Table 3-5 (cont'd)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Results, mg/L$^1$</th>
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<tr>
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<td>1012GA-A</td>
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<tr>
<td>Sample ID:</td>
<td>(7439-9)</td>
</tr>
<tr>
<td>Lab ID:</td>
<td>1012CC-A</td>
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<tr>
<td>(7439-18)</td>
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<tr>
<td>Ammonia, total as NH$_3$</td>
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<tr>
<td>Arsenic</td>
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<tr>
<td>Calcium</td>
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<tr>
<td>Iron</td>
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<tr>
<td>Lithium</td>
<td>$&lt; 0.01$</td>
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<tr>
<td>Magnesium</td>
<td>$&lt; 0.1$</td>
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<tr>
<td>Manganese</td>
<td>--</td>
</tr>
<tr>
<td>Mercury</td>
<td>--</td>
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<tr>
<td>Potassium</td>
<td>0.1</td>
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<tr>
<td>Sodium</td>
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</tr>
<tr>
<td>Sulfate</td>
<td>13</td>
</tr>
<tr>
<td>Sulfide</td>
<td>--</td>
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<tr>
<td>Sulfate, dissolved</td>
<td>--</td>
</tr>
<tr>
<td>Total sulfur, dissolved</td>
<td>--</td>
</tr>
</tbody>
</table>

| Sample ID:                           | 1012CC-D          |
| Lab ID:                              | (7439-58)         |
| Sulfide                              | 5.2               |
| Sulfate, dissolved                   | 12                |
| Total sulfur, dissolved              | 8.3               |
Diamond Shamrock Thermal Power Co., Operator

**KAPOHO STATE 1-A DEVIATION SURVEYS**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Dev. Angle</th>
<th>Acc. T.V.D.</th>
<th>Acc. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>0.5°</td>
<td>115.99'</td>
<td>1.01'</td>
</tr>
<tr>
<td>159'</td>
<td>0.5°</td>
<td>274.98'</td>
<td>2.40'</td>
</tr>
<tr>
<td>343'</td>
<td>1.0°</td>
<td>617.93'</td>
<td>8.39'</td>
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<td>929'</td>
<td>1.5°</td>
<td>928.82'</td>
<td>16.53'</td>
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<td>1,364'</td>
<td>2.0°</td>
<td>1,363.33'</td>
<td>31.71'</td>
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<td>1,728'</td>
<td>2.75°</td>
<td>1,727.13'</td>
<td>47.27'</td>
</tr>
<tr>
<td>2,099'</td>
<td>4.75°</td>
<td>2,096.85'</td>
<td>77.99'</td>
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<td>2,722'</td>
<td>6.0°</td>
<td>2,716.44'</td>
<td>143.11'</td>
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<td>2,967'</td>
<td>7.0°</td>
<td>2,959.61'</td>
<td>172.97'</td>
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<tr>
<td>3,649'</td>
<td>7.25°</td>
<td>3,636.16'</td>
<td>259.04'</td>
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<tr>
<td>3,989'</td>
<td>7.5°</td>
<td>3,973.25'</td>
<td>303.42'</td>
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<tr>
<td>5,018'</td>
<td>7.0°</td>
<td>4,995.43'</td>
<td>437.99'</td>
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<td>5,205'</td>
<td>7.0°</td>
<td>5,181.03'</td>
<td>460.78'</td>
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<tr>
<td>6,505' TD</td>
<td>--</td>
<td>6,471.34'</td>
<td>619.21'</td>
</tr>
</tbody>
</table>

**Note:** The maximum accumulated deviation is probably less than the calculated maximum of 619.21' due to spiraling of the wellbore.
WELLBORE SCHEMATIC KS-1A

30" Casing

Water Table

20", 90 lbs., H-40 Casing

17.5" Hole

13 3/8", 61 lbs., C-90 Casing

12.25" Hole

9 5/8", 47 lbs., C-90 Casing

8.5" Hole

7", 26 lbs., C-90 Slotted Liner

84' KB

597'

1377'

2701'

3874'

4061'

6505'

All Measurements From KB (18' above ground level)

9 5/8" Casing Volume = 296 bbls

G.L. Elevation = 619'

Figure 3: Wellbore Diagram of KS-1A
WELL SUMMARY REPORT - GEOTHERMAL

Operator
Diamond Shamrock/Thermal Power Company

Well name and number
Kapoho State 1-A

Field
Puna

County
Hawaii

Location (property or section corner, or street center lines)
State Geothermal Resource Mining Lease No. R-2
(Surveyors' Report shows exact location)

Commenced drilling (date)
7/8/85

Total depth (meters)
6505 ft.

