6L01910

Diamond Shamrock
Thermal Power Company

October 29, 1986

Ms Susan Prestwich
U. S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

Re: CTGH-1 Data Transmittal

Dear Susan:

Enclosed herein is a complete set of the Clackamas Thermal Gradient Hole No. 1 (CTGH-1) borehole information collected by Thermal Power Company under Task 4.4 of our Cooperative Agreement DE-FC07-85ID12614. Additionally, the Actual Gradient Hole Completion Configuration and Casing Head, Access Gate and Cellar Schematics and Dr. Blackwell's temperature survey and commentary are provided. Attachment 1 is a current listing of all data/reports being submitted. The CTGH-1 drill cuttings and core were picked up by the University of Utah Research Institute (UURI) at hole completion. UURI will be provided with two complete data sets as requested and the original, reproducible COLOG geophysical borehole logs to facilitate future reproductions.

Transmittal of these data to DOE completes Milestone No. 2 of said Cooperative Agreement. Please acknowledge receipt by signing both copies of this letter and returning one to us. If there are any questions about this transmittal, call me at 707/576-7232.

Yours very truly,

Joe Iovenitti

J. L. Iovenitti
Senior Geologist

JLI/ma

RECEIVED:

_____

Date_____

cc P. M. Wright, UURI
OR-CL-YE-02

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

THERMAL POWER COMPANY
Santa Rosa Office

ATTACHMENT NO. 1

CTGH-1 DATA LISTING - 27 OCTOBER 1986

1. Cutting Description Log: 0 - 527'
2. Core Description Log: 527 - 4796'
3. Core Recovery Log: 527 - 4800'
4. Summary Wellsite "Mud Log": 0 - 4800'
5. Geophysical Borehole Logs

A. Shallow Logging Run (TD = 517')

(i) Temperature: 6 - 516.5'
(ii) Fluid Resistivity: 16 - 514'
(iii) Caliper: 10 - 514'
(iv) Gamma-Gamma Density Uncompensated and Compensated

Uncompensated: 30 - 516'
Compensated: 0 - 510'

(v) Guard Resistivity: 20 - 514'
(vi) Natural Gamma: 0 - 510'
(vii) Spontaneous Potential: 35 - 516'
(viii) 16-64" Resistivity: 35 - 516'
(ix) Deviation Survey
(x) Tabulated data sheets on the following surveys: spontaneous potential, 16-64" resistivity, fluid resistivity, temperature, long-spaced density (uncompensated), natural gamma, guard resistivity, caliper, dual density (compensated) at 0.5 feet increments and deviation at generally 10 foot increments.
(xi) Plots of Wellbore Deviation
(xii) Density Calibration Plot
(xiii) Caliper Calibration Plot
(xiv) Shallow Logging Run Report by Goodwin and McDannell (Drillsite Geologists)
(xv) Shallow Logging Run Report by Colorado Well Logging

B. Deep Logging Run (TD = 4800')

(i) Temperature: 0 - 4785'
(ii) Fluid Resistivity: 0 - 4785'
(iii) Gamma Gamma Density Uncompensated: 775 - 900'
(iv) Sonic: 4225 - 4425'
(v) Natural Gamma: 0 - 4800'
(vi) Neutron: 0 - 4800'
(vii) Induced Polarization: 4200 - 4799'
(viii) Spontaneous Potential: 4200 - 4798'
(ix) 16-64" Resistivity: 4200 - 4799'
(x) 6' Lateralog: 4200 - 4798'

(xi) Caliper: 760 - 885': 4100 - 4800'
(xii) Caliper Calibration Plot
(xiii) Density Calibration Plot
(xiv) Tabulated data sheets on the following surveys: spontaneous potential, 6' lateralog, induced polarization, 16-64" resistivity and sonic at 0.5 foot increments; inclination at 25-foot increments; and temperature and fluid resistivity at 10-foot increments
(xv) Deep Logging Report by Colorado Well Logging

