

DIVISION OF WATER AND LAND DEVELOPMENT

FROM: DATE: 5/12 FILE IN:

TO: INIT:

PLEASE:

REMARKS:

M. TAGOMORI

L. Nanbu

~~G. Akita~~

L. Chang

E. Lau

A. Monden

 H. Young

T. Kam

G. Miyashiro

 D. Lee

A. J. Yim

_____ Mr

See Me

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Investigate & Report

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FOR YOUR:

R. LOUI

S. Kokubun

Approval

Signature

Information

W. PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

March 23, 1994

John C. Lewin, M.D., Director
State Department of Health
P.O. Box 3378
Honolulu, HI 96801

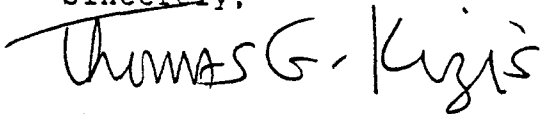
SUBJ: WELL MONITORING DATA

Dear Dr. Lewin,

Attached please find water analyses data for wells MW-1 and MW-2 for samples taken on March 1, 1994.

Should you or your staff have any questions, please contact me.

Sincerely,



Thomas G. Kizis
Environmental Manager

c: [REDACTED]
C. Hew (DOH)
V. Goldstein (HCPD)

File: MW-1/MW-2

RECEIVED
94 MAR 24 9:17
DIV. OF WATER &
LAND DEVELOPMENT



BREWER
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INDUSTRIES, INC.
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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURE
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: GREG DAVIDSON

JOB NUMBER: 2069

DATE: MARCH 17, 1994

PROJECT NAME: BI MONTHLY GROUND WATER
PO #10028 ITEM 1

Date/Time Sampled: 03/01/94 @ 1100
Date/Time Received: 03/01/94 @ 1225

Matrix: WATER
SAMPLE #: MW-1

ANALYSIS	RESULT mg/L	REPORTING LIMIT mg/L	ANALYSIS DATE	METHOD NUMBER
CALCIUM	20.4	1.0	03/10/94	200.7
MAGNESIUM	11.8	0.25	03/10/94	200.7
POTASSIUM	11.3	4.0	03/10/94	200.7
SODIUM	57.8	0.10	03/10/94	200.7
ALKALINITY	31.0	0.2	03/10/94	310.1
CHLORIDE	17.0	1.0	03/11/94	325.3
CONDUCTIVITY (umhos/cm)	551	10	003/10/94	120.1
pH (units)	7.6		03/01/94	150.1
SILICA	116	0.2	03/10/94	370.1
SULFATE	187	10	03/08/94	375.4
TOTAL DISSOLVED SOLIDS	439	10	03/04/94	160.1

BREWER ENVIRONMENTAL LABORATORIES
PO. BOX 552
PAPAIIKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by: Thomas Davis



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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURE
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: GREG DAVIDSON

JOB NUMBER: 2069

DATE: MARCH 17, 1994

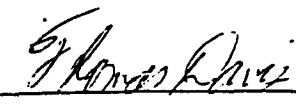
PROJECT NAME: BI MONTHLY GROUND WATER
PO #10028 ITEM 1

Date/Time Sampled: 03/01/94 @ 1043
Date/Time Received: 03/01/94 @ 1225

Matrix: WATER
SAMPLE #: MW-2

ANALYSIS	RESULT mg/L	REPORTING LIMIT mg/L	ANALYSIS DATE	METHOD NUMBER
CALCIUM	47.7	1.0	03/10/94	200.7
MAGNESIUM	22.8	0.25	03/10/94	200.7
POTASSIUM	36.8	4.0	03/10/94	200.7
SODIUM	590	0.10	03/10/94	200.7
ALKALINITY	109	0.2	03/10/94	310.1
CHLORIDE	1060	1.0	03/11/94	325.3
CONDUCTIVITY (umhos/cm)	3750	10	003/10/94	120.1
pH (units)	7.9		03/01/94	150.1
SILICA	61.0	0.2	03/10/94	370.1
SULFATE	15	10	03/08/94	375.4
TOTAL DISSOLVED SOLIDS	2200	10	03/04/94	160.1