Plugged depth (meters)
None

Completed drilling (date)
9/3/85

Geologic formation and age at total depth
Basalt

Commenced producing (date)
Tested October, 1985

Geologic marker(s)
Junk

Top Reservoir
≈ 4000'

STATIC TEST PRODUCTION TEST DATA

<table>
<thead>
<tr>
<th>DATE</th>
<th>Temp °C</th>
<th>Press. bars</th>
<th>Total mass flow data</th>
<th>Separator data</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/31/85</td>
<td>70°F</td>
<td>425 psig</td>
<td>79,170 lbs/hr</td>
<td>14,210 lbs/hr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>369°F 153.5 psig</td>
<td>64,960 lbs/hr</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>1042 Btu/lb .836</td>
<td>150 psig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE</th>
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<td>10/31/85</td>
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<td></td>
<td></td>
<td></td>
<td>1042 Btu/lb .836</td>
<td>150 psig</td>
</tr>
</tbody>
</table>

CASING RECORD (present hole)

<table>
<thead>
<tr>
<th>Size of casing (A.P.I.)</th>
<th>Top of casing (m)</th>
<th>Depth of shoe (m)</th>
<th>Weight of casing (kg)</th>
<th>New or second hand</th>
<th>Seamless or lapweld</th>
<th>Grade of casing</th>
<th>Size of hole drilled (cm)</th>
<th>Volume of cement (m³)</th>
<th>Depth of cementing if through perforations (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 in.</td>
<td>0 ft.</td>
<td>84 ft.</td>
<td>--</td>
<td>new</td>
<td>seamless</td>
<td>H 40</td>
<td>36 in.</td>
<td>See</td>
<td>See</td>
</tr>
<tr>
<td>20 in.</td>
<td>0 ft.</td>
<td>1377 ft.</td>
<td>#94</td>
<td>new</td>
<td>seamless</td>
<td>H 40</td>
<td>26 in.</td>
<td>History</td>
<td></td>
</tr>
<tr>
<td>13-3/8 in.</td>
<td>0 ft.</td>
<td>2700 ft.</td>
<td>#61</td>
<td>new</td>
<td>seamless</td>
<td>C 90</td>
<td>17-1/2 in.</td>
<td>History</td>
<td></td>
</tr>
<tr>
<td>9-5/8 in.</td>
<td>0 ft.</td>
<td>4063 ft.</td>
<td>#46</td>
<td>new</td>
<td>seamless</td>
<td>C 90</td>
<td>12-1/4 in.</td>
<td>History</td>
<td></td>
</tr>
</tbody>
</table>

PERFORATED CASING (size, top, bottom, perforated intervals, size and spacing of perforation and method)
7" liner - C 90 - #26 - shoe 6505' - top 3874' - 5 blank joints on top, rest perforated with 1/2" holes on 3" centers, 10 rows (in 8-1/2" hole).

Was analysis of effluent made?
Yes  ☑ No  ☐

Electric log depths
None

Temperature depths
0 - 6501'

In compliance with Title 13, DLNR Chapter 183, 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.

Name
Jeffrey J. Hebein

Address
3333 Mendocino Ave., Suite 120

City
Santa Rosa, California

Telephone Number
707/576-1398

Signature
Jeffrey J. Hebein

Date
1-30-86
Day 48  August 24, 1985  Depth: 4,068'

Found tight spot in 9-5/8" casing slip area, milled on tight spot to allow tool passage, installed BOPS.

Day 49  August 25, 1985  Depth: 4,212'

Installed BOPS, tested 4" pipe rams for 15 minutes @ 150 psi, drilled out float collar, cement, and shoe, drilled 8-1/2" hole 4068-4212', tripped for bit change.

Day 50  August 26, 1985  Depth: 4,325'

Tripped for bit change, repaired rig, reamed from 4143' to 4212', drilled 8-1/2" hole 4212'-4325', repaired rig.

Day 51  August 27, 1985  Depth: 4,759'

Drilled 8-1/2" hole 4324'-4759', repaired rig.

