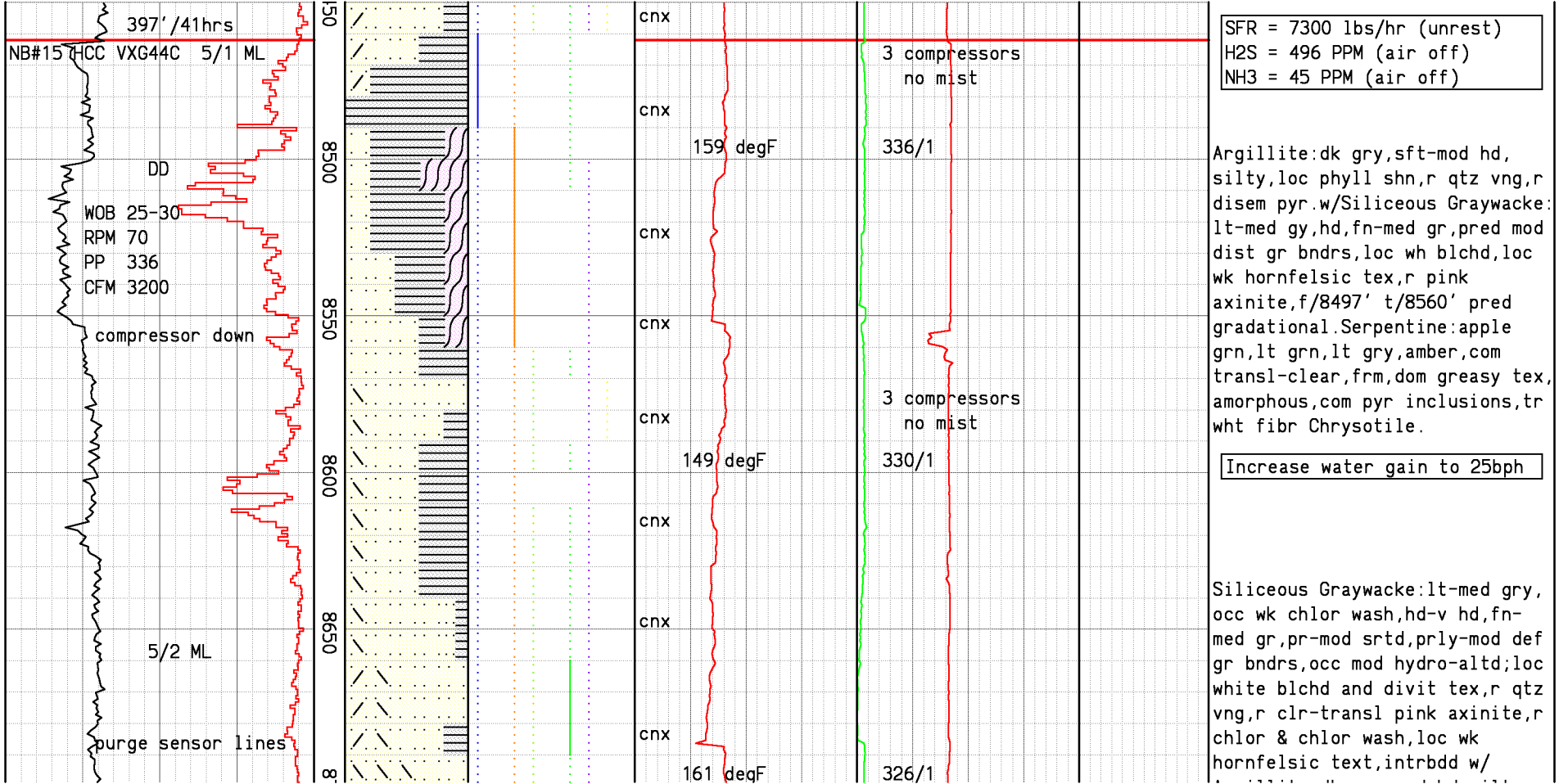
Siliceous Graywacke:lt-med gry,
loc dk gry,overall wk clorite

