TECTON GEOLOGIC

COMPANY	Sierra Geothermal Power
WELL	26-19 ST1
FIELD	Alum
COUNTY/STATE	Esmeralda/Nevada
WELL HEAD COORDINATES	
37.91N,117.67W Sect29,T1N,R38.5E	
ELEVATION	4993.57'
SPUD DATE	2/28/10
TD DATE	3/9/10
TOTAL DEPTH	4400
TRUE VERTICAL DEPTH	4400
TD LOCATION	000'N, 000'E of wellhead
CONTRACTOR/RIG	Xtreme #4
COMPANY REPRESENTATIVE	Jerry Hamblin, Rod Bray

LOG INTERVAL

DATE LOGGED	2/28/10	TO	3/9/10
DEPTH LOGGED	852'	TO	4400
MUD DRILLING	852'	TO	4400
AIR DRILLING	N/A	TO	N/A
LOG SCALE	1:600	UNIT NO.	

LOGGING GEOLOGISTS

Lamont, Schepflin

Feinberg

HOLE

12.25"	TO	805'
6.125"	TO	4400'
0"	TO	0'
	TO	
	TO	
	TO	

CASING

7"	FROM	0'	TO	808'
4.5"	FROM	0'	TO	3514'
	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		

SYMBOLS

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

LITHOLOGY

- Clay
- Mudstone
- Siltstone
- Sandstone
- Conglomerate
- Quartzite
- Quartz Veins
- Rhyolite
- Diorite
- Tuff Seds
- Tuff
- Breccia
- Limestone
- Dolomite
- Marble
- Schist
- Undiff Carbonates
- Dike
- Altered Zone

REMARKS

All depths from KB
KB = 12.5'

ml = Matthew Lamont
as = Andrew Schepflin
jf = Jeremy Feinberg

SECONDARY MINERALS

Q	= Quartz	Rare	<< 1%
C	= Calcite	Trace	< 1%
P	= Pyrite	Minor	1% to 4%
Pr	= Pyrrhotite	Common	4% to 7%
H	= Hematite	Abundant	7% to 10%
Ch	= Chlorite		> 10%
Cl	= Clay		
S	= Sulfur		
A	= Alum (Alunite)		

Tecton Geologic | Alum 26-19 ST | Scale 1: 600

Drilling Data
ROP
250 ft/hr 0
Weight on Bit
0 k lbs 80

Depth (ft)

Lithology

Minerals
Quartz
Calcite
Pyrite
Hematite
Alum
Chlorite
Sulfur
Galena
Sanidine
Chalcopyrite
Epidote
Clay

Temperatures
Temperature In
Temperature Out
50 deg F 250

Circulation
Pit Total
200 bbls 1200
Pump Pressure
0 psi 4000

Descriptions

Samples f/90' t/800' collected prior to logging Alum 26-19 were identified at the end of the well.

SANDSTONE:gry,olive grn, pale grn,pale yellow,sft-mod hd,fn-crs gr,prly srtd, mod cemented,str calcareous, frsh,pred tuffaceous,occ str blchd,sub rndd to ang grs, mod rexln,r qtz,r-com calc,r calc micro vng,r disem & agg pyr,pred lim altd grs until 120',r hem,graded to SILTSTONE:wht,tan,pale grn, olive grn,pale orng,sft-frm, r occ crs lithics, calcareous,r disem & pyr,r hem,graded to MUDSTONE:pale orng,tan,olive grn,v fn slty-aphan,sft-frm,com clay altd grs,mixed with CLAY: tan,wht,v sft,slty,sticky, amorph,pr-no relic text.

SANDSTONE:lt-med gry,salt& pepper,wk-mod grn cast,mod fm-v hd,loc crumb,ang-subrdd grs,pred mod well strtd,loc ind gr bndrys,loc wk-mod rexl,r loc druzy qtz, r-mnr diss calc,r-mnr diss & vn pyr,r loc horn alt to chl, r loc gypsum,r-mnr silty matrix. SILTSTONE:lt-med gry,buff,red-brn,loc grn cast,mod sft-mod hd,loc sandy,loc gypsum bearing, r-mnr diss calc,r-tr fn lams. CLAY:lt-med gry, med soluble,r loc sticky. TUFF: Med gry,buff,dull, waxy,hd-v hd,pred ind gr brnrys,r loc flattened k-spar grs.