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PAPA'IKOU, HI 96781
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FAX (808) 964-5309

Approved by: 

DIVISION OF WATER AND LAND DEVELOPMENT

FROM: 25 DATE: 4-1-81 FILE IN: _____

TO: INIT: PLEASE: REMARKS:

___ M. TAGOMORI
 ___ L. Nanbu
 ✓ 50 ___ G. Akita
 ___ L. Chang
 ___ E. Lau
 ___ A. Monden
 ✓ fm ___ H. Young
 ___ T. Kam
 ___ G. Miyashiro
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 ___ S. Kokubun
 ___ Approval
 ___ Signature
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PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

WL

April 15, 1994

John C. Lewin, M.D., Director
State Department of Health
P.O. Box 3378
Honolulu, HI 96801

SUBJ: WELL MONITORING DATA

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

94 APR 19 10:21 AM

Dear Dr. Lewin,

Attached please find water analyses data for wells MW-2 and MW-3 for samples taken on March 29, 1994.

Should you or your staff have any questions, please contact me.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

c: K. Ahue (DLNR)
C. Hew (DOH)
V. Goldstein (HCPD)

File: MW-1/MW-2

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94 APR 20 3:10

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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURE
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: GREG DAVIDSON

JOB NUMBER: 2218-2

DATE: APRIL 22, 1994

PROJECT NAME: BI MONTHLY GROUND WATER
PO #10028 ITEM 1

Date/Time Sampled: 03/29/94 @ 0827
Date/Time Received: 03/29/94 @ 1000

Matrix: WATER
SAMPLE #: MW-2

ANALYSIS	RESULT mg/L	REPORTING LIMIT mg/L	ANALYSIS DATE	METHOD NUMBER
CALCIUM	44.7	1.0	04/04/94	200.7
MAGNESIUM	17.6	0.25	04/04/94	200.7
POTASSIUM	34.9	4.0	04/04/94	200.7
SODIUM	584	0.10	04/04/94	200.7
ALKALINITY	108	0.2	04/07/94	310.1
CONDUCTIVITY (umhos/cm)	3700	10	04/07/94	120.1
CHLORIDE	1070	1.0	04/07/94	325.3
pH (units)	8.3		03/29/94	150.1
SILICA	41.8	0.2	04/05/94	370.1
SULFATE	8.8	10	04/08/94	375.4
TOTAL DISSOLVED SOLIDS	2120	10	03/29/94- 04/05/94	160.1

BREWER ENVIRONMENTAL LABORATORIES
P.O. BOX 552
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PHONE (808) 964-5522
FAX (808) 964-5309

Approved by: *Greg Davidson*



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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURE
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: GREG DAVIDSON

JOB NUMBER: 2218-1

DATE: APRIL 11, 1994

PROJECT NAME: BI MONTHLY GROUND WATER
PO #10028 ITEM 1

Date/Time Sampled: 03/29/94 @ 0900
Date/Time Received: 03/29/94 @ 1000

Matrix: WATER
SAMPLE #: MW-3

ANALYSIS	RESULT mg/L	REPORTING LIMIT mg/L	ANALYSIS DATE	METHOD NUMBER
CALCIUM	21.5	1.0	04/04/94	200.7
MAGNESIUM	12.5	0.25	04/04/94	200.7
POTASSIUM	10.9	4.0	04/04/94	200.7
SODIUM	57.7	0.10	04/04/94	200.7
ALKALINITY	33.0	0.2	04/07/94	310.1
CONDUCTIVITY (umhos/cm)	570	10	04/07/94	120.1
CHLORIDE	18.5	1.0	04/07/94	325.3
pH (units)	7.7		03/29/94	150.1
SILICA	105	0.2	04/05/94	370.1
SULFATE	164	10	04/08/94	375.4
TOTAL DISSOLVED SOLIDS	459	10	03/29/94- 04/05/94	160.1

BREWER ENVIRONMENTAL LABORATORIES
PO BOX 552
PAPAIIKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by: *Greg Davidson*