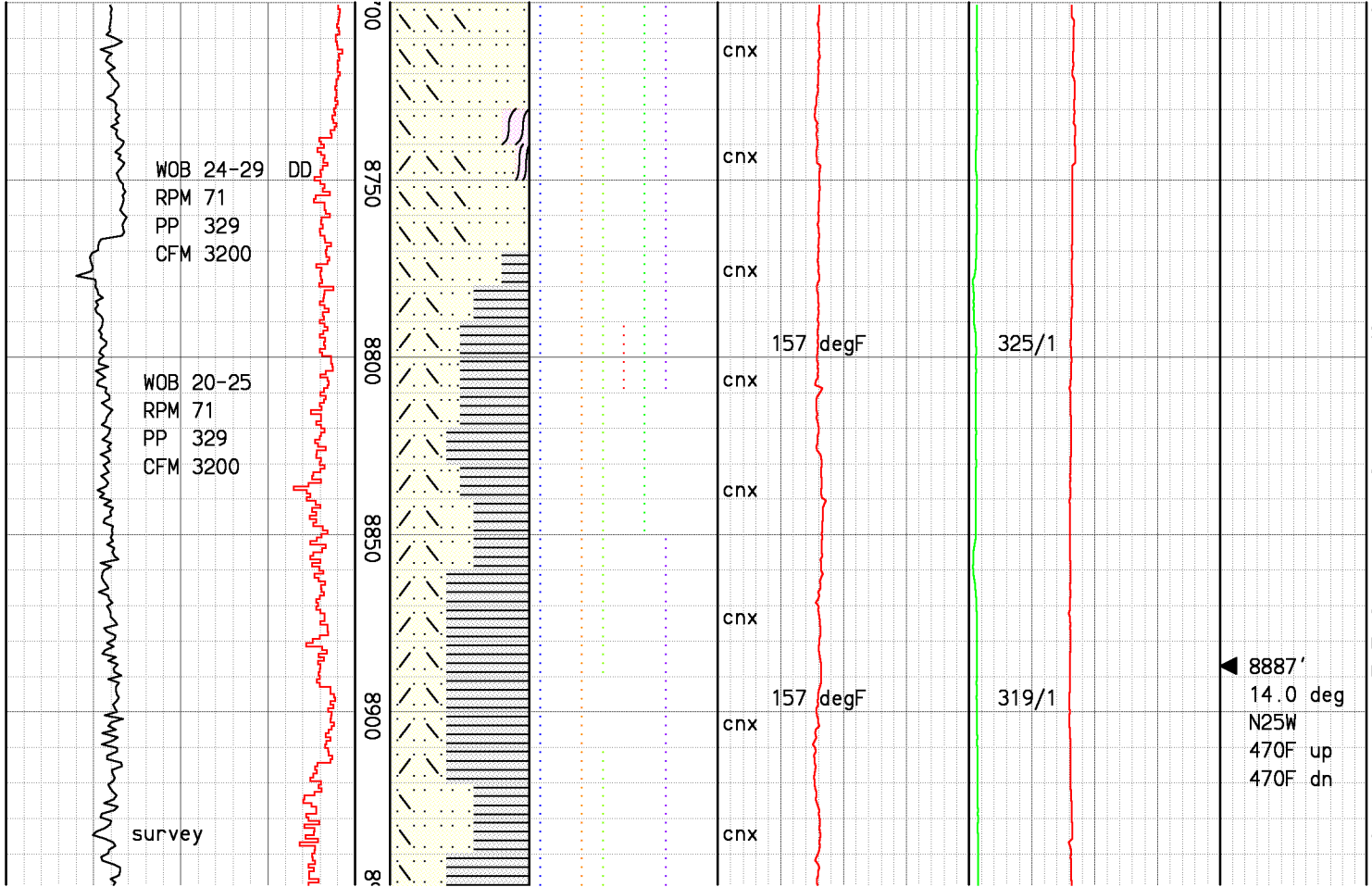


wash,med gry in samp,frm-hd,fn-med gr,good dist gr bndrs,mod hydro-altd f/8270';loc white blchd and devit tex,well srtd, loc wk hornfelsic tex-decr w/ depth,loc grdng to lithic tex, r-tr qtz vng,r-tr clr-transl axinite,r disem pyrite,r canary yel epid,intrbdd w/Argillite to 40%:dk gry,blk,mod hd,silty i.p. r phyll sheen,r qtz vng w/r-tr gneissic tex,r pyr vng,r seric.