SANDSTONE:lt-med gry,wht, tan,olive gry-olive grn,occ salt & pepper,mod mod hd-v hd,loc crumb,ang-subrdd grs,prly-mod well strtd,loc ind gr bndrs,loc wk-mod rexl,r loc druzy qtz, r-mnr disem calc,tr-mnr disem/ agg/vng pyr,r loc gypsum,r-mnr silty matrix,SILTSTONE: lt-med gry,tan,pale orng, red-brn,loc olive grn,mod sft-mod hd,loc sandy,loc gypsum bearing,r calc,com lams,MUDSTONE:brnsh gry, tan,v slty-aphan,frm-mod hd,com bedd with vis sandstone & siltstone,tr-mnr disem/agg/vng pyrCLAY: lt-med gry,tan,med soluble, amorph,r loc sticky.

Abandon original hole and start Alum 26-19 ST on 2/28/10 making new 6 1/8" hole f/852'.

SILTSTONE:med-dk gry,dk brn, occ tan,frm-mod hd,fissle,occ laminated,wk-str calcareous, r agg & vn pyr,tr metallic stringers (magnetic),r qtz micro vng,loc grading to SANDSTONE:tan-white,mod hd-hd,mod rexln,fn-med gr,com lith frags,calc-siliceous cement,prly srtd,r lithic frags,loc r agg pyr. 30-40% CLAY:lt gry-white,

No Sample
No Sample
No Sample
No Sample
No Sample
No Sample
No Sample

NB#3 HTC TSXA6144C 2/28 m1
47'/1hr 3/1 as
RRB#1 Hughes HC406ZX
WOB 6K
PP 1700
SPM 65

Temp Out Removed Due To Magnet
BUT=70 degF
68/71 degF
75/80 degF

no losses
no losses 1509 psi
incr pump rate
no losses 2266 psi

soft,aphan-silty,no relic text,disintegrates in water.

ml

RRB#1 Hughes HC406ZX

1031'
5.36 deg

BUT=82 degF

80/83 degF

no losses 1699 psi

WOB not tracking,6Klbs entered f/tour sheet for interval 892-1175'

1165
switch to mud pump 2

build volume

intentionally slow down ROP

1164'
7.20 deg

1185'
7.47 deg

80/81 degF

no losses 1517 psi

SILTSTONE:wht,med-dk gry, brnsh gry,tan,frm-mod hd, v fn silt,fissle,r loc occ laminated,pred wk calcareous, r qtz & calc,r disem & agg pyr,v r qtz micro vng,occ grading to SANDSTONE:wht,lt-dk gry,salt & pepper appr, mod hd,mod cemented,mod rxln, fn-crs gr,prly-mod srtd,r v crs lithics,mod vis gr bndrs,wk-mod calcareous, mod silic f/1130' t/1160', r felds,MUDSTONE:brnsh gry, v slty-aphan,sft-frm,occ bedd with vis sandstone,r disem/agg pyr,~10-30% Clay, wht,tan,sft,slty,mod-no relic text,disintegrates in water,~50-60% clay f/1210'-1220'.

flat motor belts break

repair flat motor belts

1288'
7.47 deg

87/89 degF

1617 psi

3/2 as

250 ROP 0
0 WOB 80

Q C P H A Ch S G Sn Cp E C1

50 T In 250
150 T Out 250

0 PSI 4000
200 PVT 1200

1380'
6.24 deg

89/92 degF

1507 psi

CLAY:Wht,sft,sticky,r-absnt relic text,different than previous noted clays,doesn't dissolve in water,peppered w/ black frags and/or minerals.

1437'
4.92 deg

1497'
3.87 deg

90/93 degF

1622 psi

WOB not tracking,11Klbs entered f/tour sheet for interval 1175-1560'

1529'
2.81 deg

1565'
0.70 deg

build volume

CLAY:Wht,sft,sticky,r-absnt relic text,consistent color and texture,doesn't dissolve in water,peppered w/black frags and/or minerals.