Table 1. KS-1A 12 hour injection test data, 18 March, 1992

Time 17-Mar-92	Pumping Time (hrs)	Flowrate (gpm)	Wellhead Pressure (psig)	Injectivity Index (gpm/psi)	Comments
07:45	0.00		0		Start Pumping
07:50	0.08	252	0		Inj. water temp = 104 F
07:55	0.17	252	0		
07:57	0.20	252	0		
08:00	0.25	252	0		
08:05	0.33	252	0		
08:10	0.42	252	0		
08:15	0.50	252	0		
08:20	0.58	252	0		
08:25	0.67	252	0		
08:30	0.75	252	0		
08:35	0.83	252	0		
08:40	0.92	252	0		
08:45	1.00	252	0		
08:50	1.08	252	0		
09:00	1.25	252	0		
09:10	1.42	252	0		
09:20	1.58	252	0		
09:30	1.75	252	0		
09:40	1.92	252	0		
09:50	2.08	252	0		
10:00	2.25	252	0		
10:08	2.38	378	0		
10:15	2.50	378	0		
10:20	2.58	378	0		
10:30	2.75	378	0		
10:40	2.92	378	2		
10:45	3.00	378	2		
10:50	3.08	378	7		
10:55	3.17	378	14		
11:00	3.25	378	15	0.87	
11:10	3.42	378	25	0.85	
11:13	3.47	430		1.03	
11:15	3.50	438	75	0.89	
11:20	3.58	460	75	0.93	
11:25	3.67	464	92	0.91	
11:30	3.75	453	105	0.86	
11:35	3.83	453	116	0.85	
11:36	3.85	453	130	0.83	
11:40	3.92	467	140	0.84	

Table 1. 3 12 hour injection test data. 17 Mar. 392

Time 17-Mar-92	Pumping Time (hrs)	Flowrate (gpm)	Wellhead Pressure (psig)	Injectivity Index (gpm/psi)	Comments
06:58	0.00		0		Start Pumping Inj. water temp = 105F
07:00	0.03	252	0		
07:03	0.12	252	0		
07:10	0.20	252	0		
07:15	0.23	252	0		
07:20	0.37	252	0		
07:26	0.47	504	0		
07:32	0.57	504	0		
07:37	0.65	500	0		
07:42	0.73	502	0		
07:47	0.82	510	0		
07:52	0.90	505-	0		
07:57	0.98	505	0		
08:00	1.03	505	0		
08:05	1.12	505	0		
08:10	1.20	505	0		
08:15	1.23	500	0		
08:20	1.37	520	0		
08:25	1.45	525	0		
08:30	1.53	520	0		
08:35	1.62	520	0		
08:40	1.70	530	0		
08:45	1.78	530	0		
08:50	1.87	530	0		
08:55	1.95	530	0		
09:00	2.03	530	0		
09:05	2.12	530	0		
09:10	2.20	530	0		
09:15	2.28	530	0		
09:18	2.33	710	0		
09:22	2.40	750	48	1.83	
09:25	2.45	750	65	1.76	
09:30	2.53	750	77	1.71	
09:35	2.62	715	87	1.60	
09:40	2.70	750	98	1.63	
09:45	2.78	750	103	1.62	
09:50	2.87	745	106	1.60	
09:55	2.95	745	108	1.59	
10:00	3.03	740	109	1.58	
10:05	3.12	740	112	1.57	
10:10	3.20	735	112	1.55	
10:15	3.28	735	114	1.55	
10:20	3.37	735	114	1.55	
10:25	3.45	735	116	1.54	
10:30	3.53	735	118	1.54	
10:33	3.58	830	155	1.61	
10:37	3.65	840	158	1.62	
10:40	3.70	795	140	1.59	
10:45	3.78	795	152	1.55	

