

THERMAL POWER COMPANY/SOUTHLAND ROYALTY COMPANY

DIXIE FEDERAL 66-21

Bit Record

Bit #	Size	Make/Type	In	Out	Total Drilled
1	44.45cm (17½")	Security S3SJ	12.5m (41')	299m (981')	259.4m (851')
H.O.	67.31 (26½")	Smith	12.5m (41')	39.6m (130')	27.1m (89')
2	44.45cm (17½")	Smith S4S	299m (981')	503m (1650')	206.9m (679')
3	44.45cm (17½")	Smith BSJ	503m (1650')	661.4m (2170')	158.5m (520')
4	31.12cm (12¼")	H.T.C. x 1	661.4m (2170')	687.6m (2256')	26.3m (86')
5	31.12cm (12¼")	Smith F-3	687.6m (2256')	937.3m (3075')	249.6m (819')
6	31.12cm (12¼")	HTC J-33	937.3m (3075')	1243.9m (4081')	306.6m (1006')
7	31.12cm (12¼")	Smith S88F	1243.9m (4081')	1459.7m (4789')	215.8m (708')
8	21.59cm (8½")	Smith DGJ	1459.7m (4789')	1468.8m (4819')	9.1m (30')
9	21.59cm (8½")	Smith F-3	1468.8m (4819')	1667.6m (5471')	199.0m (652')
10	21.59cm (8½")	HTC J-33	1667.6m (5471')	1847.4m (6061')	179.8m (590')
11	21.59cm (8½")	Smith F-4	1847.4m (6061')	1988.2m (6532')	140.8m (462')
12	21.59cm (8½")	Smith F-4	1988.2m (6532')	2150.4m (7055')	162.2m (532')
13	21.59cm (8½")	Hughes J-44	2150.4m (7055')	2266.5m (7436')	116.2m (381')
14	21.59cm (8½")	Smith F-44	2266.5m (7436')	2364.1m (7756')	97.6m (320')
15	21.59cm (8½")	Smith F-4	2364.1m (7756')	2552.4m (8374')	188.4m (618')
16	21.59cm (8½")	HTC J-44	2552.4m (8374')	2727.1m (8947')	173.7m (570')
17	21.59cm (8½")	HTC J-44	2727.1m (8947')	2890.1m (9482')	163.1m (535')
18	21.59cm (8½")	Hughes J-44	2890.1m (9482')	2980.9m (9780')	90.8m (298')
19	15.65cm (6 1/8")	Smith FB7	Drilling cement		

THERMAL POWER COMPANY/SOUTHLAND ROYALTY COMPANY

WELL DATA SHEET

Fields Dixie Valley, Churchill Nevada
 Well# Dixie Federal 66-21
 Dates December 20, 1979

Casing String	Hole Size (in)	Casing Specifications Size (in) Wt. (#/ft) Gr.	Jt.	Setting Depth (ft)		Total Wt. (lbs)	Cementing Slurry Volume (ft)	% Excess	Sks. of Cement w/o add.	Mud wt. Csg. Pt. (lbm/gal)	Minimum Tension	Calculated Factor Collapse	Safety Burst (psi basis)
				From	To								
Conductor	26	20 94 H-40	Butt	0	125	11,817	416	20	362	8.5	88.09	9.43	1.50
Surface	17 1/2	13 3/8 54.5 K-55	Butt	0	2157	117,557	3952	100	1900	9.1	8.83	1.11	(1019)
Production liner	12%	9 5/8 40 K-55	Butt	1948	3903	78,200	--	--	--	10.1	5.98	1.26	1.64
	12%	9 5/8 40 N-80	Butt	3903	4580	27,080	--	--	--	10.1	33.83	1.29	2.39
Total Liner	12%	9 5/8 --	Butt	1948	4580	105,280	2520	200	1189	10.1	5.98	1.26	1.64 (2402)
7" Liner	8%	7" 23 N-80	LT&C	4152	6349	50,531	--	--	--	10.3	7.34	1.13	1.65
	8%	7" 26 N-80	LT&C	6349	7195	21,996	--	--	--	10.3	27.46	1.41	1.88
Total Liner	8%	7" --	LT&C	4152	7195	72,527	988	100	610	10.3	7.34	1.13	1.65 (3848)