WOB 10K
PP 1600
SPM 62

1591'
0.53 deg

87/89 degF

1693 psi

1688'
0.26 deg

92/95 degF

1600 psi

CLAY:Wht,sft,sticky,r-absnt relic text,consistent color and text,doesn't dissolve in water,peppered w/black frags and/or minerals.

ml

1729'
0.00 deg

build volume

92/95 degF

no losses 1745 psi

WOB not tracking,10Klbs entered f/tour sheet for interval 1560-1875'

1804'
0.18 deg

WOB 10K
PP 1600
SPM 62

reposition temp out

1872'
0.00 deg

CLAY:Wht,sft,sticky,r-absnt relic text,consistent color and text,doesn'tdissolve in water,peppered w/black frags and/or minerals,mixed w/ SANDSTONE:wht,lt grn,mod hd-hd,mod cemented,fn-loc v crs, pred med gr,gd vis gr bndrs, prly srtd,pred silic cement, r-mnr wk calc,salt & pepper appr,wk chlor wash,r qtz & calc,r qtz vng,r disem & agg pyr,r pebble sz feldspar, abund clay altd grs.

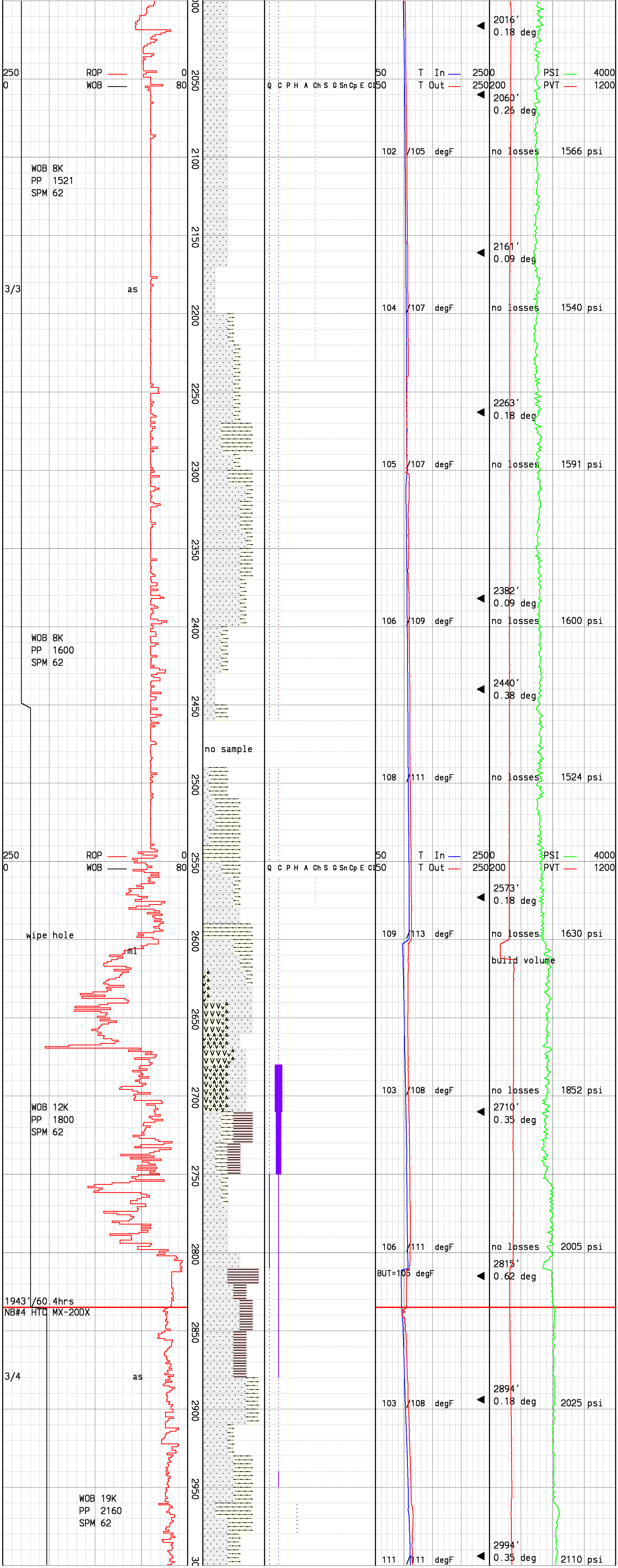
95/98 degF

no losses 1868 psi

1946'
0.09 deg

99 /102 degF

no losses 1547 psi



CLAY:Wht,sft,sticky,r-absnt relic text,consistent color and text,doesn't dissolve in water,peppered w/black frags and/or minerals,mixed w/ SANDSTONE:wht,lt-occ dk grn, frm-hd,mod cemented,fn-loc crs,pred med gr,gd vis gr bndrs,prly srtd,pred silicic cement,r-tr wk calcareous, salt & pepper appr,wk chlor cast,r qtz & calc,r qtz vng, r disem & agg pyr,abund wk clay altd grs.

