



Santa Rosa, CA

COMPANY Calpine Corporation
 WELL Happy Jack 12
 FIELD Geysers
 COUNTY/STATE Sonoma County, California
 WELL HEAD COORDINATES
 N 416524.0 E 1769412.4
 ELEVATION 1934.9'
 SPUD DATE 2/06/2009
 TD DATE 3/24/2009
 TOTAL DEPTH 7622'
 TRUE VERTICAL DEPTH 7247'
 TD LOCATION N/A
 CONTRACTOR/RIG Kenai Rig #3
 COMPANY REPRESENTATIVE Silva, Gamble

LOG INTERVAL

DATE LOGGED 2/06/2009 TO 3/28/2009
 DEPTH LOGGED 69' TO 7622'
 MUD DRILLING 69' TO 1751'
 AIR DRILLING 1751' TO 7622'
 LOG SCALE 1:600 UNIT NO.
 LOGGING GEOLOGISTS
 J. Everts, A. Schepflin, K. Clark
 J. Feinberg, D. Dunlap

HOLE

17.5 TO 515
 12.25 TO 1751
 8.5 TO 7622
 TO
 TO

CASING

13.375 FROM 0 TO 500
 9.625 FROM 0 TO 1725
 7 FROM 0 TO 7622
 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 Casing Shoe
 Steam/Water Entry Flow Test
 Deviation Survey Cored Interval
 No Recovery

LITHOLOGY

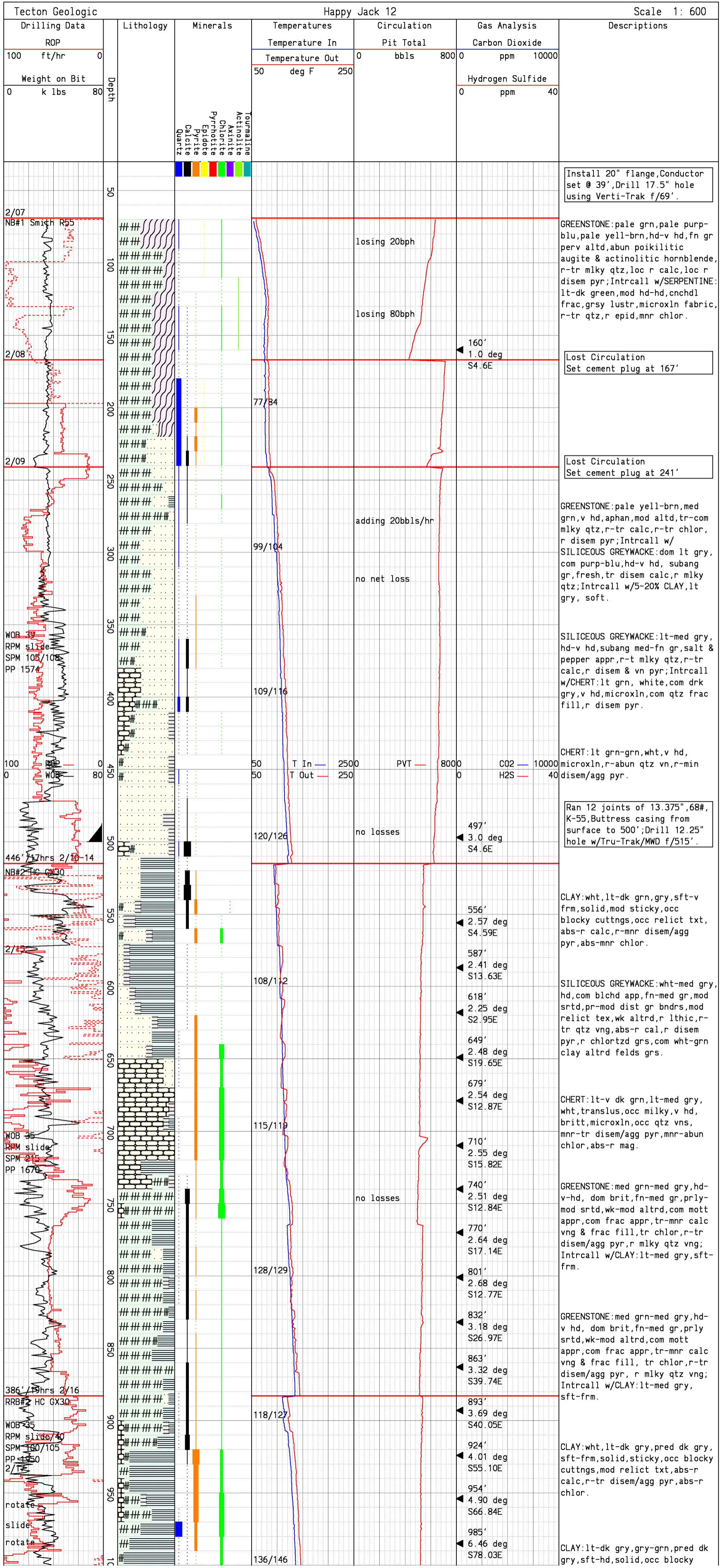
	Argillite		Argillaceous Grywcke
	Chert		Volcanic Graywacke
	Phyllite		Siliceous Graywacke
	Greenstone		Weak Foliation
	Serpentine		Strong Foliation
	Blueschist		Marginal Alteration
	Felsite		Pervasive Alteration
	Clay		Weakly Hornfelsic
	Andesite		Strongly Hornfelsic
	Lithic Graywacke		