6. Temperature and Pressure Survey by Pruett Wireline Industries, Inc.
7. Actual Gradient Hole Completion Configuration Schematic
8. Actual Gradient Hole Casing Head, Access Gate, Cellar Schematic
9. A Preliminary Review of the Secondary Mineralogy in Drillhole CTGH-1 by Columbia Geoscience
10. Selected Mineralogical Analysis of Secondary Minerals in CTGH-1 by Mr. Keith Barger, USGS, Menlo Park
11. Temperature Survey by Dr. David Blackwell
12. CTHG-1 Drilling and Completion History
13. Daily Drilling Report

JLI/ma
JLI095

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108—1295
TELEPHONE 801-524-3422

M E M O R A N D U M

TO: Mike Wright

FROM: Bruce Sibbett

SUBJECT: Comments of Clackamas Data Collection Plan

DATE: May 7, 1986

Appendix 1, #2 Core handling procedures. Fragmental or clay altered intervals may suffer significant degradation from the extra handling step during washing in a core trough and transfer to the core box. Therefore, at the drillsite geologist discretion, incompetent intervals should be placed directly into the core box from the core barrel to reduce handling damage.

Appendix I, #2 and #3 cuttings collection interval. #2 states cuttings will be collected at 10-foot intervals, #3 states cuttings will be described at 20-foot intervals. Is there a conflict or will they describe every other sample?

Appendix I, #6. On the mud log the type bit should be noted, i.e., blue impregnated, or stone inset, etc. This data with the lithology and total footaged drilled by a bit, could be valuable for determining performance of bit type. For this to be complete drill rpm's and weight on bit data could be taken off the daily drilling report when the evaluation is made.

Geophysical Borehole Logging

The second paragraph is a little vague. I assume it means that for the intermediate depth logging prior to setting casing. However, as stated it could be applied to the total depth log such that if casing went to 2000 ft and only core hole from 2000 to 5000 ft, only temperature logs would be run below 2100 ft. Is this the intent? Does "field calibration" include checking the mud resistivity in the mud pit, and would it be useful?

CASCADES DRILLING PROGRAM

DAY	DAILY COST	CUM COST
1	17552	17552
2	2175	19727
3	3232	22959
4	6646	29605
5	4078	33683
6	3011	36694
7	12696	49390
8	1550	50940
9	2050	52990
10	4125	57115
11	3255	60370
12	2050	62420
13	5703	68123
14	4205	72328
15	5070	77398
16	3921	81319
17	5194	86513
18	6476	92989
19	4360	97349
20	3536	100885
21	3640	104525
22	5409	109934
23	6963	116897
24	5258	122155
25	6277	128432
26	6274	134706
27	5150	139856
28	4251	144107
29	2547	146654
30	3375	150029
31	4646	154675
32	4452	159127
33	4981	164108
34	5636	169744
35	5880	175624
36	3575	179199
37	3370	182569
38	5636	188205
39	5566	193771
40	4300	198071
41	6878	204949
42	6211	211160
43	6304	217464
44	4682	222146
45	6031	228177
46	6918	235095
47	6503	241598
48	6023	247621
49	6972	254593
50	7203	261796
51	6243	268039
52	6301	274340
53	3462	277802
54	6101	283903
55	6267	290170
56	6360	296530
57	6859	303389
58	7089	310478
59	5667	316145
60	1480	317625
61	1180	318805
62	2680	321485
63	4180	325665
64	2680	328345
65	4487	332832
66	4925	337757
67	7550	345307
68	9095	354402
69	6700	361102
70	7827	368929
71	7745	376674
72	6185	382859
73	4400	387259
74		387259

Thermal Power

1. Core Recovery Log

2. Daily Drilling Report

62 p 3. Borehole Geophysical Logging for Clackamas Geothermal Test Well No. 1, Sept 3-5, 1986
Report by Colorado Well Logging

124 p 4. Cutting and Core Description by Thermal Power

9 p 5. Graphic ~~Log~~ Drilling ~~Statistics~~ Drilling Log
(Temperatures from MRT, Penetration Rate, Lost Circulation)

Diamond Shamrock
Thermal Power Company

October 29, 1986

Ms Susan Prestwich
U. S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

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Dear Susan:

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Transmittal of these data to DOE completes Milestone No. 2 of said Cooperative Agreement. Please acknowledge receipt by signing both copies of this letter and returning one to us. If there are any questions about this transmittal, call me at 707/576-7232.