JMR:tpw
 12/19/79

7/20/79	453.2m(1487')	Drilled 132.9m (436') of 44.45cm (17½") hole to 453.2m (1487') with mud.
7/21/79	566m(1857')	Drilled 49.7m (163') of 44.45cm (17½") hole to 503m (1650') P.O.H. R.I.H. with bit #3 drilled 63.1m (207') of 44.45cm (17½") hole to 566m (1857') with mud.
7/22/79	661.4m(2170')	Drilled 95.4m (313') of 44.45cm (17½") hole to 661.4m (2170') with water. P.O.H.
7/23/79	661.4m(2170')	Rigged up to run 33.97cm (13 3/8") casing. Ran 54 joints 33.97cm (13 3/8"), 90.89 Kg/m (54.5 lb/ft.) H-40 Buttress casing. Total length 657.3m (2156.7'). Casing set at 655.9m(2152')K.B. Ran Guide shoe on bottom circulating and waiting on Halliburton for 5 hours, pumped in 1750 sacks of Class "G" cement mixed with 1:1 perlite, 40% Silica Flour, 3% gel, 0.5% CFR ₂ ; Followed by 150 sacks Class "G" mixed with 40% Silica ³ Flour, 3% gel, 0.5% CFR ₂ . Total slurry volume 111.9m ³ (3952ft ³). Displaced with 52.98m ³ (1871ft ³), bumped plug with 1300 psi; float held ok. Good returns, circulated 1.7m ³ (60ft ³) to sump. C.I.P. 2130 hours, W.O.C.
7/24/79	661.4m(2170')	Nippled up B.O.P. Cut of 44.45cm (13 3/8") weld on bradenhead. Nippled up 30.5cm(12") x 900 series B.O.P. Tested blind rams at 70.3 Kg/m ² (1000psi) for 15 min. Held ok.
7/25/79	709.9m(2329')	Drilled cement plug, float & shoe at 655.9m (2152') to 661.5m (2170'). Drilled 26.2m (86') of 31.12cm (12½") hole to 687.6m (2256') with bit #4. P.O.H. R.I.H. with bit #5 drilled 22.8m(75') of 31.12cm (12½") hole to 709.9m (2329') with mud.
7/26/79	863.8m(2834')	Drilled 153.9m (505') of 31.12cm (12½") hole to 863.8m (2834') with mud.
7/27/79	1005.8m(3300')	Drilled 73.5m (241') of 31.12cm (12½") hole to 937.3m (3075') with mud P.O.H. R.I.H. with bit #6 drilled 68.9m (225') of 31.12 cm (12½") hole to 1005.8m (3300') with mud.
7/28/79	1162.5m(3814')	Drilled 156.7m (514') of 31.12cm (12½") hole to 116.5m (3814') with mud.
7/29/79	1243.9m(4081')	Drilled 81.4m (267') of 31.12cm (12½") hole to 1243.9m (4081') with mud.
7/30/79	136.3m(4476')	Drilled 120.1m (395') of 31.12 cm (12½") hole to 1364.3m (4476') with mud.