Siliceous Graywacke:lt-med gry, loc dk gry,occ wk clorite wash, hd-v hd,fn-med gr,pr-mod dist gr bndrs,mod hydro-altd;loc white blchd and devit tex,well srtd,loc wk hornfelsic tex-decr w/depth,loc grdng to lithic tex, r-tr qtz vng,r clr-transl pink axinite,r disem pyrite & pyr vng none-r canary yel epid,r grn bladed actinolite,occ intrbdd w/Argillite to 20%:dk gry,blk, mod hd,silty i.p.,r phyll sheen, r qtz vng w/r-tr gneissic tex,r pyr vng.

Water Entry @ 8428',begin making approximatley 10 bph.


397'/41hrs
NB#15 HCC VXG44C 5/1 ML
DD
WOB 25-30
RPM 70
PP 336
CFM 3200
compressor down
5/2 ML
purge sensor lines
8450
8500
8550
8600
8650
cnx
159 degF
149 degF
161 degF
3 compressors
no mist
336/1
330/1
326/1
SFR = 7300 lbs/hr (unrest)
H2S = 496 PPM (air off)
NH3 = 45 PPM (air off)
Argillite:dk gry,sft-mod hd, silty,loc phyll shn,r qtz vng,r disem pyr.w/Siliceous Graywacke: lt-med gy,hd,fn-med gr,pred mod dist gr bndrs,loc wh blchd,loc wk hornfelsic tex,r pink axinite,f/8497' t/8560' pred gradational.Serpentine:apple grn,lt grn,lt gry,amber,com transl-clear,frm,dom greasy tex, amorphous,com pyr inclusions,tr wht fibr Chrysotile.
Increase water gain to 25bph
Siliceous Graywacke:lt-med gry, occ wk chlor wash,hd-v hd,fn-med gr,pr-mod srtd,prly-mod def gr bndrs,occ mod hydro-altd;loc white blchd and divit tex,r qtz vng,r clr-transl pink axinite,r chlor & chlor wash,loc wk hornfelsic text,intrbdd w/