Day 52  August 28, 1985  Depth: 5,045'

Drilled 8-1/2" hole 4759'-5045', surveyed @ 5018', tripped for bit change, repaired rig.
Day 45  August 21, 1985  Depth: 4,068'

Ran 9-5/8" casing - C90 - #46 - hydrol threads, shoe at 4063', float collar @ 3984', DV collar @ 3834', circulated casing 5 hrs to cool hole, pumped 20 bbls. H₂O, cemented first stage w/85 sks Class G cement - 40% silica flour - .65% CFR2, slurry wt. 15.5 ppg, displaced cement w/267 bbl mud, bumped plug w/1500 psi, drop plug open DV collar w/900 psi, circulated excess cement to surface, circulated casing 2 hrs, rigging up casing jacks.

Day 46  August 22, 1985  Depth: 4,068'

Circulated + conditioned hole 1 hr., tensioned 9-5/8" casing to 500,000 lbs - 33.75" extension, pumped 20 bbls. H₂O - 20 bbl. flo-check - 20 bbls. H₂O preflush, followed w/510 sacks cement w/50 lb. spherelite/sack - 40% silica flour - 4% gel - 5% lime - .65% CFR2 - .5% Halad 22A -slurry volume 1,632 cu. ft. - cement wt. 11.4 ppg, followed w/60 sacks cement w/40% silica flour - .65% CFR2 - cement wt. 15.5 ppg, released plug, displaced cement w/280 bbls. H₂O, bump plug w/2000 psi, closed DV collar, circulated 80 bbls. cement to surface, good cement returns, cut off 9-5/8" casing and installing BOPS.

Day 47  August 23, 1985  Depth: 4,068

Installed and tested BOPS, blind rams held for 15 minutes @ 1000 psi, serviced and prepared rig.
Day 39  August 15, 1985  Depth: 3,104'

Rig shut down for repair

Day 40  August 16, 1985  Depth: 3,132'

Rig shut down for repair, drilled 12-1/4" hole 3104'-3132'.

Day 41  August 17, 1985  Depth: 3,474'

Drilled 12-1/4" hole 3132'-3474'.

Day 42  August 18, 1985  Depth: 3,821'

Drilled 12-1/4" hole 3474'-3821', serviced rig, surveyed @ 3649 ft.

Day 43  August 19, 1985  Depth: 4,068'

Drilled 12-1/4" hole 3821'-4068', circulated for 3 hrs. @ 4068' to condition hole for casing.

Day 44  August 20, 1985  Depth: 4,068'

Circulated and conditioned hole for casing, surveyed @ 3,989', checked for fill on bottom and circulated.
psig - increased pressure to 1500 psig, DV held OK before bleed down, cut-off 13-3/8" casing, installed 20" x 13-3/8" expansion spool, installing BOPS.

Day 35 August 11, 1985 Depth: 2,722'

Installed BOPS, tested pipe rams @ 1000 psi for 15 minutes - held OK, tested 5" pipe rams @ 1000 psi for 15 minutes - held OK, tested hydri @ 700 psi for 15 minutes - held OK, drilled on collars and cement plugs w/12-1/4" bit.

Day 36 August 12, 1985 Depth: 2,856'

Drilled out cement and cleaned hole to 2722', drilled 12-1/4" hole to 2747', tripped for bit change.

Day 37 August 13, 1985 Depth: 3,104'

Drilled 12-1/4" hole from 2856' to 3104', hung drillstring @ 2592', rig shut down for repair.

Day 38 August 14, 1985 Depth: 3,104'

Rig shut down for repair
Day 31 August 7, 1985 Depth: 2,722'

Ran 13-3/8" 61#/vam coupled C-90 casing with shoe @ 2700', top @ surface, ran w/15 centralizers, float collar @ 2620', DU point @ 2456', circulated mud outside casing for 2 hours, pumped 30 bbls. H₂O ahead of 326 cu. ft. cement slurry containing 201 sks. Class G cement, 40% sil flour -0.65% CFR2, ran wiper plug ahead of cement slurry, opened DV parts w/850 psig, circulated 8 bbls. cement slurry to surface, conditioned with mud circulation for 5 hours.

Day 32 August 8, 1985 Depth: 2,722'

Rigged up for tension casing cementing.

Day 33 August 9, 1985 Depth: 2,722'

Set casing slips and circulated mud for 4 hours, jacked casing in tension to 550,000 lbs. and 12.12" extension, released jacks and repeated jacking, set @ 550,000 lbs tension and 12.12" extension, circulated mud for 45 minutes, pumped 20 bbl H₂O - 20 bbls. flow check and 20 bbls H₂O.