Yours very truly,

J. L. Iovenitti
Senior Geologist

JLI/ma

RECEIVED:

_____

Date_____

cc P. M. Wright, UURI
OR-CL-YE-02

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

Diamond Shamrock
Thermal Power Company

October 29, 1986

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785 DOE Place
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OR-CL-YE-02

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

Diamond Shamrock
Thermal Power Company

29 October 1986

Mr. Patrick Geehan
Deputy State Director for Mineral Resources
Bureau of Land Management
U. S. Department of the Interior
P. O. Box 2965
Portland, Oregon 97208

Re: Clackamas Thermal Gradient Hole CTGH-1
Federal Geothermal Lease OR 12344
Marion County, Oregon

Dear Mr. Geehan:

Drilling operations for CTGH-1 commenced 7 June 1986 and completed on 7 September 1986 as an activity of the DOE Cascades Thermal Gradient Drilling Project. We submit herewith Geothermal Well Completion Report, Drilling and Completion History, schematics showing actual completion configuration and casing head, access gate and cellar. Complete copies of all core, lithology, geophysical logs and temperature surveys are also submitted under this letter. Complete duplicate information is being provided today to the Oregon Department of Geology and Mineral Industries.

Please be aware that the 4800-foot CTGH-1 is being retained in a shut-in mode during the 12-month DOE Access Period which commenced 7 September 1986. No abandonment procedure is enclosed because Thermal is evaluating options for additional borehole evaluation activity in 1987, possible borehole deepening or a suspended retention as allowed under the lease provisions.

Very truly yours,

W. L. D'Olier
Vice President
Geothermal Exploration

WLD/ma

cc Susan Prestwich, DOE Idaho Falls

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

Form: USGS 9-1960

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY, CONSERVATION DIVISION

Form Approved
Budget Bureau No.

GEOTHERMAL WELL COMPLETION REPORT

The U.S. Geological Survey requires this form or other Supervisor approved form to be prepared and filed in duplicate with requisite attachments with the Supervisor within 30 days after completion of permitted operations.

4. LEASE SERIAL NO.: OR 12344

5. SURFACE MANAGER: BLM ( ) FS (X) Other ( )

1a. WELL TYPE: PRODUCTION ( ) INJECTION ( ) DISPOSAL ( ) WATER SUPPLY ( ) OBSERVATION ( ) COLD ( ) HEAT EXCHANGE ( ) OTHER XX
Thermal Gradient Hole/DOE Cascades TG Drilling Project

6. UNIT AGREEMENT NAME: N/A

1b. COMPLETION: NEW (X) WORKOVER ( ) DEEPENED ( ) PLUGBACK ( ) REDRILL ( ) RECOMPLETED ( ) DRILLED & ABANDONED ( ) OTHER ( )

7. WELL NO.: CTGH-1

8. PERMIT NO.:

2. NAME OF LESSEE/OPERATOR
Thermal Power Company

9. FIELD OR AREA: Squirrel Creek

3. ADDRESS OF LESSEE/OPERATOR
3333 Mendocino Ave., Suite 120, Santa Rosa, Calif. 95401

10. SEC. T., R., B.& M.: Sec. 28, T8S, R8E, WM

18. LOCATION OF WELL
At Surface: Approximately 2200' N and 1500' W of SE corner of Sec. 28
At Top of Production Zone:
At Total Depth: Vertical hole