- 7/31/79 1459.7m(4789') Drilled 95.4m (313') of 31.12cm (12 1/2") hole to 1459.7m (4789') with mud. Encountered Fluid entry at 1459.7m (4789'). Well shut in at 2135 hours with 250 psi.
- 8/1/79 1459.7m(4789') Pumped in 250 BBls gel around DC's until well was killed at 12:15. P.O.H. to shoe of 33.97cm (13 3/8") casing. Conditioned mud and changed out flowline. Installed blooieline. Shut in well. Weighting up mud.
- 8/2/79 1459.7m(4789') Staged in to 1417.3m (4650') and conditioned mud. P.O.H. Made up 33.97cm (13 3/8") E.Z.S.V. plug. R.I.H. with plug and set at 1417.3m (4650') P.O.H.
- 8/3/79 1459.7m(4789') R.I.H. to 1412.8m (4635') with OEDP. Pumped 3.5m³ (123ft³) Class "G" cement premixed with 15% SiO₂ and 15% sand. 0.75% CFR₂ and 0.03% HR60 Displaced with 12.2m³ (431 ft³) mud.² CIP 0330 Hr. P.O.H. Modified D.A. Ran 33.12cm (12 1/2") bit to 640m (2100'). Circulated and conditioned mud. Ran to top of cement of 1377.7m (4520'); drilled cement from 1377.7m (4520') to 1396m(4580'). Circulated for Schlumberger logging service.
- 8/4/79 1459.7m(4789') Ran Schlumberger logs FDC. CNL, GR & Caliper DIL-S.L. and D.M. R.I.H. with 33.12cm (12 1/2") bit to 1396m (4580'). Drilled from 1396m (4580') to 1397.6m (4585'). P.O.H. Prepare to run casing made up liner hanger for 24.45cm (9 5/8") casing.
- 8/5/79 1459.7m(4789') Ran 63 joints of 24.45cm (9 5/8"), 59.60 Kg/m (40 lb/ft), K-55 & N-80 buttress casing under Midway liner langer. Total length 802m (2632'). Casing shoe set at 1396m (4580') B & W float collar set at 1382.3m (4535'). Liner hanger 593.7 (1948'). Bottom 16 joints of 206.4m (677') is N-80. Cemented with 71.4m³ (2520 ft³) class "G" cement premixed 1:1 perlite and 40% SiO₂, 3% gel, 0.75% CFR₂ and 0.03 HR7 displaced with 33.9m³ (1200ft³) mud; 45.3m³ 1600ft³ of cement returns. CIP 1400 hours. Ran OEDP to 593.7m (1948') circulated wellbore clean. Ran 33.12cm (12 1/2") bit and C.O. to 593.7m (1948').
- 8/6/79 1459.7m(4789') P.O.H. Laid down 20.32cm (8") D.C., Installed new mud valves and kjll line. Tested Blind rams & B.O.P. with 63.3 Kg/cm² (900 psi). R.I.H. with bit #9 to 593.7m (1948').

- 8/7/79 1459.7m(4789') Drilled cement from 593.7m (1948') to 619.7m (2034') R.I.H. to 1313m (4308') top of cement. Tested pipe rams & Hydril with 49 Kg/cm² (700psi) for 15 minutes. Held o.k. Drilled cement from 1313m (4308') to 1414.7m (4640'). Changed R.H. rubber. Drilled EZSV plug pushed to bottom at 1459.7m (4789'). Well flowing water. Brief wellhead pressure peaks to 409 psig. Displaced water with 9.8ppg mud.
- 8/8/79 1468.8m(4819') Drilled 9.1m (30') of 21.59cm (8½") hole from 1459.7m (4789') to 1468.8m (4819') with mud. Displaced mud with water. Flowed well with Drill pipe in hole and bit at 1377.4m (4519'). Ran McNally temperature survey to 1404.8m (4609') Displaced wellbore fluids with heavy mud.
- 8/9/79 1468.8m(4819') Killed well with 10.2 ppg mud. Nippled down flowline wellhead pressure 33.39 Kg/cm² (475 psig). Changed rotating head rubbers. RIH to 1404.8m (4609') with well Flowing.
- 8/10/79 1468.8m(4819') Mixing mud, Killing well and pulling out of hole with plugged bit. Pipe rams and Hydril washed out Tear out rotating head and hydril.
- 8/11/79 1468.8m(4819') Installed Hydril, Nippled up Hydril and new rotating head, made up RTTS tool R.I.H. with R.T.T.S. to 1335m (4380'). Rigged up HOWCO, tested pipe rams and Hydril to 33.4Kg/cm² (700psig) for 5 minutes. Flowed well to sump through drill pipe to clean out mud. S.I. pressure at end 468 psi Pumped 11.4m³ (400ft³) water into well at 105.4 Kg/cm² (1500psi) initial pressure.
- 8/12/79 1468.8m Cement squeeze below 1396m(4580'). Pumped 550 sacks class G cement mixed with 40% S.O., 0.75% CFR₂ and 0.35% HR 7. Total slurry volume (1226 ft³). Average density 6.8Kg (15 pounds). Pump pressure started at 400psi dropped to 0 and built to final of 155.7 Kg/cm² (2200psi) Bled down to 84.4 Kg/cm² (1200psi) in 30 minutes. Pumped 0.2m³ (5ft³), pressure built to (1800psi). W.O.C. 1 hr. Pumped additional 5ft³ standing with 42.2 Kg/cm² (600psi) ended with 112 Kg/cm² 1600psi. Pressure bled to 52.7 Kg/cm² (750psi). Pressure test formation to 49.2Kg/cm² (700psi). Pressure bled back to 500 psi in 15 minutes. Released pressure, well dead CIP at 0600 hours. Rigged down HOWCO POH with RTTS packer. WOC 17 hours RIH with bit #10 and B.H.A. tagged cement at 1393.8m (4573'). Drilled cement from 1393.8m (4573') to 1402.9m (4603')