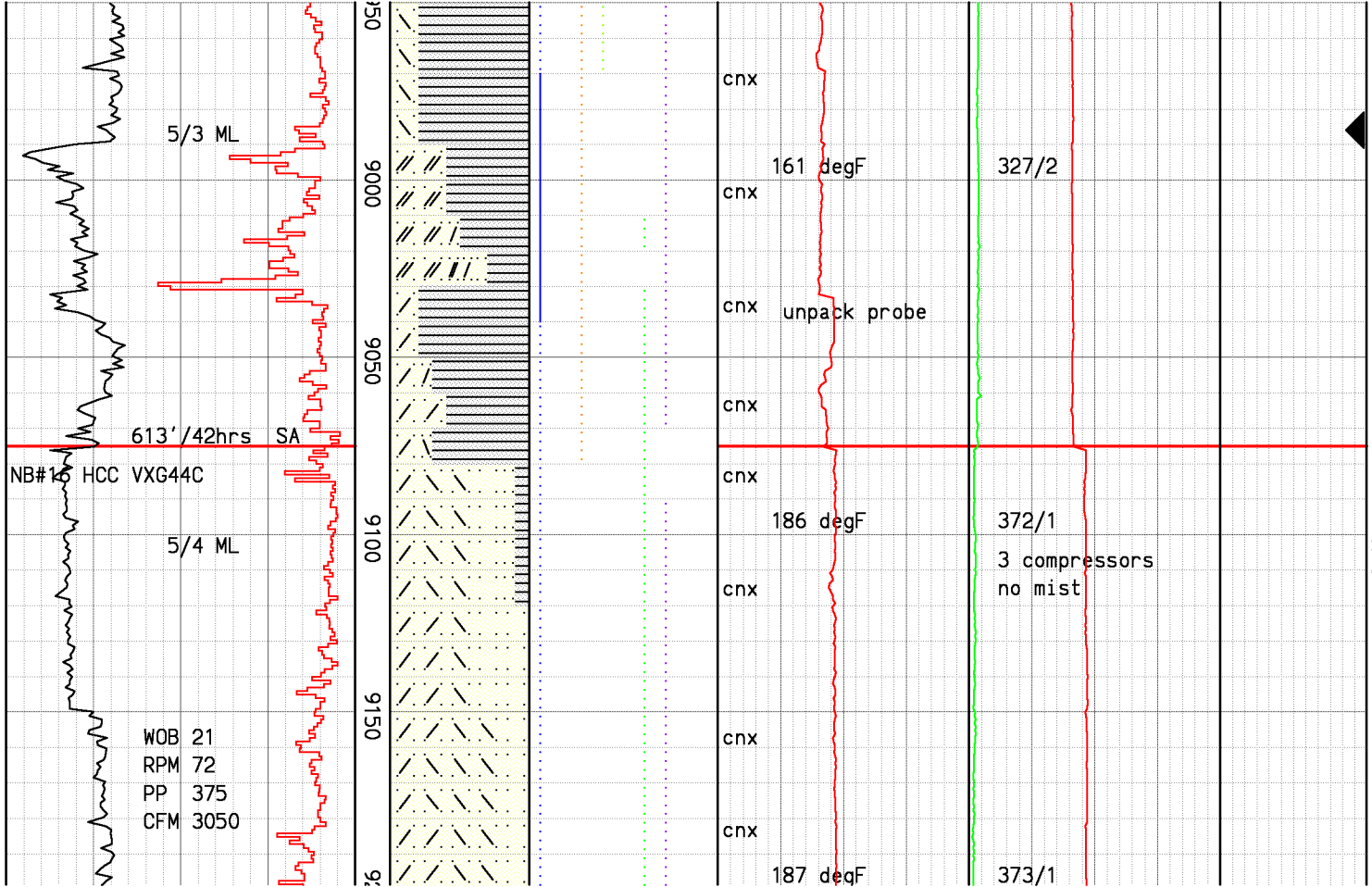
Argillite:dk gry,mod hd,silty, loc phyll shn,r qtz vng,r disem pyr,w/Serpentine:apple grn,lt grn,lt gry,frm,greasy tex, amorph,tr wht fibr chrysotile.

Gaining 8-15 bph water.

Siliceous Graywacke:med gry,loc dk gry,r loc pale chlorite wash, hd-v hd,fn-med gr,wk-mod vis gr bndrs,r loc hydro-altn,poorly srtd,loc wk hornfelsic tex-inc w/depth,loc grdng t/lithic app, r qtz vng,r clr-transl pink axinite,r disem pyrite & pyr vng r canary yel epid,r sericite,r galena in qtz,r magn,loc intrbdd w/Argillite to 60%:dk gry,blk, mod hd,loc silty i.p.,r fiss tex micaceous luster,r qtz vng w/r-t gneissic app,r pyr vng.

Gaining 6 bph water.

Argillite:dk gry,blk,frm-mod hd, dom aphan,mass,loc silty,loc tec



blocky,r fiss tex,r qtz vng,r disem and agg pyr,to 80% f/8950' com slough in samp.