11. COUNTY: Marion

12. STATE: Oregon

13. SPUD DATE: 7 June 1986 DATE T.D. REACHED: 18 August 1986

14. COMPLETION DATE (Ready to produce): 7 September 1986

19. TOTAL DEPTH Measured: 4800' True Vertical: 4800'

15. DIRECTIONALLY DRILLED INTERVALS: N/A

20. PLUGBACK TOTAL DEPTH Measured: N/A True Vertical: N/A

21. ELEVATION: ESTIMATED (X) FINAL ( ) 3840
REFERENCE DATUM: GR ( ) MAT ( ) DF ( ) KB ( ) RT ( ) CASINGHEAD FLANGE ( ) OTHER (X) Sea Level

16. SURVEYED INTERVALS: 0-4800' Intermittently

22. DRILLING MEDIA: AIR ( ) WATER ( ) MUD (X) FOAM ( ) OTHER ( )
List Characteristics:
8.4 lbs/gal weight and 45 seconds viscosity

17. CORE SIZE AND INTERVALS
HX (3.94"): 526-4205'
NX (2.875"): 4205-4800'

23. LOG TYPE & INTERVALS
See Attachment 1

24. CASING RECORD

Size	Weight	Grade	Collars & Threads	Depths Set Top	Depths Set Shoe	Hole Size	Cementing Record (slurry volume)
10.75"	40.5 lbs	K-55	--	0	35'	12.25"	--
7"	26 lbs	K-55	BT&C	0	488'	8.75"	177 cu. ft.

25. LINER RECORD

Size	Weight	Grade	Collars & Threads	Top	Bottom	Perforated Intervals	Cementing Record (slurry volume)
4.5"				0	526	None	N/A
3.5"				0	4205	None	N/A

26. TUBING RECORD

Size	Weight	Grade	Depth Set	Packer Depth

27. CEMENT SQUEEZE, ACID, FRACTURE, ETC. (detail type, amount, intervals)
N/A

28. PERFORATION RECORD

Type	Total No.	Density (No./ft)	Size	Intervals

29. ATTACHMENTS & PREVIOUS SUBMITTALS: List all reports, surveys, tests and logs, not listed in item 23, which have resulted from drilling and completion operations. List relevant previously furnished data with date of submittal referenced.
See Attachment 1

30. WELL STATUS: PRODUCING ( ) SHUT-IN (X) SUSPENDED ( ) INJECTION ( ) DISPOSAL ( ) HEAT EXCHANGE ( ) ABANDONED ( ) WATER SUPPLY ( ) OTHER ( )

31. DO YOU CONSIDER THE WELL TO BE COMMERCIAL? No EXPLAIN: N/A

32. I hereby certify the information on this report and the attached information is complete and accurate according to the best of by knowledge.

SIGNED W.L. D'Olier TITLE Vice Pres., Geothermal Exploration DATE 28 October 1986

This report is required by law (30 U.S.C. 1023); regulations: 30 CFR 270.37, 30 CFR 270.73; Federal Geothermal Lease Terms and Stipulations and other regulatory requirements. Failure to report in a timely prescribed manner can result in shutting down operations, suspension and or recommendation of cancellation of lease (30 U.S.C. 1011, 30 CFR 270.80, 43 CFR 3244.3). The United States Criminal Code (18 U.S.C. 1001) makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

(See instructions on reverse side)

INSTRUCTIONS

GENERAL: This form is designed for submitting a complete and accurate geothermal well completion report, and should be accompanied by a detailed chronological history of well operations and final copies of the results of any logs, surveys or tests performed on the well, which have not previously been submitted. The report shall be submitted within 30 days after the date of completion of continuous well activities, as determined by the District Geothermal Supervisor. The completion date in many cases will be the day the drilling rig is released. The Supervisor may postpone the required report submittal date if adequate justification is presented by the lessee.

ITEM 18: Show the surface location coordinates from the nearest section corner or tract line. Show production zone and total depth coordinates from the surface location if the well is directionally drilled.