8/13/79	1528.6m(5015')	Drilled cement from 1402.9m (4603') to 1429.5m(4690') C.O. fill from 1429.5m (4690') to 1468.8m(4819'). Drilled 6.4m (21') of 21.59cm (8½") hole from 1468.8m (4819') to 1475.3m (4840') with mud. P.O.H. to 1423.1m (4669'); displaced 9.9 ppg mud with 300 barrels of water and well flowed; squeeze cement job failed. Displaced water with mud to control well and drilled ahead. Drilled 21.6m (71') of 21.59cm (8½") hole from 1475.3m (4840') to 1496.9m (4911') with mud. P.O.H. to 1395.9m (4580') Displaced mud with fresh water and drilled to 1528.6m (5015') with well flowing.
8/14/79	1532.2m(5027')	Drilled 3.7m (12') of 21.59cm (8½") hole to 1532.2m (5027') with water. Mixed new mud.
8/15/79	1572.5m(5159')	Drilled 40.2m (132') of 21.59cm (8½") hole to 1572.5m (5159') with 10.3 ppg mud.
8/16/79	1664.5m(5461')	Drilled 92.0m (302') of 21.59cm (8½") hole to 1664.5m (5461') with mud.
8/17/79	1689.8m(5544')	Drilled 3.01m (10') of 21.59cm (8½") hole to 1667.6m (5471') with mud. P.O.H. R.I.H. with Bit #10. Drilled 22.2 (73') of 21.59cm (8½") hole to 1689.8m (5544') with mud.
8/18/79	1779.1m(5837')	Drilled 89.3m(293') of 21.59cm (8½") hole to 1779.1m(5837') with mud.
8/19/79	1847.4m(6061')	Drilled 68.2m (224') of 21.59cm (8½") hole to 1847.4m (6061') with mud. P.O.H.
8/20/79	1894m(6214')	R.I.H. with Bit #11 Drilled 46.6m (153') of 21.59cm (8½") hole to 1894m(6214') with mud.
8/21/79	1974.5m(6478')	Drilled 80.5m (264') of 21.59cm (8½") hole to 1974.5m (6478') with mud.
8/22/79	2026.0m(6647')	Drilled 13.7 (45') of 21.59cm (8½") hole to 1988.2m (6523') with mud P.O.H. R.I.H. with Bit #12 and B.H.A. drilled 37.8m (124') of 21.59cm (8½") hole to 2026.0m (6647') with mud.
8/23/79	2122.3m(6963')	Drilled 96.3m (316') of 21.59cm (8½") hole to 2122.3m (6963') with mud.
8/24/79	2163.2m(7097')	Drilled 28.0m (92') of 21.59cm (8½") hole to 2150.4m (7055') with mud. P.O.H. R.I.H. with Bit #13 drilled 12.8 (42') of 21.59 cm (8½") hole to 2163.2m (7097') with mud.