Day 34 August 10, 1985 Depth: 2,722'

Cemented with 768 sks. Class G cement - 50 lbs. spherelite per sack - 40% sil flour - 4% gel - 5% lime - 5% Halad 22A - 0.65% CFRZ in 2650 cu. ft. cement slurry @ 11 ppg, ran wiper plug and displaced w/377 bbls. mud, good returns to surface - ± 200 bbls., closed DV ports @ 2457' with 1250
Day 26       August 2, 1985       Depth: 1,995'

Drilled 17-1/2" hole 1896'-1995', twisted off @ 1968', circulate 1 hr. @ T.O.F., fished over fish, engaged and slipped off, fished over fish with smaller tool, engaged fish and pulled out.

Day 27       August 3, 1985       Depth: 2,126'

Drilled 17-1/2" hole 1995'-2126', 2 hr. rig repair, 1 hr. circulate and condition mud, 5 hr. rig service, 1 hr. trip for bit change.

Day 28       August 4, 1985       Depth: 2,372'

Changed bit, cleaned out fill 2121'-2126', drilled 17-1/2" hole from 2126'-2372', lost 25 bbl mud @ 2190'-2205'.

Day 29       August 5, 1985       Depth: 2,688'

Drilled 17-1/2" hole for 2372'-2688'.

Day 30       August 6, 1985       Depth: 2,722'

Drilled 17-1/2" hole to 2722', circulated and conditioned hole for 3 hrs., ran back in to check for fill, no fill, circulated hole for 2 hrs., surveyed at 2722 ft.
148', poured 8 cu yds redi-mix cement hole, mixed 1/1 sand - 5% 1/4" rock - 3% CaCl - 25% perlite, W.O.C., cut off 20" casing, welding on 20" Braden head.

Day 22   July 29, 1985   Depth: 1,386'

Completed welding Braden head, flange heated to 1000°F, slow cooled w/asbestos wrap.

Day 23   July 30, 1985   Depth: 1,391'

Cooled casing head flange, rigged B.O.P., tested B.O.P. at 1000 psig for 30 min., held OK, drilled cement from 1375'-1377', cleaned out to 1386', drilled 17-1/2" hole 1386'-1391'.

Day 24   July 31, 1985   Depth: 1,161'

Tripped for bit @ 1422', cut + move drilling line @ 1422', drilling 17-1/2" hole, lost 50 bbl mud @ 1610', added L.C.M., still losing small amount below that depth, drilled 17-1/2" hole to 1616 ft.

Day 25   August 1, 1985   Depth: 1,986'

Drilled 17-1/2" hole from 1616'-1896', 1 hr - circulate and survey at 1,728 ft.
Day 18  July 25, 1985  Depth: 1,348'

Drilled 26" hole to 1,348 ft., serviced rig 0.5 hr.

Day 19  July 26, 1985  Depth: 1,386'

Drilled 26" hole 1348-1386' T.D. at 1386', conditioned hole with 200 bbl mud, pumped 300 bbl mud and L.C.M. (8%), surveyed, ran H₂O fluid level probe, fluid @ 441' KB, cut off 30" conductor.

Day 20  July 27, 1985  Depth: 1,386'

Ran 36 joints 20" H-40 #94 BTU casing w/Howco stab-in float shoe, total length 1379.37', set @ 1377.27' R.K.B., shoe @ 1377', pumped 837 sks + 10 bbls H₂O + 47 bbls super-flush, 10 bbls H₂O lead slurry cement, 1778 cu. ft. cement - 1-1 perlite - 3% gel - 40% sil flour - .65% CFR2 - 1% c.c.; cement wt. 12.6 to 13.3 ppg, tail slurry 300 cu. ft. 185 sks cement w/40% sil flour - .65% CFR2 - 1% CaCl cement @ 15.5 ppg. bump plug w/200 psig, plug held OK, W.O.C., tag top of cement @ 478'.

Day 21  July 23, 1985  Depth: 1,386'

Pumped 360 cu. ft. 170 sks. cement - 1/1 perlite - 3% gel, 40% sil. flour - .65% CFR2 - 1% CaCl, W.O.C., tag cement @ 435', pump 360 cu. ft. 170 sks - 1/1 perlite - 3% CSL - 40% sil flour - .65% CFR2 - 1% CaCl, W.O.C., tag cement @ 331', cement 13.3 ppg, pumped 16 cu yds redi-mix down back side mixed w/1/1 sand - 3% CaCl - 25% perlite, W.O.C., tag cement @
Day 12  July 19, 1985  Depth: 660'

Drill 26" hole from 604-660', survey @ 618', bailed for water sample 10 hours - 75 gal/bail - water @ 608' KB, recover water sample.