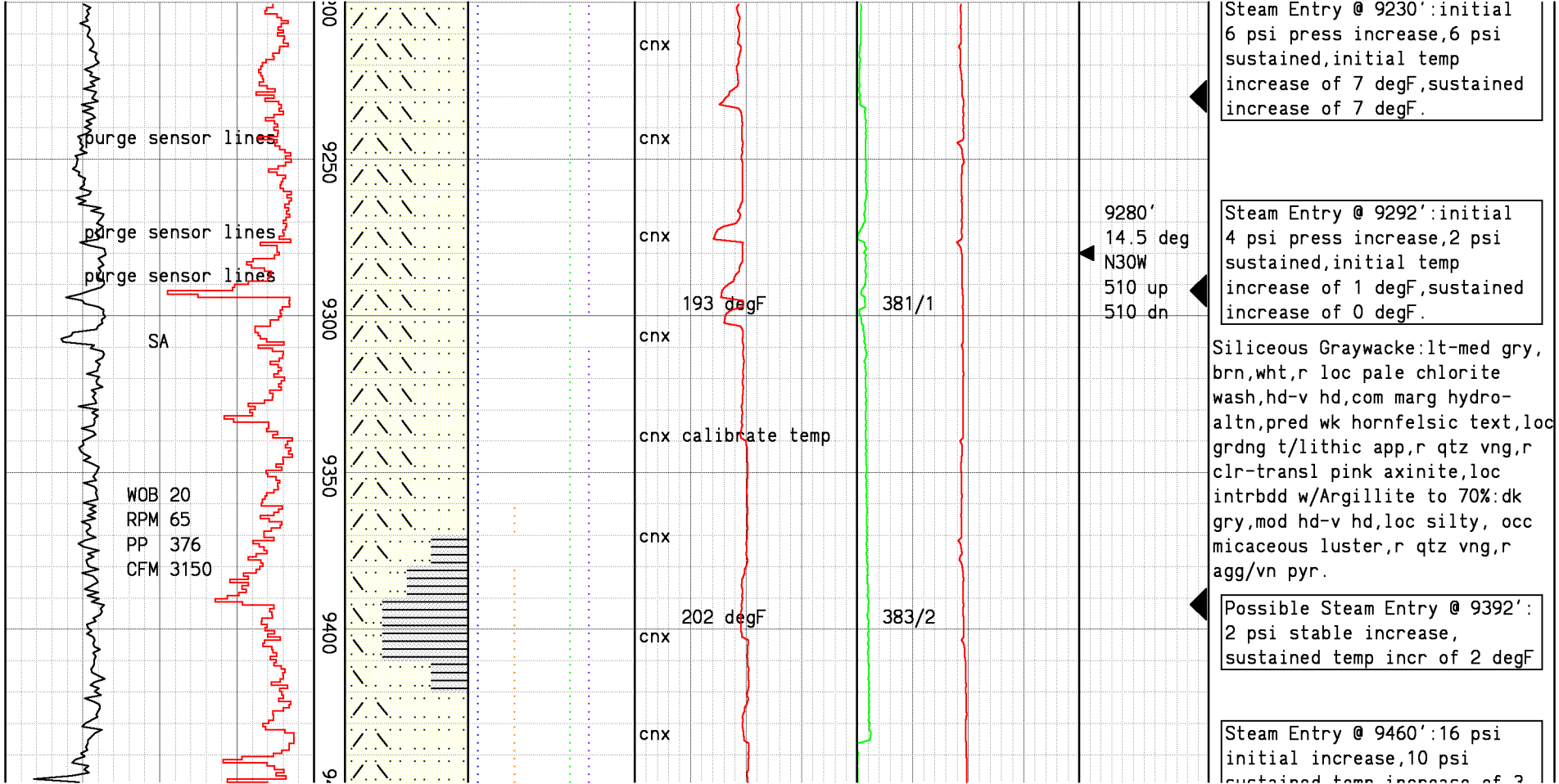
Entry Zone f/8986' t/9035', gradually increased 6 psi standpipe press,16 degF initial/sustained temp out increase,ROP max of 113'/hr.