ITEM 34: If the well is immediately placed into operation without testing, this section should reflect the first month's production data.

ITEMS 35 & 36: Indicate the depth(s) of subsurface pressure and temperature measurement, and include the reference datum.

Temperature/Pressure Survey: 0-4800'

33. WELL TEST

TEST DATE	PRODUCTION METHOD: FLOWING ( ) OTHER ( )	PUMPING ( ) - include size, type, intake depth, etc.
N/A		

34. PRODUCTION

HOURS TESTED	PRODUCTION DURING TEST			ENTHALPY (Btu/lb)
	TOTAL LIQUIDS (lb)	STEAM (lb)	WATER (lb)	

35. STATIC TEST DATA

DEPTH	SURFACE PRESSURE (psig)	SUBSURFACE PRESSURE (psig)	SUBSURFACE TEMPERATURE (°F)	WATER ANALYSIS	
				Total Dissolved Solids	pH

36. FLOWING TEST DATA

SURFACE PRESSURE	SUBSURFACE PRESSURE	SURFACE TEMPERATURE	SUBSURFACE TEMPERATURE	AVE. TOTAL MASS FLOW RATE PER HOUR		
	at _____ feet		at top of perfs.	TOTAL (lb/hr)	STEAM (lb/hr)	WATER (lb/hr)
WELLHEAD: N/A						
SEPARATOR:						

37. SUMMARY OF POROUS ZONES: Show all important porous zones and contents of each; cored intervals with recoveries, drill stem or formation tests with depth of interval tested, time open, cushion used, and flowing and shut-in pressures, temperatures and recoveries.

38. GEOLOGIC MARKERS (TOP)

FORMATION	TOP	BOTTOM	DESCRIPTION OF DETAILS	NAME	MEASURED DEPTH	TRUE VERTICAL DEPTH
			See Mud Log			

Form 9-1931

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY, CONSERVATION DIVISION

Form Approved
Budget Bureau No. _____

GEOTHERMAL DRILLING PERMIT

The U.S. Geological Survey requires this form or other Supervisor approved form to be prepared and filed in triplicate with requisite attachments with the Supervisor. The Supervisor must approve this permit prior to any lease operations.

Clackamas 5000' Thermal Gradient Hole (CTGH)

1a. TYPE OF WORK: DRILL NEW WELL ( ) REDRILL ( ) DEEPEN ( ) PLUG BACK ( ) DIRECTIONALLY DRILL ( ) OTHER (X)

1b. WELL TYPE: PRODUCTION ( ) INJECTION ( ) HEAT EXCHANGE ( ) OBSERVATION ( ) WATER SUPPLY ( ) OTHER kx

1c. WELL STATUS: Proposed

2. NAME OF LESSEE/OPERATOR: Thermal Power Company

3. ADDRESS OF LESSEE/OPERATOR: 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401

4. LOCATION OF WELL
At surface: Approximately 2200' N and 1500' W of SE Corner of Sec. 28
At proposed prod. zone: Same as Surface Location

5. DISTANCE FROM PROPOSED LOCATION TO NEAREST PROPERTY OR LEASE LINE: 1500' W of East Line of Sec. 28

6. DISTANCE FROM PROPOSED LOCATION TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR ON THIS LEASE: No previous well drilled or applied for on this lease.

7. LEASE SERIAL NO.: OR 12344

8. SURFACE MANAGER: BLM ( ) FS (X) Other ( )

9. UNIT AGREEMENT NAME: N/A

10. WELL NO.: CTGH-1

11. PERMIT NO.:

12. FIELD OR AREA: Squirrel Creek

13. SEC., T., R., B.& M.: Sec. 28 T8S R8E Willamette Meridian

14. COUNTY: Marion

15. STATE: Oregon

16. APPROX. STARTING DATE: 1 June 1986

17. ACRES ASSIGNED (WELL SPACING): N/A

18. DRILLING MEDIA AND CHARACTERISTICS: AIR ( ) WATER (X) MUD (X) FOAM ( ) Other ( )

19. PROPOSED DEPTH: MEASURED: 5000 TRUE VERTICAL: 5000

20. ELEVATIONS: ESTIMATED xxk FINAL ( )
REFERENCE DATUM: GR (X) RAT ( ) DF ( ) RB ( ) RT ( )
CASINGHEAD FLANGE ( ) OTHER ( )