Day 13  July 20, 1985  Depth: 749'

Pump 100 Bl mud in hole, clean out 5' fill from 655'-660', drilled 26" hole from 660'-749'.

Day 14  July 21, 1985  Depth: 899'

Drilled 26" hole from 749-899', repaired rig.

Day 15  July 22, 1985  Depth: 1,078'

One-half hour survey @ 929', repaired rig, drilled 26" hole to 1,078 ft.

Day 16  July 23, 1985  Depth: 1,195'

Drilled 26" hole to 1,195 ft.

Day 17  July 24, 1985  Depth: 1,258'

Tripped for 26" bit #6 @ 1197', washed down from 980'-1018', pumped in 100 bbls mud, drilled 26" hole to 1,258 ft.
Day 6  
July 13, 1985  
Depth: 90'

Cleaned out with 26'' H.O. from 45-87', opened 36'' hole from 31'-42'.

Day 7  
July 14, 1985  
Depth: 90'

Opened 36'' hole from 62'-84', ran 79' 30'' casing-set @ 84' KB, center 30'' casing, cement casing with 7 yd.³ redi-mix cement 1:1 sand/cement 2% CaCl, D.I.P., W.O.C.

Day 8  
July 15, 1985  
Depth: 143'

W.O.C., drilled cement 70'-84' in 30'' conductor, C.O. fill 84'-90', drilled 26'' hole from 90' to 143'.

Day 9  
July 16, 1985  
Depth: 211'

One-half hour survey @ 116', repair rig, drill 26'' hole to 211 ft.

Day 10  
July 17, 1985  
Depth: 380'

Service rig and compressor, 1 hour surveying at 275', drilled 26'' hole to 380 ft.

Day 11  
July 18, 1985  
Depth: 604'

Repair compressor, 1/2 hour surveying N.R., mix mud and condition hole, hit water table @ 597', mixed mud, drill 26'' hole to 604 ft.
<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>July 8, 1985</td>
<td>64'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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<td>90'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>July 10, 1985</td>
<td>90'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>July 11, 1985</td>
<td>90'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>July 12, 1985</td>
<td>90'</td>
</tr>
</tbody>
</table>

Spudded 1730 hours, center punched hole with 12-1/4" bit plus H.O., drilled 12-1/4" hole to 64 ft.

Drilled 12-1/4" hole to 90 ft., opened 12-1/4" hole with 17-1/2" bit, at 90 ft.

Open hole to 26" - 34' to 87'.

Open hole to 36" - 34' - 53', stuck @ 53', work free, cut off 42" spud conductor @ collar floor, fished out large boulder, placed 22 yd.\(^3\) ready-mix cement 1:1 sand 3% CaCl from 49'-54', W.O.C.

Drilled cement plug with 17-1/2" bit, cleaned out to 90', cleaned out to 45' with 26" H.O.
Mr. Manabu Tagomori  
Manager - Chief Engineer  
Department of Land and Natural Resources  
P. O. Box 373  
Honolulu, Hawaii 96809

Dear Mr. Tagamori:

In accordance with D.L.N.R. Administrative Rule 13-183, we are submitting the following data for the Kapoho State 1-A geothermal well:

1. Lithologic and drilling log  
2. Well history report  
3. Well summary report  
4. Well location map  
5. Well directional survey  
6. Temperature logs before and after buildup.  
7. Pressure logs before and after buildup.  
8. Geochemical analysis of effluent is in progress and will be sent upon completion under separate cover.  
9. Induction electrical log was not run because of temperature limitations. Log from KS-1 (twinned location) is in your possession.

Please sign and return the second letter as acknowledgement of receipt of this data. Thank you for your attention to this transmittal.