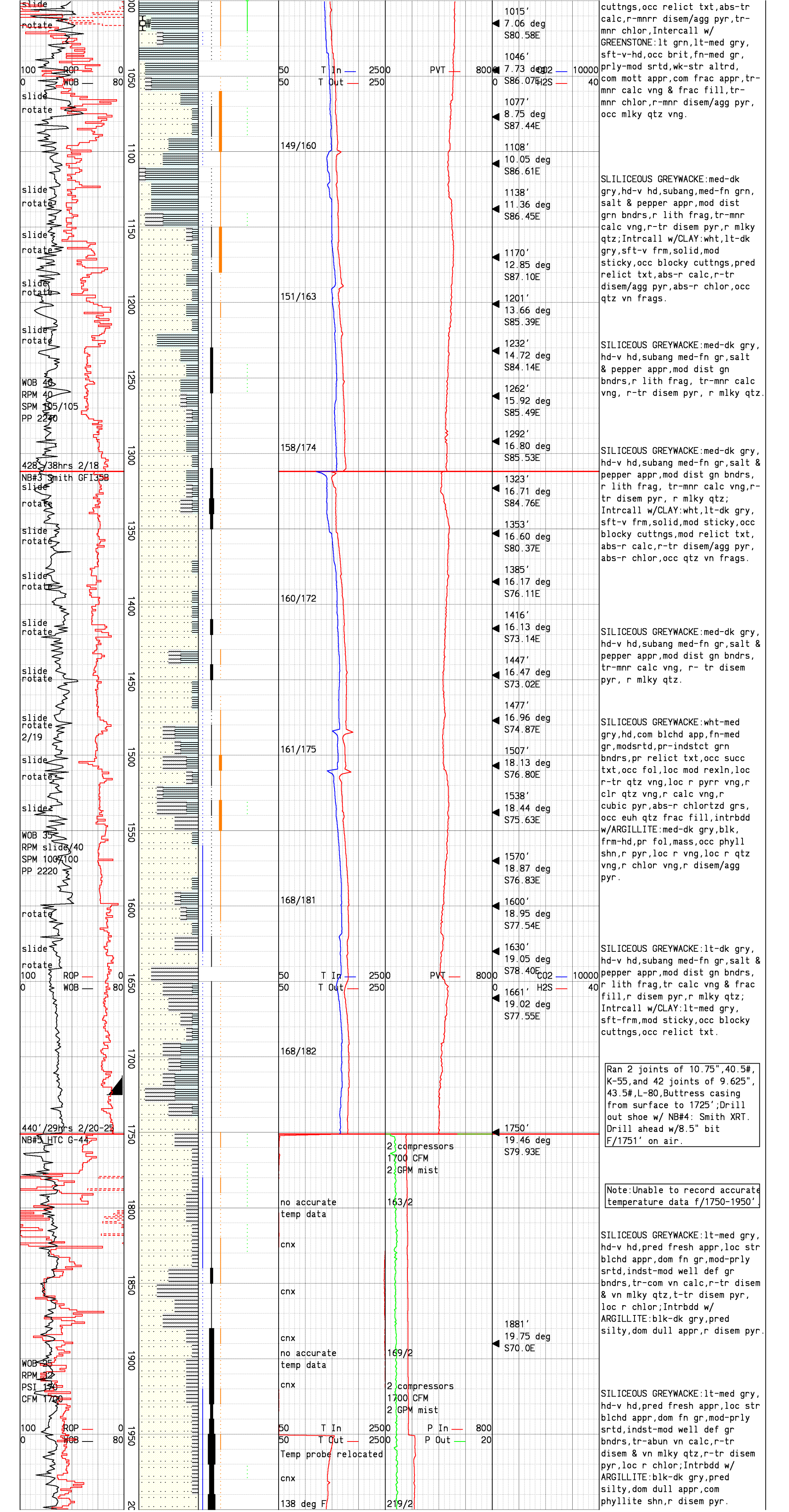
REMARKS

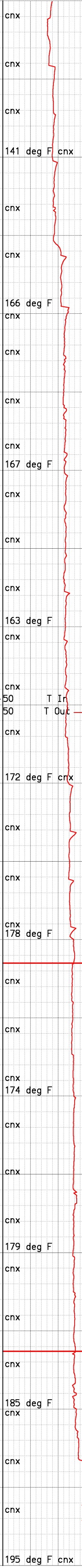
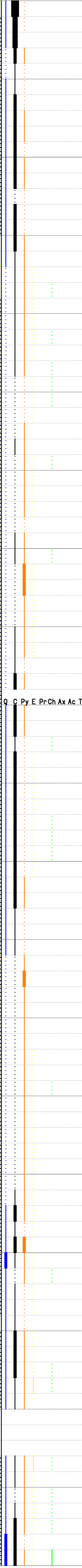
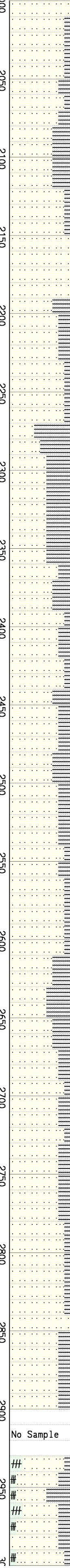
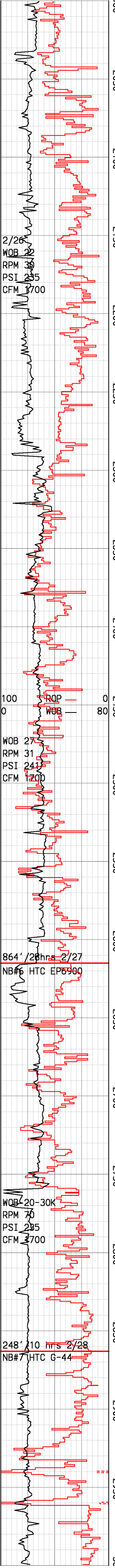
Drill grass roots injection well for the Unit 5 & 6 steam field
 All depths from Kelly Bushing: KB = 30'
 cnx = connection

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			







cnx
 141 deg F cnx 214/2
 cnx
 166 deg F
 cnx 231/2
 cnx
 167 deg F 241/2
 cnx
 163 deg F 248/2
 cnx
 172 deg F cnx 240/2
 cnx
 178 deg F 241/2
 cnx
 174 deg F 230/2
 cnx
 179 deg F 233/0
 cnx
 185 deg F 242/0
 cnx
 195 deg F cnx 255/2

2146'
 18.5 deg
 S68.1E
 2421'
 17.2 deg
 S85.0E
 2567'
 15.7 deg
 S68E
 2724'
 18.0 deg
 S65E
 2817'
 19.5 deg
 S76E

SILICEOUS GREYWACKE:lt-med gry, hd-v hd,pred fresh appr,loc str blchd appr,dm fn gr,mod-prly srted,indst-mod well def gr bndrs,tr-abun vn calc,r-tr dise & vn mlky qtz,r-tr dise pyr,loc r chlor;Intrbdd w/ ARGILLITE:blk-dk gry,pred silty,dm dull appr,com phyllite shn,r dise pyr.