21. EXISTING AND/OR PROPOSED CASING AND CEMENTING PROGRAM (List existing program first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING (Collars & Threads)	GRADE	SETTING DEPTH Top	SETTING DEPTH Bottom	QUANTITY OF CEMENT
14-3/4"	11-3/4"	28 lbs.	N/A	1/4" Wall	0	30	25 cu. ft.
10" or 9-7/8"	7"	26 lbs.	Buttress	K-55	0	500	266 cu. ft.
6" or 5-5/8"	4-1/2"	11.6 lbs.	Long	K-55	450	4000	605 cu. ft.

22. PROPOSED WORK SUMMARY

Prepare 160' x 200' drillsite pad and lined sump adjacent to existing access road into clear cut parcel 30. Move in truck mounted rig. Drill 14-3/4" hole to 30' depth, run 11-3/4" conductor to bottom and cement to surface. Drill 10" hole to 500' depth; run 7" K-55 26 pound Buttress casing to bottom and cement to surface. Install casing head on 7" casing, then BOPE consisting of a double control gate and Hydril. Test BOPE per BLM regulations. Diamond core with HQ heads to 5000'. Run geophysical borehole log suite to 5000'. Open HQ hole with 6" bit to 4000' or other selected depth; run 4-1/2" K-55 11.6 pound LT&C casing to 4000', cement solid from shoe to lap in 7" casing at 450'-500' depth. Briefly flow well to obtain expected geothermal fluid samples. Hang 2-7/8" J-55 tubing string to 5000'; fill same with water. Release rig; leave CTGH-1 shut-in awaiting DOE high precision temperature log.

This will be a vertical borehole; no directional drilling/coring practices will be applied. However, borehole directional surveys will be run with the geophysical logging suite.

This deep thermal gradient hole would be drilled under a Cooperative Agreement between Thermal Power Company and the U. S. Department of Energy as part of the DOE program to 1) gather data to characterize the deep hydrothermal resource of the Cascades volcanic region and 2) transfer this data to the public in order to stimulate further development of hydrothermal resources.

(Use additional space on reverse side of form)

SIGNED W. L. D'Olier TITLE Vice President, Geothermal Exploration DATE 14 November 1985

(This space for Federal use)

APPROVED BY _____ TITLE Deputy State Director for Mineral Resources DATE 4/17/86

CONDITIONS OF APPROVAL, IF ANY:

See Attached Conditions and Requirements

A permit is required by law (30 U.S.C. 1023); regulations: 30 CFR 270.71; Federal Geothermal Lease Terms and Stipulations and other regulatory requirements. The United States Criminal Code (18 U.S.C. 1001) makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

(See instructions on reverse side)

Diamond Shamrock
Thermal Power Company

29 October 1986

Department of Geology and Mineral Industries
State of Oregon
910 State Office Building
Portland, Oregon 97201

Attention: Dennis L. Olmstead

Re: Clackamas Thermal Gradient Hole CTGH-1
Federal Geothermal Lease OR 12344
Marion County, Oregon

Gentlemen:

Drilling operations for CTGH-1 commenced 7 June 1986 and completed on 7 September 1986 as an activity of the DOE Cascades Thermal Gradient Drilling Project. We submit herewith Well Summary Report, Drilling and Completion History, schematics showing actual completion configuration and casing head, access gate and cellar. Complete copies of all core, lithology, geophysical logs and temperature surveys are also submitted under this letter.

Please be aware that the 4800-foot CTHG-1 is being retained in a shut-in mode during the 12-month DOE Access Period which commenced 7 September 1986. No abandonment procedure is enclosed because Thermal is considering options for additional borehole evaluation activity in 1987, possible borehole deepening or a suspended retention as allowed under the lease provisions.