Sincerely yours,

Jeffrey J. Hebein  
J. J. Hebein  
Senior Geologist

JJH/ma

Thermal Power Company  
A subsidiary of Diamond Shamrock, 3333 Mendocino Avenue, Suite 120, Santa Rosa, California 95401  
Phone 707 576-7022
ATTACHMENT PROPOSED DRILLING AND CONVERSION PROGRAM

CONFIDENTIAL

3-1/16" - 3000 psi SWAB GATE

11" - 3000 psi WING VALVE (NOT SHOWN)

11" - 3000 psi CROSS

11" - 3000 psi REMOTE ACTUATED MASTER VALVE

11" - 3000 psi MASTER VALVE

2-1/16" - 3000 psi FLANGED OUTLETS

13-5/8" x 11" - 3000 psi EXPANSION SPOOL

21'1/4" - 2000 psi x 13-5/8" - 3000 psi CASING SPOOL

2" - 2000 psi THREADED OUTLETS

21-1/4" - 2000 psi STARTING HEAD

FIGURE 8

KAPOHO STATE #3 PROPOSED WELLHEAD DESIGN
11. Drill 12¼" hole to approximately 4100' depth with mud drilling fluid.
   (a) Survey hole at 500' intervals. Run maximum reading thermometers with each survey.
   (b) Continue mud logging as specified in 6(c) with special emphasis on temperature increases with depth.

12. Run 9 5/8", 47 pound, C-90, Hydril Triple Seal coupled production casing to bottom of 12¼" hole, with DV collar 200 feet above casing shoe.
   (a) Cool wellbore and first stage 400 annular feet of Class G cement with 40% silica flour.
   (b) Open DV collar, circulate out excess cement. W.O.C. 24 hours, cooling hole as directed.
   (c) Tension 9 5/8" casing with jacks and set extended casing in wellhead slips.
   (d) Second stage a low density spherelite cement through DV collar. Use appropriate excess slurry to obtain uncontaminated cement returns. Close DV tool with wiper plug.

13. Remove B.O.P.E. Stub the 9 5/8" casing as directed.
   (a) Install 13 5/8" x 11" 3000 psi expansion spool and 11" 3000 psi master valve.
   (b) Reinstall B.O.P.E. as in 10(b) above; notify BLNR as in 10(c) and test as in 10(d).

14. Drill 8 3/4" or 8½" hole, using fresh water as drilling fluid, to 6500 or 7500 foot total depth as directed. Flow testing of incremental intervals of production zone may be performed.

15. At total depth, hang or stand as directed, a drilled or slotted, 7", 26 pound, C-90, VAM coupled, production liner which is to be lapped 200 feet inside the 9-5/8" production casing.

16. Make a wireline run to bottom of 7" liner. Release rig and prepare for flow testing.

ATTACHMENT
7. Install mud logging service at shoe of 20" casing before drilling out. Record continuous mud in and out temperatures, \( \text{H}_2\text{S} \), \( \text{CH}_4 \), \( \text{CO}_2 \), lithology, and drilling rate. Have pit level indicator and intercom to drillers station. Catch four sets of 50 gpm dry sample every 20'. Make daily copies of the mud log, keeping one (1) copy up to date and spliced in trailer. Send five copies to:

THERMAL POWER COMPANY
601 California Street
San Francisco, California 94108
Attention: Joe Iovenitti

8. Drill 17\( \frac{3}{4} \)" hole to 2700' depth with mud drilling fluid. Survey wellbore every 200' or on bit change.

9. Run 13 3/8", 61 pound C-90 VAM coupled casing to 2700', with DV collar at 2500'.
   (a) First stage 400 annular feet of Class G cement with 40% silica flour.
   (b) Open DV collar, circulate out excess cement. W.O.C. 24 hours.
   (c) Tension 13 3/8" casing with jacks and set extended casing in wellhead slips.
   (d) Second stage a low density spherelit cement through DV collar. Use appropriate excess slurry to obtain uncontaminated cement returns. Close DV tool with wiper plug.

10. Remove B.O.P.E. Stub the 13 3/8" casing and nipple up 21\( \frac{3}{4} \)" 2000 psi x 13 5/8 3000 psi casing spool.
   (a) Pressure test the wellhead.
   (b) Install B.O.P.E. consisting of one 12" Series 400 gate valve, a 12" mud cross with two side outlets for a kill line and a choke manifold, a hydraulically-operated double ram blowout preventer with one set each of pipe and blind rams, a 12" expansion-type annular preventer, and a mud fillup line. A rotating head may be added as directed.
   (c) Notify the Chairman of the Hawaii Board of Land and Natural Resources (BLNR) in advance of B.O.P.E. test so that designated representative can travel to the site and witness the test.
   (d) Test each preventer, the stack, casing, kelly cock, master valve, check valves in kill line, and blowdown line valve to 1000 psig. Record results on contractor and operator's daily reports.
   (e) Confirm drillsite location and operation of all \( \text{H}_2\text{S} \) safety equipment. Put all drillsite personnel through \( \text{H}_2\text{S} \) safety review including equipment downing by each person.
   (f) Confirm kelly cock installation and operation between kelly and swivel.
THERMAL POWER COMPANY, OPERATOR