8/25/79	2208.6m(7246')	Drilled 45.5m (149') of 21.59cm (8½") hole to 2208.6m (7246') with mud.
8/26/79	2259.8m(7414')	Drilled 51.2m (168') of 21.59cm (8½") hole to 2259.8m (7414') with mud.
8/27/79	2285.1(7497')	Drilled 6.7m (22') of 21.59cm (8½") hole to 2266.5m (7436') with mud P.O.H. Magnaglowed 2 DC's, laid down 1 stabilizer & near bit reamer. R.I.H. with bit #14 and drilled 18.6m (61') of 21.59cm (8½") hole to 2285.1m (7497') with mud.
8/28/79	2326.3m(7632')	Drilled 41.2m (135') of 21.59cm (8½") hole to 2326.3m (7632').
8/29/79	2364.1m(7756)	Drilled 37.8m (124') of 21.59cm (8½") hole to 2364.1m (7756') with mud P.O.H.
8/30/79	2420.4m(7941')	R.I.H. with bit #15 and drilled 56.4m (185') of 21.59cm (8½") hole to 2420.4m (7941') with mud.
8/31/79	2510.9m(8238')	Drilled 90.5m (297') of 21.59cm (8½") hole to 2510.9m (8238') with mud.
9/1/79	2578.9m(8461')	Drilled 41.5m(136') of 21.59cm (8½") hole to 2552.4m (8374') with mud. P.O.H. R.I.H. with Bit #16 and drilled 26.5m (87') of 21.59cm (8½") hole to 2578.9m (8461') with mud.
9/2/79	2662.7m(8736')	Drilled 83.8m (275') of 21.59cm (8½") hole to 2662.7m (8736') with mud.
9/3/79	2714.5m(8906')	Drilled 51.8m (170') of 21.59cm (8½") hole to 2714.5m (8906') with mud.
9/4/79	2727.1m(8947')	Drilled 12.5m (41') of 21.59cm (8½") hole to 2727.1m (8947') with mud. P.O.H. and ran Schlumberger logs FDC-CNL, Ind. Log.
9/5/79	2740.5m(8991')	Completed Schlumberger logs, R.I.H. with bit #17. Drilled 13.4m (44') of 21.59cm (8½") hole to 2740.5m (8991') with mud.
9/6/79	2805.9m(9206')	Drilled 65.5m (215') of 21.59cm (8½") hole to 2805.9m (9206') with mud.
9/7/79	2867.9m(9409')	Drilled 44.8m (147') of 21.59cm (8½") hole to 2867.9m (9409') with mud.
9/8/79	2890.1m(9482')	Drilled 22.2m(73') of 21.59cm (8½") hole to 2890.1m (9482') with mud. P.O.H. R.I.H. with Bit #18.

9/9/79	2949.9m(9678')	Drilled 59.7m (196') of 21.59cm (8½") hole to 2949.9m (9678') with mud.
9/10/79	2980.9m(9780')	Drilled 31.1m (102') of 21.59cm (8½") hole to 2980.9m (9780') with mud. P.O.H. Cleaned cellar and prepared to nipple down BOP. R.I.H. with Baker Model C Retrievable bridge plug and set it at 645.3m (2117'). P.O.H. Nippled down BOP.
9/11/79	2980.9m(9780')	Completed installation of 10" WKM production gate, and tested to 42.2 Kg/cm ² (600psi) Held O.K. R.I.H. and recovered Baker Model C Bridge Plug. Rigged up and ran Agnew & Sweet Temperature Survey.
9/12/79	2980.9m(9780')	A & S Temperature Survey stopped at 1868.4m (6130') Displaced mud from 2980.9m (9780') with 8.5 ppg water gel mix. Pulled up to 2255.5m (7400') and displaced with water. Pulled up and positioned bit just above shoe 24.45cm (9 5/8") casing at 1395.9m (4580'). Flowed well for 4 hours.
9/13/79	2980.9m(9780')	Flowing well: max 31,752Kg/hr (70,000 lbs/hr) rate 261.5°F, 33.2 psig wellhead + 7psig lip pressure. Tested well for 12 hours. P.O.H. with well flowing. Ran A & S temperature to 1999.5m (6560').
9/14/79	2980.9m(9780')	Continue to flow well. 261°F, 33psig well head pressure.
9/15/79	2980.9m(9780')	Flowed well 24 hours.
9/16/79	2980.9m(9780')	R.I.H. to 1420.9m (4662'), killed well with 10.3ppg mud. Continued to bottom at 2980.9m (9780') for 4 hours. Dropped multishot.
9/17/79	2980.9m(9780')	Attempted to retrieve multishot-not successful P.O.H. Rigged up Schlumberger logs. HRT reached 2781.7m (9126') and registered 338°F. Ran Ripmeter to 2133.6m (7000') before temperature increase threatened soude.
9/18/79	2980.9m(9780')	Continue to run Schlumberger logs.
9/19/79	2980.9m (9780')	Completed logging. R.I.H. to T.D. to condition and cool hole for additional logs.