Yours very truly,

W. L. D'Olier
Vice President
Geothermal Exploration

WLD/ma

cc Susan Prestwich, DOE Idaho Falls

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

Form 8-1/80

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 State Office Building Portland, Oregon 97201

WELL SUMMARY REPORT
(Geothermal Well)

Operator Thermal Power Company Field Squirrel Creek

Well No. CTGH-1* Sec. 28, T 8S, R 8E, WM W. B. & M.

Location 2200' N. and 1500' W of SE corner Sec 28 Elevation above sea level 3840 feet

All depth measurements taken from top of Rig floor, which is 4 feet above ground

In compliance with the rules and regulations pursuant to ORS 522 (Chapter 552 OL 1975) the information given herewith is a complete and correct record of the present condition of the well and all work done thereon, so far as can be determined from all available records.

Date 28 October 1986 Signed W. L. D'Olier

Engineer or Geologist Superintendent Title Vice President, Geothermal Exploration
(President, Secretary or Agent)

Commenced drilling 7 June 1986 Completed drilling 7 Sept. 1986 Drilling tools ~~XXXXX~~Core 526-4800'
Rotary 0-526'

Total depth 4800' Plugged depth N/A

Junk	GEOLOGICAL MARKERS	DEPTH
N/A	N/A	

Commenced producing N/A
Date

*Thermal Gradient Hole
DOE Cascades TG Drilling Project

	Water gpm	Temp °C	Total Dissolved Solids (ppm)	Steam lb/hr	Tubing Pressure	Casing Pressure
Initial production N/A						
Production after 30 days						

CASING RECORD (Present Hole)

Size of casing (A.P.I.)	Depth of shoe	Top of casing	Weight of casing	New or second hand	Seamless or lapweld	Grade of casing	Size of hole drilled	No. of sacks of cement	Depth of cementing if through perforations
10.75"	35'	0	40.5 lbs			K-55	12.25"	32	
7"	488'	0	26 lbs			K-55	8.75"	N/A	

PERFORATIONS

Size of casing	From	To	Size of perforations	Number of rows	Distance between centers	Method of perforations
	ft.	ft.				
	ft.	ft.				
	ft.	ft.				
	ft.	ft.				
	ft.					

Electrical Log Depths See Attachment 1 (Attach Copy of Log)

THERMAL POWER COMPANY
Santa Rosa Office

ATTACHMENT NO. 1

CTGH-1 DATA LISTING - 27 OCTOBER 1986

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4. Summary Wellsite "Mud Log": 0 - 4800'
5. Geophysical Borehole Logs

A. Shallow Logging Run (TD = 517')

(i) Temperature: 6 - 516.5'
(ii) Fluid Resistivity: 16 - 514'
(iii) Caliper: 10 - 514'
(iv) Gamma-Gamma Density Uncompensated and Compensated

Uncompensated: 30 - 516'
Compensated: 0 - 510'

(v) Guard Resistivity: 20 - 514'
(vi) Natural Gamma: 0 - 510'
(vii) Spontaneous Potential: 35 - 516'
(viii) 16-64" Resistivity: 35 - 516'
(ix) Deviation Survey
(x) Tabulated data sheets on the following surveys: spontaneous potential, 16-64" resistivity, fluid resistivity, temperature, long-spaced density (uncompensated), natural gamma, guard resistivity, caliper, dual density (compensated) at 0.5 feet increments and deviation at generally 10 foot increments.
(xi) Plots of Wellbore Deviation
(xii) Density Calibration Plot
(xiii) Caliper Calibration Plot
(xiv) Shallow Logging Run Report by Goodwin and McDannell (Drillsite Geologists)
(xv) Shallow Logging Run Report by Colorado Well Logging