WOB not tracking,8Klbs entered f/tour sheet for interval 1875-2450'

SANDSTONE:white-lt gry,occ pale grn cast,mod hd-vhd,fn-med gr,dist gr bndrs,prly srtd,com ang lith frags,fresh appr,loc rexln,pred silicic cement,r calcic cement,r qtz microvng,r disem qtz,r agg & vn pyr.intrcltdd w/SILTSTONE: blk-dk brn,com lt gry,mod hd-hd,fissle,wkly foliated,pred silicic cement.

Clay:lt gry,water soluble, v soft,unnatural appearance.

Hands catching samples.No sample caught f/2470-2490' No apparant change in Lith

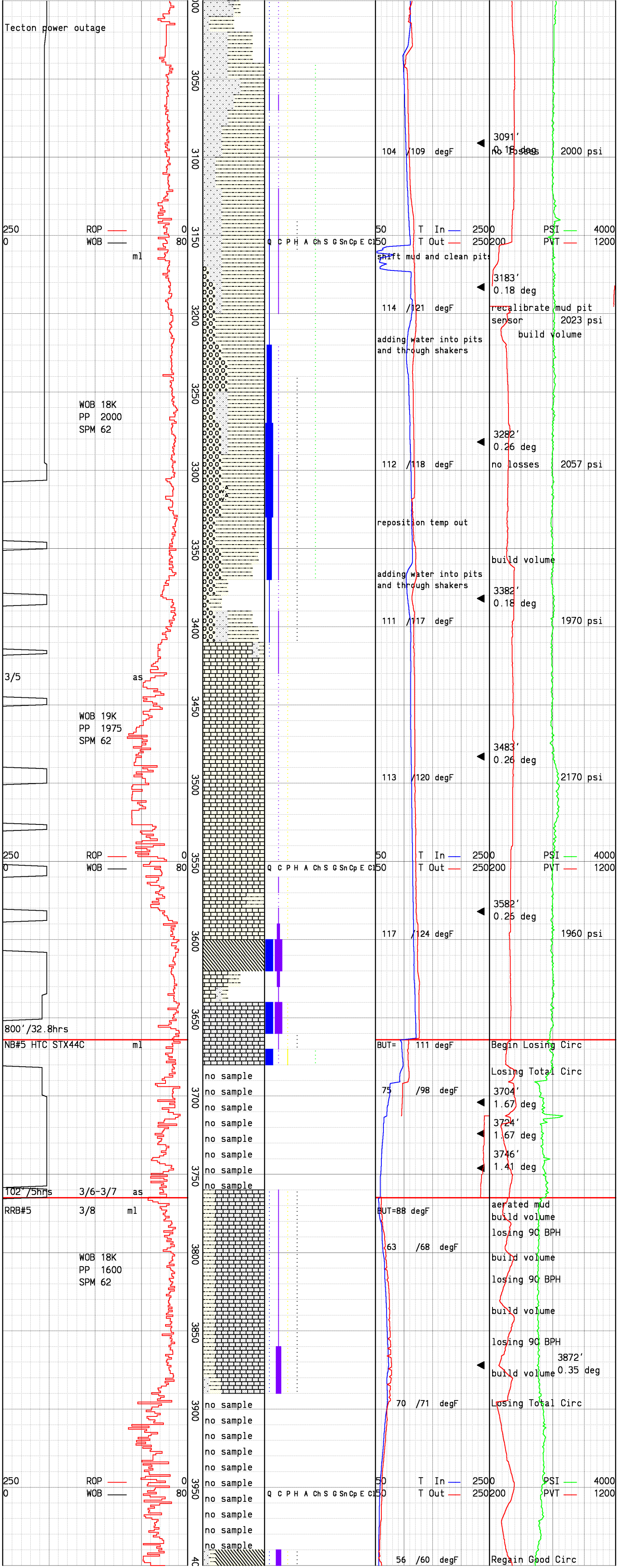
Rust colored clay f/2510-2530

SANDSTONE:white-lt gry,loc pale grn cast,mod hd-vhd,fn-med gr,dist gr bndrs,prly srtd,com ang lith frags,fresh appr,loc rexln,pred silicic cement,r calcic cement,r qtz microvng,r disem qtz. intrcltdd w/SILTSTONE:lt-dk gry,com blk,mod hd-hd,fissle, wkly foliated,pred silicic cement,loc r qtz frac fill and microvng.