- 9/20/79 2980.9m (9780') Circulated 7 hours P.O.H. Ran Schlumberger Induction & Caliper.
- 9/21/79 2980.9m (9780') Ran DM log, Made up EZSV packer and setting tool, RIH set packer at 2224.4m (7298'). P.O.H. and laid down setting tool. RIH open ended to drop cement plug on top of packer.
- 9/22/79 2980.9m (9780') RIH and tagged EZSV bridge plug at 2224.4m (7298'). Circulated at bottom. Halliburton Services mixed 50 sacks Class "G" cement with 40% SiO₂, 0.5% CFR₂ and 0.15% CHR₇ CIP 0300. WOC POH Picked up 21.59-cm (8½") bit. RIH to top cement at 2154.9m (7070'). Drilled cement plug to 2194.6m (7200'). Circulated. POH picked up 17.78cm (7") liner hanger.
- 9/23/79 2980.9m (9780') Changed BOP rams to 17.78cm (7") casing size ran 22 joints 17.78cm (7") 11.8 kg (26#) N-80 LT &C with shoe and float collar on first joint. Total length 259.7m (851.93') and 56 joints of 10.4kg (23lb) N-80 LT&C. Total length 669.7m (2197.07'). Hung liner at 2193.1m (7195') shoe depth and top at 1265.5m (4152'). Pumped (100ft³) H₂O ahead; mixed 610 sacks Class "G" cement with 40% SiO₂ flour, 0.75% CFR₂, 0.17% HR₇ Total Slurry Volume 27.9m³ (988ft³) slurry density 15.5 ppg. Pumped plug with 175.5m³ (2500psi) float collar held ok. Good returns. CIP 1730 WOC POH and laid down hanger setting tool 2 hours WOC RIH with 21.59 (8½") bit to top cement at 1193.9m (3917'). CO to 1265.5m (4152') and circulated hole clean.
- 9/24/79 2890.9m (9780') POH laid down 12.7cm (5") D.P. and 15.88cm (6¼") D.C. Picked up 12 10.8cm (4¼") D.C. and 8.89cm (3½") D.P. and ran Bit #18 15.65cm (6 1/8") bit to 2022.3m (6635'). Circulated tested 17.78cm (7") lap with 49.2Kg/cm² (700psi) held ok.
- 9/25/79 2980.9m (9780') Drilled cement from 2022.4m (6635') to 2180.6m (7154'). Float collar at 2180.6m (7154'), shoe at 2193.1m (7195'). Cement at 2193.1m (7195') 2225.1m (7300'); EZSV at 2225.1m(7300'). Pushed EZSV to bottom. Circulate on bottom with fresh water. Mixed 80 sacks caustic with 200 bbls fresh water to pH 12.5 + 8.8ppg mud and pumped 160 barrels caustic flush into well bore at T.D. P.O.H. to 2193m (7195'). Well flowed 1.9cm (3/4") stream water. Closed rams, squeezed caustic flush at 1200-1400 psi broke to 600psi at 215gpm pumped 160 barrels. Open rams - well flowed briefly; Closed rams pumped 5 minutes at 1000psi. Opened rams well flowed 3" stream for 3 minutes and died.

9/26/79	2980.9m (9780')	Well shut in 10 hours. Waiting on Agnew and Sweet.
9/27/79	2980.9m	Mixed 100 barrel caustic flush pH 13 + 8.3ppg Displaced 100 barrel caustic flush at 2809.1m (9216') POH to 2168.9m (7116'). Closed rams and pumped flush to formation. P.O.H. Laid down 12.7cm (5") D.P., 8.89 (3½") D.P. and 10.7cm (4¼")D.C.
9/28/79	2980.9m (9780')	Ran Agnew and Sweet Wellbore temperature Survey. Removed BOP and cleaned pits. Released rig 1700 hours 9-28-79.