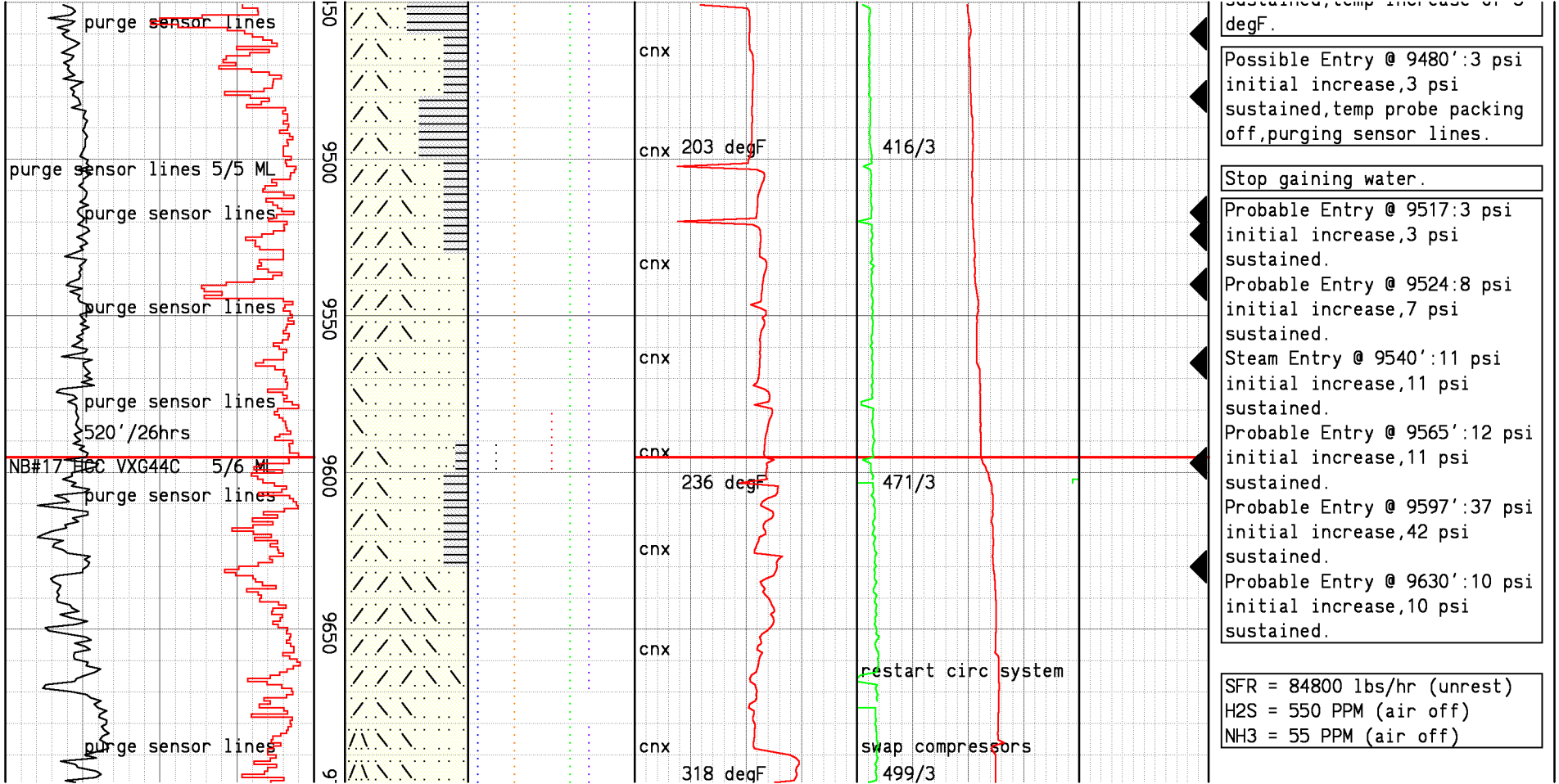
Pull out of the hole with 10 5/8" drilling assembly, make up 8 1/2" drilling assembly to reduce hole size, drill ahead 8 1/2" hole.