WOB not tracking,12Klbs entered f/tour sheet for interval 2450-2810'

SANDSTONE:wht,lt gry,occ pale grn cast,mod sft-v hd,fn-v crs gr,prly srtd,pred tuffaceous,tuff appr starting @ 2610',mod-gd vis gr bndrs, com ang lith frags,com clay altd,pred silic cement,r-tr calcareous,fn ashy mtx,r-tr qtz & qtz vng,r calc vng,r-abund calc,r disem & agg pyr, BRECCIA:wht,lt-dk gry,brn,mod hd-v hd,fn-pebble sz ang lithic frags,CLAY:wht,gry,v sft,silty,water soluble,falls apart,SILTSTONE:lt-dk gry,lt brn,firm-mod hd,v fn silt,r occasional phyll shn,wk fol, pred silic cement,r qtz vng, MUDSTONE:blk,dk gry,v slty-aphan,sft-frm,occ lamin,wk phyll shn,fissle,r disem/agg pyr,TUFF:wht,lt grn,fn-pebble sz ang lithics w/i a fn ashy mtx,mod weldd-occ v dense weldg.

WOB not tracking,19Klbs entered f/tour sheet for interval 2810-3020'



SILTSTONE:lt gry-blk,mod hd-v hd,fissle,com ang lith frags,occ muddy text,occ mod rexln,loc foliated,dom calcic cement,com silicic cement,tr qtz vng,r qtz microvng,r-tr calc vng,r agg pyr.Intrclltd w/SANDSTONE:lt-dk gry,com white,mod hd-v hd,fn-med gr, dom lithic w/fn-med ang lith frags,occ fresh,r-com brecc fabric (brittle red-lt gry aphan matrix w/med gr lith frags),occ sucrose text,com rexln,tr disem & vn qtz,r-tr disem & vn calc,r agg pyr.

WOB not tracking,18Klbs entered f/tour sheet for interval 3020-3295'

SILTSTONE:lt-dk gry,wht,tan, occ pale grn,mod hd-v hd, silic-occ v silic cement, britt,rxln,mnr fissle text, com fn-pebble sz lithic frags,r qtz & calc vng,r disem & agg pyr,r chlor,r hem,CONGLOMERATE:wht,gry,tan, red,mod hd-hd,silic,fn-cobble+ sz lithic frags, slty-sndy mtx,sub rndd-rndd lithics,lithics pred blk chert,tr-abund qtz vng,r-tr calc vng,r hem altd,CLAY:wht, gry,sft,slty,mod sticky, amorph,no relic text.

WOB not tracking,19Klbs entered f/tour sheet for interval 3295-3635'

LIMESTONE:tan-lt brn,hd-v hd, friable,dom clastic text,loc dom silty text,loc r oolithic com organic,loc com surface altrd to blk hornfels,r-tr disem calcite,r agg pyr.

WOB not tracking,17Klbs entered f/tour sheet for interval 3635-3700'

Felsic Intrusive:White,v hd, crystalline,terminated qtz xls,abun disem calc, abun calc microvng.

Begin losing circulation @ 3664',drill ahead,lose total circulation @ 3686', drill ahead blind to 3765' while adding LCM,POOH to switch to aerated mud drilling.

DOLOMITE:slvr,lt-med gry, sft-mod hd,frm,phyllitic, fissle,calcareous,r qtz vng, tr disem calc & calc micro vng,Siltstone:gry,olive grn, red,brn,com rxln appr,pred frsh appr,r qtz vng,tr disem & vng calc,r disem & agg pyr, r occ pebble sz lithics,r hem,poss slough from up hole, mnr-com sandstone cuttings.

WOB not tracking,18Klbs entered f/tour sheet for interval 3865-3905'

Begin losing total circulation @ 3895',drill ahead blind from 3895' to 3994' where good circ was reestablished.