SILICEOUS GREYWACKE:lt-med gry, hd-v hd,pred fresh appr,com blchd appr,dm fn gr,mod-prly srted,indst-mod well def gr bndrs,tr-mnr vn calc,r-tr dise & vn mlky qtz,r-tr dise pyr, loc r chlor;Intrbdd w/ ARGILLITE:blk-dk gry,pred silty,dm dull appr,com phyllite shn,r qtz frac fill,r dise pyr.

SILICEOUS GREYWACKE:lt-dk gry, hd-v hd,pred fresh appr,occ blchd appr,dm fn gr,mod-prly srted,indst-mod well def gr bndrs,r-mnr vn calc,r-tr dise & vn mlky qtz,r-tr dise pyr,r dism pyr,loc r chlor.

SILICEOUS GREYWACKE:lt-med gry,hd-v hd,pred fresh appr,com blchd appr,dm fn gr,mod-prly srted,indst-mod well def gr bndrs,tr-mnr vn calc,r-tr dise & vn mlky qtz,r-tr dise pyr, locr chlor;Intrbdd w/ARGILLITE: blk-dk gry,pred silty,dm dull appr,com phyllite shn,r qtz frac fill,r dise pyr.

Steam entry F/2440-2500'.
 0#, 8 deg F initial incr,
 0#, 8 deg F stable incr,
 trace steam only.

Steam entry F/2590-2610'.
 0#, 8 deg F initial incr,
 0#, 8 deg F stable incr,
 trace steam only.

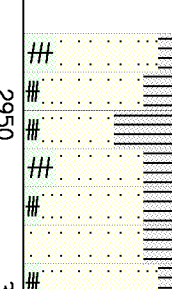
SILICEOUS GRAYWACKE:wht,lt-med gry,loc salt&peppr appr,hd-v hd,pred fresh appr,com blchd appr,fn-med gr,pred fn gr,mod-prly srted,indst-mod well def gr bndr,r-mnr vn mlky qtz,r loc druzi qtz,r loc subhed qtz,tr-mnr vn calc,r-tr dise pyr& loc pyr vng, r-tr epid:loc canary yell;epid assc/w qtz and calc vng,loc r chl&chl stn,r loc disag pnk ax;Intrbdd w/ ARGILLITE:blk-dk gry,pred silty,dm dull appr,com phyll shn,r-tr qtz frac fill,r-mnr dise pyr.

Steam entry F/2840-2860'.
 0#, 4 deg F initial incr,
 0#, 4 deg F stable incr,
 trace steam only.

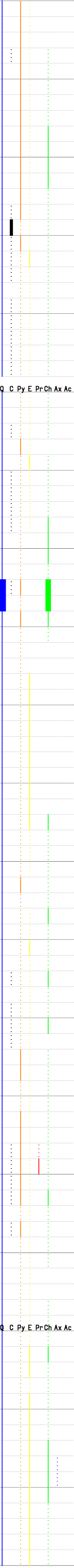
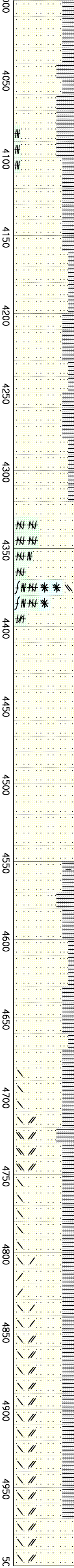
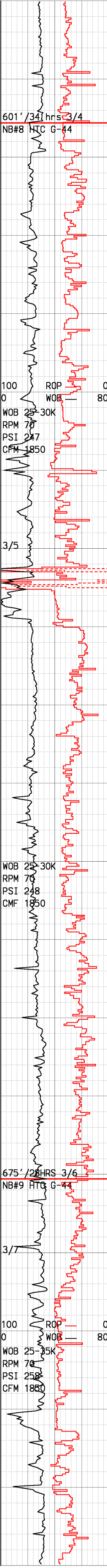
Steam entry F/2930-2940'.
 10#, 11 deg F initial incr,
 8#, 7 deg F stable incr.

