Tecton Geologic

COMPANY	Calpine Corporation
WELL NAME	WGS 27A-2
FIELD	The Geysers
COUNTY	Sonoma
STATE	California
WELL HEAD COORDINATES	1653.27A-2
7.5' N.B.4000 W of SE corner of Sec.2, T12N, R10W,	
GROUND ELEV.	1,500 feet (MSL)
SECTION	2707' SE, 4N-15.5'
SPD. CONTRACT START DATE	10/15/2009
TD DATE	11/1/2010
TOTAL DEPTH	5767
MAX VERTICAL DEPTH	5650'
TD LOCATION	753.7' N and 355.0' E of
	2707' SE, 4N
DRILLING CONTRACTOR	Kenda Rig 1
COMPANY REPRESENTATIVES	Randy Fulcher
	Daniel McCormick

LOG INTERVALS

DATE LOGGED	11/3/2009 to 1/30/10
DEPTH LOGGED	2205 to 5767
DATE LOGGED	2/20/10 to 2/26/10
DEPTH LOGGED	2790 to 5767
DATE LOGGED	10/30/10
DEPTH LOGGED	5767

LOGGING GEOLOGISTS

Jim Kilkuskie (1/01), Patrick Dezelovich (1/01), Andrew Schlagfer (1/01), Charley Wahl (1/04), Derrick Boschmann (1/05), Steve Allnquist (1/4)

HOLE

10.625"	to	5767

CASING

30"	shoe	0	to 40
20"	shoe	0	to 1102
13.375"	shoe	0	to 786
11.75"	shoe	0	to 2205

ABBREVIATIONS

NA	New Bit	BHT	Bottom Hole Temp
RB	Re-cut Bit	C	Carbide Tooth
DB	Core Bit	NR	No Returns
WOB	Weight on Bit	LOB	Logged After Trip
SPM	Strokes per Minute	CBP	Cutter Feet per Min
PP	Pump Pressure	BPM	Bottoms Up Pump
RPM	Revolutions per Min		

LITHOLOGY

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

SYMBOLS

Alteration Log	Casing Shoe
Steam/Water Zone	Lost Circulation Zone
Resistivity Log	Gamma Ray Log
	No Recovery

REMARKS

All coupons from kelly bushing, KB = 15 feet
Well Bore Azimuth = 0
Well Making 0.5 GPM during air drilling
Switch to mud circulation at 2205 feet
circulation zones, Pump 20 plugs
Lost circulation zones encountered @ 2660', 2700', 2760', 2837', 2850', 2908', 2921', 2955'.
See stuck while pumping plug #1

STEAM ENTRIES

2447	2.5 GPM	1.5 GPM

WATER ENTRIES

No discrete entries

SECONDARY MINERALS

1 - Quartz		Vein	>1 %
2 - Calcite		Trace	1 %
3 - Epidote		Minor	1-5 %
4 - Chlorite		Common	5-10 %
5 - Hematite		Abundant	10 to 20
6 - Pyrite		Dominant	>20 %
7 - Sulfur			
8 - Gypsum			

Tecton Geologic — WGS 27A-2 — Scale 1 : 600

Drilling Data: ROP (min/ft 200, max/ft 0); Weight on Bit (0 lbs, max 50); Rotary Speed (0 rpm, max 100); Mud Weight (8.4 lb/gal, max 9.0); Temperature (Temperature Out, Temperature In, 50 to 100 deg F); Circulation (Pit Total, Pressure In, 0 to 100 psi); Surveys (Inclination, Azimuth); Lithology; Alteration; Steam/Water Zones; Lost Circulation Zones; Resistivity; Gamma Ray; Casing Shoe; Bit Runs; Coupons; Comments

Description

Set Wireline @ 2230. Will Log Open Hole Tomorrow. (Pin of window @ 2229') Drill ahead with directional assembly (2230'-

03.10.2009 DRAYWOOD: it-wo grs, sm, hd,mod well wrtd, fr-med grs,subang-subrnd, grd gr beds,mod cmbr,gr mgs ss, sm sltst, sm arglt, sm chert,sm lse cobble of beach, mod calc,gd ins,Drilled w/ air, Lost circulation at 2660' w/ 1/2 of fluid, gr ss mgs, lse grng-r-t sltst,r-mod calc, gr-r mgsst,r gr-r chert

2660' 12.5deg 522.7m

2700' 12.5deg 527.8m

2760' 12.5deg 535.4m

2837' 12.5deg 544.9m

2850' 12.5deg 546.7m

2908' 12.5deg 554.1m

2921' 12.5deg 555.8m

2955' 12.5deg 560.2m

3000' 12.5deg 565.9m

3030' 14.5deg 567.1m

3100' 14.5deg 569.8m

3150' 14.5deg 571.7m

3200' 14.5deg 573.6m

3250' 14.5deg 575.5m

3300' 14.5deg 577.4m

3350' 14.5deg 579.3m

3400' 14.5deg 581.2m

3450' 14.5deg 583.1m

3500' 14.5deg 585.0m

3550' 14.5deg 586.9m

3600' 14.5deg 588.8m

3650' 14.5deg 590.7m

3700' 14.5deg 592.6m

3750' 14.5deg 594.5m

3800' 14.5deg 596.4m

3850' 14.5deg 598.3m

3900' 14.5deg 600.2m

3950' 14.5deg 602.1m

4000' 14.5deg 604.0m

4050' 14.5deg 605.9m

4100' 14.5deg 607.8m

4150' 14.5deg 609.7m

4200' 14.5deg 611.6m

4250' 14.5deg 613.5m

4300' 14.5deg 615.4m

4350' 14.5deg 617.3m

4400' 14.5deg 619.2m

4450' 14.5deg 621.1m

4500' 14.5deg 623.0m

4550' 14.5deg 624.9m

4600' 14.5deg 626.8m

4650' 14.5deg 628.7m

4700' 14.5deg 630.6m

4750' 14.5deg 632.5m

4800' 14.5deg 634.4m

4850' 14.5deg 636.3m

4900' 14.5deg 638.2m

4950' 14.5deg 640.1m

5000' 14.5deg 642.0m

5050' 14.5deg 643.9m

5100' 14.5deg 645.8m

5150' 14.5deg 647.7m

5200' 14.5deg 649.6m

5250' 14.5deg 651.5m

5300' 14.5deg 653.4m

5350' 14.5deg 655.3m

5400' 14.5deg 657.2m

5450' 14.5deg 659.1m

5500' 14.5deg 661.0m

5550' 14.5deg 662.9m

5600' 14.5deg 664.8m

5650' 14.5deg 666.7m

5700' 14.5deg 668.6m

5750' 14.5deg 670.5m

5767' 14.5deg 671.0m