B. Deep Logging Run (TD = 4800')

(i) Temperature: 0 - 4785'
(ii) Fluid Resistivity: 0 - 4785'
(iii) Gamma Gamma Density Uncompensated: 775 - 900'
(iv) Sonic: 4225 - 4425'
(v) Natural Gamma: 0 - 4800'
(vi) Neutron: 0 - 4800'
(vii) Induced Polarization: 4200 - 4799'
(viii) Spontaneous Potential: 4200 - 4798'
(ix) 16-64" Resistivity: 4200 - 4799'
(x) 6' Lateralog: 4200 - 4798'

(xi) Caliper: 760 - 885': 4100 - 4800'
(xii) Caliper Calibration Plot
(xiii) Density Calibration Plot
(xiv) Tabulated data sheets on the following surveys: spontaneous potential, 6' lateralog, induced polarization, 16-64" resistivity and sonic at 0.5 foot increments; inclination at 25-foot increments; and temperature and fluid resistivity at 10-foot increments
(xv) Deep Logging Report by Colorado Well Logging

6. Temperature and Pressure Survey by Pruett Wireline Industries, Inc.
7. Actual Gradient Hole Completion Configuration Schematic
8. Actual Gradient Hole Casing Head, Access Gate, Cellar Schematic
9. A Preliminary Review of the Secondary Mineralogy in Drillhole CTGH-1 by Columbia Geoscience
10. Selected Mineralogical Analysis of Secondary Minerals in CTGH-1 by Mr. Keith Barger, USGS, Menlo Park
11. Temperature Survey by Dr. David Blackwell
12. CTHG-1 Drilling and Completion History
13. Daily Drilling Report

JLI/ma
JLI095

Diamond Shamrock
Thermal Power Company

July 3, 1986

Dr. D. Nielsen
University of Utah Research Institute
Earth Science Laboraotry
391-A Chipeta Way
Salt Lake City, Utah 84108

Dear Dennis:

In addition to the week's drilling and geologic report, enclosed are the following:

1. Cutting description log from 0 to 527 ft.

2. Core description log from 527 to 1247 ft.

3. Mud log from 0 to about 1280 ft.

4. Core recovery log from 675 to 1306 ft.

5. Field prints of the shallow geophysical borehole logging run consisting of (1) natural gamma and guard resistivity, (2) gamma-gamma density and caliper, (3) spontaneous potential, 16" and 64" resistivity, and (4) temperature and fluid resistivity.

Please acknowledge receipt of these data by signing and returning a copy of this transmittal letter.

Sincerely,

Joe Iovenitti

J. L. Iovenitti
Senior Geologist

JLI/ma

Received by: _____

Date: 12 July 86

JLI061

Thermal Power Company
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401
Phone 707 576-7022

THERMAL POWER COMPANY
Santa Rosa Office

ATTACHMENT NO. 1

CTGH-1 DATA LISTING - 27 OCTOBER 1986

1. Cutting Description Log: 0 - 527'
2. Core Description Log: 527 - 4796'
3. Core Recovery Log: 527 - 4800'
4. Summary Wellsite "Mud Log": 0 - 4800'
5. Geophysical Borehole Logs

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EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108—1295
TELEPHONE 801-524-3422

M E M O R A N D U M

TO: P. M. Wright
Susan Prestwich (Telecopy)

FROM: Louise Orvin/Joseph Iovenetti

SUBJECT: Thermal Power Report given verbally by Joseph Iovenetti

DATE: August 15, 1986

THERMAL POWER REPORT # 69

August 14, 1986

Depth at 2400 hours: 4430'

Report for 2400 hour period: Cored 80' from 4450-4530' 100% core recovery. No fluid returns.

Squirl creek water supply continues at an adequate field; enough to keep 500 barrel breaker tank full and to meet daily requirements. Forest Service visits drill site every two or three days to ensure water supply status and fire compliance.

Operation 0600 hr.: (On following day) Coring at 4550'. MRT Reading at 4550' - 182°F.

Daily: $6,700
Cumulative: $359,106