SILICEOUS GRAYWACKE:wht,lt-dk gry,loc salt&pepper appr,loc red-pnk stn,hd-v hd,pred fresh appr,com blchd appr,fn-med gr, pred fn gr,mod-prly srted,indst-mod well def gr bndrs,r-mnr vn

No Sample



3C



cnx
 4036' 22.25 deg S88E
 4100 195 deg F cnx 237/0
 4150 23.25 deg N90E
 4200 195 deg F 238/0
 4300 196 deg F 239/3
 4350 23.0 deg N90E
 4400 197 deg F 248/3
 4500 195 deg F cnx 248/3
 4600 197 deg F cnx 248/3
 4700 197 deg F 249/3
 4800 195 deg F 264/3
 4900 197 deg F cnx 258/3
 4950 197 deg F cnx 256/3

cnx
 4159'
 4211'
 4254'
 4347'
 4372'
 4588'
 4680'
 4862'

bndrs, loc well def, loc v indst, r-tr vn mlky qtz, r loc subhed qtz, occ euhed qtz, r-tr disem pyr & loc pyr vng; loc incip alt to hem, r-tr epid: loc canary yell; loc microvn epid, epid assc/w qtz vng & loc pyr, loc r chlor & chlor stn; Intrbdd w/ ARGILLITE: blk-dk gry, pred silty, dom dull appr, loc phyll shn, r qtz frac fill, r disem pyr; with frags of BLUESCHIST: pale wht-blue, v hd, aphan, mod altd, r mlky qtz, r mafic mins w/ indst bndrs.

Steam entry at 4211'.
 15#, 0 deg F initial incr, 0#, 0 deg F stable incr.

Steam entry at 4254'.
 10#, 0 deg F initial incr, 0#, 0 deg F stable incr.

Steam entry F/4280-4300.
 5#, 1 deg F initial incr, 5#, 1 deg F stable incr.

Steam entry at 4347'.
 15#, 5 deg F initial incr, 0#, 0 deg F stable incr.
 Steam entry at 4351'.
 15#, 0 deg F initial incr, 0#, 0 deg F stable incr.

SILICEOUS GRAYWACKE: wht, lt-dk gry, com salt&pepper appr, pred dk gry, hd-v hd, loc fresh appr, com blchd appr, pred rexl appr, fn-med gr, pred fn gr, mod-prly srted, pred prly srted, pred indst gr bndrs, loc well def, loc v indst, r-mnr vn mlky qtz, r loc druzi qtz, tr-mnr vn calc; loc hem stn calc, r-tr disem pyr & loc pyr vng; loc incip-mod alt to hem, r-tr epid: loc canary yell; loc microvn epid, epid assc/w qtz vng & loc pyr, loc r chlor & chlor stn.

SILICEOUS GRAYWACKE: wht, lt-dk gry, com salt&pepper appr, pred dk gr, hd-v hd, r fresh appr, pred blchd appr, pred rexl appr, fn-crs gr, pred fn gr, mod-prly srted, pred prly srted, pred indst gr bndrs, loc well def, loc v indst, r-mnr vn mlky qtz, r loc druzi qtz, loc r vn calc; loc r-tr disem pyr & loc pyr vng; loc incip-mod alt to hem, r-tr epid: loc canary yell; loc microvn epid, epid assc/w qtz vng & loc pyr, loc r chlor & chlor stn, r mag; Intrbdd w/ ARGILLITE: blk-dk gry, pred silty, dom dull appr, r loc cren, r qtz frac fill, r-tr disem pyr.

Steam entry at 4804'.
 7#, 1 deg F initial incr, 0#, 0 deg F stable incr.
 Steam entry at 4829'.
 8#, 2 deg F initial incr, 0#, 0 deg F stable incr.
 Steam entry at 4838'.
 12#, 2 deg F initial incr, 0#, 0 deg F stable incr.
 Steam entry at 4855'.
 15#, 0 deg F initial incr, 0#, 0 deg F stable incr.

Steam entry at 4898'.
 10#, 5 deg F initial incr, 0#, 0 deg F stable incr.
 Steam entry at 4903'.
 10#, 5 deg F initial incr, 2#, 1 deg F stable incr.

SILICEOUS GRAYWACKE (pervasive weak hornfelsic alteration): wht, lt-dk gry brn-red, brn, clr, loc grn, loc mnr-com salt&pepper appr, pred red-brn, hd-v hd, loc blchd appr, pred rexl appr, pred succrc text, tr-mnr loc wk fol, fn-crs gr, pred fn gr, mod-prly

4036' 22.25 deg S88E

4159' 23.25 deg N90E

4372' 23.0 deg N90E

4588' 22.25 deg N90E

4680' 21.3 deg N88.8E

4862' 20.6 deg N83.8E