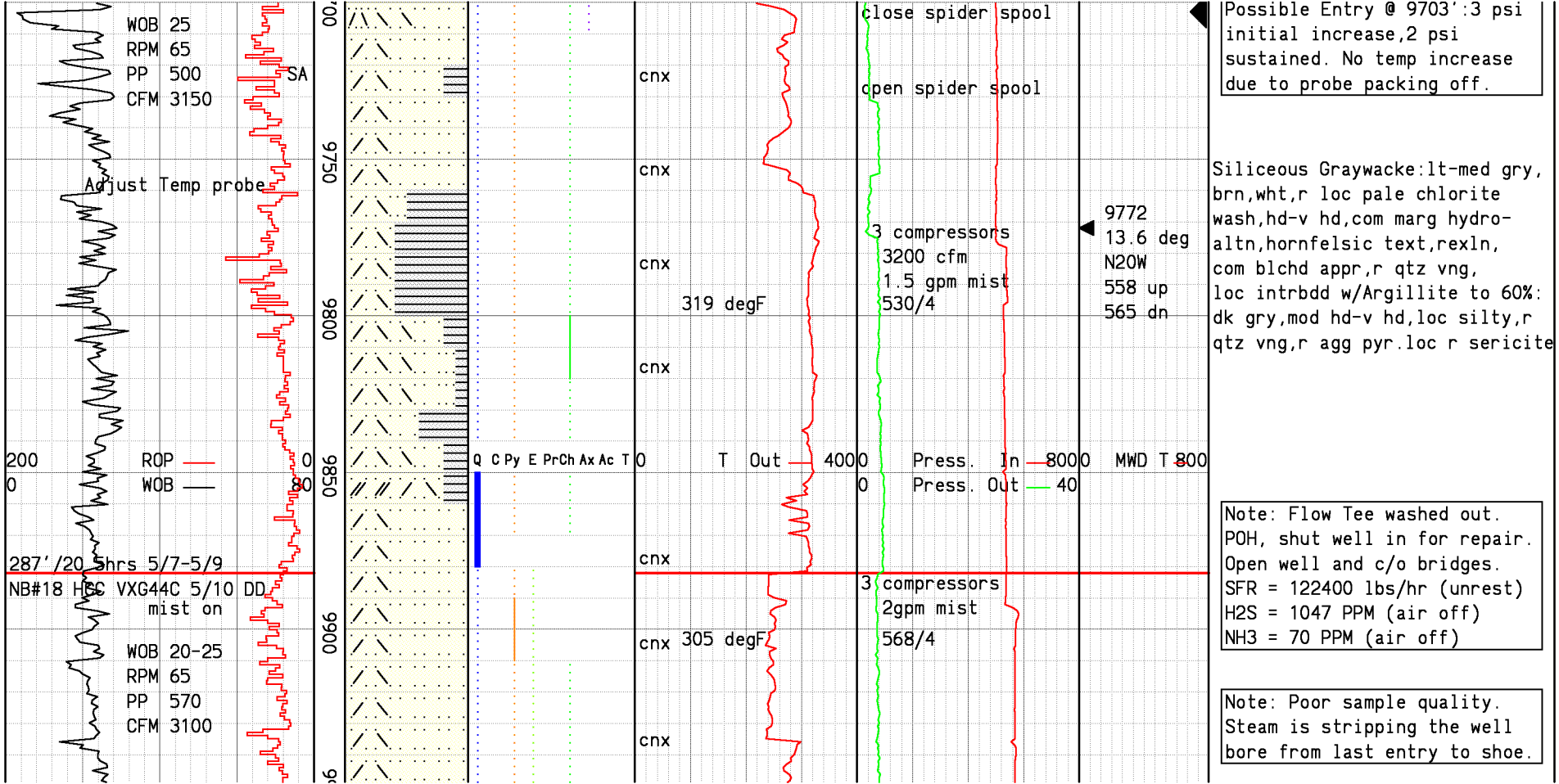
SFR = 21500 lbs/hr (unrest)
H2S = 494 PPM (air off)
NH3 = 21 PPM (air off)

Siliceous Graywacke:med gry,brn, wht,r loc pale chlorite wash,hd-hd,loc r-abund hydro-altn,loc pred wk hornfelsic text-incr w/ depth,loc grdng t/lithic app,r qtz vng,r clr-transl pink axinite,pred hematite covered from 9000' down,mnr-abund argillite slough in samples.

Gaining 5 bph water.


purge sensor lines
purge sensor lines
purge sensor lines
SA
WOB 20
RPM 65
PP 376
CFM 3150
9250
9300
9350
9400
cnx
cnx
cnx
193 degF
cnx
cnx calibrate temp
cnx
202 degF
cnx
cnx
381/1
383/2
9280'
14.5 deg
N30W
510 up
510 dn
Steam Entry @ 9230':initial 6 psi press increase,6 psi sustained,initial temp increase of 7 degF,sustained increase of 7 degF.
Steam Entry @ 9292':initial 4 psi press increase,2 psi sustained,initial temp increase of 1 degF,sustained increase of 0 degF.
Siliceous Graywacke:lt-med gry, brn,wht,r loc pale chlorite wash,hd-v hd,com marg hydro-altn,pred wk hornfelsic text,loc grdng t/lithic app,r qtz vng,r clr-transl pink axinite,loc intrbdd w/Argillite to 70%:dk gry,mod hd-v hd,loc silty, occ micaceous luster,r qtz vng,r agg/vn pyr.
Possible Steam Entry @ 9392': 2 psi stable increase, sustained temp incr of 2 degF
Steam Entry @ 9460':16 psi initial increase,10 psi