PROPOSED DRILLING AND COMPLETION PROGRAM

1. Prepare second 10' x 10' x 10' cement-rebar wellhead cellar on existing location. Set 30" conductor pipe through cellar floor.

2. Move in Drilling Contractor's rig; drill and set rathole.
   (a) Notify Hawaii Board of Land and Material Resources (BLNR) 24 hours prior to commencement of drilling.
   (b) Confirm compliance with all permit requirements.

3. Spud hole with 12½" bit and mud drilling fluid; drill to top 20-feet of ground water zone in expected 600-700' depth interval. Stop and sample ground water.

4. Drill ahead to 1400' depth. Open 12½" hole to 17½" and then to 26" Control lost circulation with LCM; cement severe lost circulation zones if required.

5. Run 20", 94 pound H-40 Buttress coupled casing to 1400'. Single stage Class G cement with 40% silica flour; use appropriate excess slurry. Be prepared to cement the 20-30" annulus with Redi-mix from the surface. W.O.C. 8 hours.

   (a) Pressure test the weld.
   (b) Install B.O.P.E. consisting of a hydraulically-operated double ram blowout preventer with one set each of pipe and blind rams, an expansion-type annular preventer and a mud fillup line.
   (c) Notify the Chairman of the Hawaii Board of Land and Natural Resources (BLNR) in advance of B.O.P.E. test so that designated representative can witness the test.
   (d) Test each preventer, the stack, casing, kelly cock, master valve, check valves in kill line, and blowdown line valve to 1000 psig. Enter test results on contractor and operator daily reports.
Day 58  September 3, 1985  Depth: 6,505'

Ran in hole @ 6504', displaced mud in well with water, circulated 1-1/2 hours, removed BOPS, installed second gate valve, serviced rig, shut in wells for injection test and pressure build-up, rig released @ 24:00 hours 9/3/85.

End of Drilling Report.
Day 53 August 29, 1985 Depth: 5,285'

Reamed hole 4805'-5045', drilled 8-1/2' hole 5045-5215', surveyed @ 5205', tripped for bit change, washed hole 5143'-5215', found 25' fill on bottom, drilled 8-1/2' hole 5215'-5258', serviced rig.

Day 54 August 30, 1985 Depth: 5,843'

Drilled 8-1/2'' hole 5258'-5843', serviced rig.

Day 55 August 31, 1985 Depth: 6,141'

Drilled 8-1/2'' hole 5843'-6026', tripped for bit change. Drilled 8-1/2'' hole 6026'-6141', serviced rig, survey @ 6013' (no results).

Day 56 September 1, 1985 Depth: 6,505'

Drilled 8-1/2'' hole 6141'-6505' total depth, circulated, pulled back, and cleaned 2' fill on bottom, circulated at total depth.

Day 57 September 2, 1985 Depth: 6,505'

Circulated and conditioned hole @ 6,505', ran 7'' liner - 68 joints - #26 -C90 - vam threads - total length 2,631', set shoe at 6505' - top @ 3874' -lapped into 9-5/8'' casing @ 187', 1 blank joint on bottom - 62 perforated joints - 5 blank joints on top, 1 centralizer at bottom collar, 3 centralizers at top collar, tripped back into hole.
PUNA GEOTHERMAL VENTURE

SITE PLAN

Diamond Shamrock
Thermal Power Company

Exhibit B
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February 4, 1986

Mr. Manabu Tagomori
Manager - Chief Engineer
Department of Land and Natural Resources
P. O. Box 373
Honolulu, Hawaii 96809

Dear Mr. Tagomori:

Enclosed is a chemical analysis of effluent produced from geothermal well Kapoho State 1-A, which will supplement the previously submitted well data now in your possession.

Please sign and return the second copy of this letter as acknowledgement of receipt of this material.

Thank you for your attention to this transmittal.

Sincerely yours,

J. J. Hebein
Senior Geologist

Receipt Acknowledged

Date