FELSITE:slvr,lt-med gry,sft-

Tecton Geologic | Alum 26-19 ST | Scale 1: 600

250 ROP 0
0 WOB 80
Q C P H A Ch S G Sn Cp E C1
50 T In 2500
150 T Out 250
0 PSI 4000
200 PVT 1200

800'/32.8hrs
NB#5 HTC STX44C ml
102'/5hrs 3/6-3/7 as
RRB#5 3/8 ml
WOB 18K
PP 1600
SPM 62

3550 3600 3650 3700 3750 3800 3850 3900 3950 4000 4050 4100 4150 4200 4250 4300 4350 4400 4450 4500

no sample
3/9 as
wipe hole t/4000'
WOB 19K
PP 1600
SPM 62

117 /124 degF
BUT= 111 degF
75 /98 degF
BUT=88 degF
63 /68 degF
70 /71 degF
56 /60 degF
72/77 degF
69/75 degF
60/72 degF

3582'
0.26 deg
1960 psi
Begin Losing Circ
Losing Total Circ
3704'
1.67 deg
3724'
1.67 deg
3746'
1.41 deg
aerated mud
build volume
losing 90 BPH
build volume
losing 90 BPH
3872'
0.35 deg
build volume
Losing Total Circ
Regain Good Circ
losing 20 BPH
1180 psi
losing 40bph
losing 30bph 1570 psi

friable,dom clastic text,loc dom silty text,loc r oolithic com organic,loc com surface altrd to blk hornfels,r-tr disem calcite,r agg pyr.

WOB not tracking,17Klbs entered f/tour sheet for interval 3635-3700'

Felsic Intrusive:White,v hd, crystalline,terminated qtz xls,abun disem calc, abun calc microvng.

Begin losing circulation @ 3664',drill ahead,lose total circulation @ 3686', drill ahead blind to 3765' while adding LCM,POOH to switch to aerated mud drilling.

DOLOMITE:slvr,lt-med gry, sft-mod hd,frm,phyllitic, fissle,calcareous,r qtz vng, tr disem calc & calc micro vng,Siltstone:gry,olive grn, red,brn,com rxln appr,pred frsh appr,r qtz vng,tr disem & vng calc,r disem & agg pyr, r occ pebble sz lithics,r hem,poss slough from up hole, mnr-com sandstone cuttings.

WOB not tracking,18Klbs entered f/tour sheet for interval 3865-3905'

Begin losing total circulation @ 3895',drill ahead blind from 3895' to 3994' where good circ was reestablished.

FELSIC INTRUSIVE:slvr,lt-med gry,mod hd,frm,britt,v fn felds mtx,r qtz vng,tr disem & vng calc,r disem & agg pyr, r hem,grades into Schist:red, brn,blk,multi colored,firm-mod hd,str phyll shn,fiss, fol,micaceous,scaly-fibrous text,r qtz & qtz vng,mnr-abund calc,r disem pyr, SILTSTONE:gry,olive grn, red,brn,pred str phyll shn, abund frsh appr,com calcareous,r qtz vng,tr disem & vng calc,r disem & agg pyr,r occ pebble sz lithics.

MICA SCHIST:v-fn samples (fine sand),30% brown mica books,com clr mica,r agg pyr,r chlor,r-mnr disem & vn calc,Intrcltd w/ Intrusive:dom clr qtz,com milky,r agg pyr,r agg pyrrhotite.

WOB not tracking,19Klbs entered f/tour sheet for interval 3905-4340'

losing a steady 60 bph f/4113-4340'.

FELSIC INTRUSIVE:slvr,lt-med gry,mod hd,frm,britt, terminated qtz,v fn felds mtx,tr-abund qtz vng,tr-com disem & vng calc,r disem & agg pyr,r hem,tr brn/blk mica,r agg pyrrhotite,r agg pyr,loc r chlor.Intrcltd w/ SILTSTONE:olive gry,slightly meta,wkly foliated,r agg pyr, LIMESTONE:wht,tan,gry,dk gry, sucrose,marbley,mod hd-hd,str calcareous,xln,r qtz,r-tr disem calc,r disem & agg pyr, SILTSTONE:slvr,gry,sft-frm, phyll,fissle,r-com frsh appr, r qtz,r disem calc,r disem & agg pyr.

TD Alum 26-19 ST1 @ 4400', run 4.5" 11.6# J-55 BUT casing from surface to 3514'.