purge sensor lines
purge sensor lines 5/5 ML
purge sensor lines
purge sensor lines
purge sensor lines
520'/26hrs
NB#17 HCC VXG44C 5/6 ML
purge sensor lines
purge sensor lines
9500
9550
9600
9650
cnx
203 degF
416/3
236 degF
471/3
318 degF
499/3
restart circ system
swap compressors
degF.
Possible Entry @ 9480':3 psi initial increase,3 psi sustained,temp probe packing off,purging sensor lines.
Stop gaining water.
Probable Entry @ 9517:3 psi initial increase,3 psi sustained.
Probable Entry @ 9524:8 psi initial increase,7 psi sustained.
Steam Entry @ 9540':11 psi initial increase,11 psi sustained.
Probable Entry @ 9565':12 psi initial increase,11 psi sustained.
Probable Entry @ 9597':37 psi initial increase,42 psi sustained.
Probable Entry @ 9630':10 psi initial increase,10 psi sustained.
SFR = 84800 lbs/hr (unrest)
H2S = 550 PPM (air off)
NH3 = 55 PPM (air off)

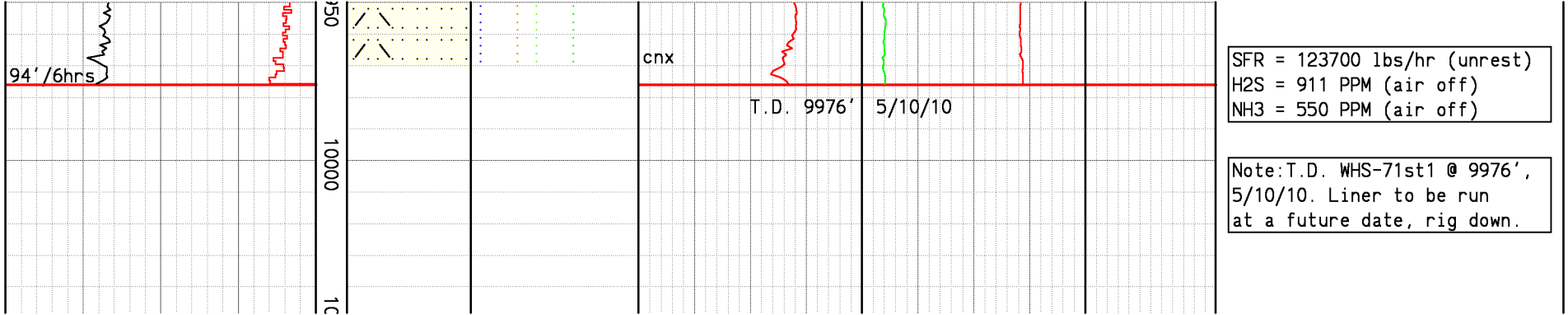


Possible Entry @ 9703':3 psi initial increase,2 psi sustained. No temp increase due to probe packing off.

Siliceous Graywacke:lt-med gry, brn,wht,r loc pale chlorite wash,hd-v hd,com marg hydro-altn,hornfelsic text,rexln, com blchd appr,r qtz vng, loc intrbdd w/Argillite to 60%: dk gry,mod hd-v hd,loc silty,r qtz vng,r agg pyr.loc r sericite

Note: Flow Tee washed out. POH, shut well in for repair. Open well and c/o bridges.
SFR = 122400 lbs/hr (unrest)
H2S = 1047 PPM (air off)
NH3 = 70 PPM (air off)

Note: Poor sample quality. Steam is stripping the well bore from last entry to shoe.



SFR = 123700 lbs/hr (unrest)
H2S = 911 PPM (air off)
NH3 = 550 PPM (air off)

Note:T.D. WHS-71st1 @ 9976',
5/10/10. Liner to be run
at a future date, rig down.