Table 1 Well KS-3 12 hour injection test

Time 17-Mar-92	Pumping Time (hrs)	Flowrate (gpm)	Wellhead Pressure (psig)	Injectivity Index (gpm/psi)	Comments
10:50	3.87	800	154	1.55	
10:55	3.95	800	155	1.55	
11:00	4.03	795	156	1.54	
11:10	4.20	800	160	1.54	
11:20	4.37	800	162	1.53	
11:30	4.53	805	165	1.53	
11:40	4.70	810		2.25	
11:50	4.87	800	163	1.53	
12:00	5.03	810	165	1.54	
12:10	5.20	810	160	1.56	
12:20	5.37	815	163	1.56	
12:30	5.53	810	163	1.55	
12:40	5.70	810	163	1.55	
12:50	5.87	815	163	1.56	
13:00	6.03	805	163	1.54	
13:10	6.20	805	157	1.55	
13:20	6.37	805	157	1.55	
13:40	6.70	800	157	1.55	
13:50	6.87	800	156	1.55	
14:00	7.03	805	156	1.56	
14:10	7.20	805	153	1.57	
14:20	7.37	800	150	1.57	
14:30	7.53	800	151	1.56	
14:40	4.70	805	152	1.57	
14:53	7.92	805	152	1.57	Start spinner survey
15:00	8.03	805	150	1.58	
15:10	8.20	800	147	1.58	
15:20	8.37	800	148	1.57	
15:30	8.53	800	148	1.57	
15:40	8.70	800	147	1.58	
15:50	8.87	795	143	1.58	
16:00	9.03	805	145	1.59	
16:10	9.20	810	150	1.59	
16:20	9.37	840	148	1.63	
16:30	9.53	805	150	1.58	
16:40	9.70	805	150	1.58	
16:50	9.87	812	148	1.60	
17:00	10.03	820	156	1.59	
17:10	10.20	795	158	1.53	
17:20	10.37	820	158	1.58	
17:30	10.53	820	158	1.58	
17:40	10.70	820	158	1.58	
17:50	10.87	815	156	1.58	
18:00	11.03	820	156	1.59	Start P/T survey
18:10	11.20	825	156	1.60	
18:20	11.37	820	152	1.60	
18:30	11.53	820	154	1.59	
18:40	11.70	825	153	1.61	
18:50	11.87	820	153	1.59	
19:00	12.03	820	153	1.60	
19:01	12.05	0			Shut-in

The results of the spinner - temperature survey are presented in table 2. The survey showed no flow was lost between the surface and the bottom of the cemented casing, and therefore there were no leaks in the casing.

Table 2. Spinner - temperature survey while injecting

Depth (feet)	Temperature (F)	Spinner % of flow
1000	67	100
2000	67	100
2400	69	100
2600	69	100
2800	69	100
3000	69	100
3720	70	100

The results of the pressure - temperature survey conducted while injecting are given in table 3 and the pressure fall-off data is given in table 4.

Table 3. Pressure - temperature survey while injecting

Depth (feet)	Temperature (F)	Pressure (psig)
2000	63	1003
2400	63	1175
2600	68	1260
3000	68	1487
4000	69	1849
5000	70	2258

Table 4. Pressure fall-off after injection

Time (minutes)	Pressure (psig)	Temperature (F)
0	2261	70
10	1952	74
20	1896	80
30	1884	89
60	1818	135
120	1808	167
180		193
240		214
300		231
360		245
420		
440	1786	260

The pressure fall-off and temperature change at 5,000 feet is also plotted in figure 5. The total pressure fall-off at 5,000 feet recorded 7 hours after shut-in was 475 psi. The injection flowrate prior to shut-in was 820 gpm, therefore the approximate injectivity index was; $820 \text{ gpm} / 475 \text{ psi} = 1.7 \text{ gpm/psi}$.

The injectivity index calculated for the portion of the test during which the wellhead pressure exceeded zero is shown on table 1. Inspection of the table shows the injectivity index was roughly constant during the test.

A Horner plot of the pressure fall-off data is shown in figure 6. Simple quantitative analysis of the data is not appropriate in this case due to the complications produced by large temperature changes (see Figure 5), and probable boiling or condensation transients in the reservoir.

The pressure and temperature survey conducted on March 19, 1992, approximately 36 hours after the injection test is presented in table 5.

Table 5. Static pressure - temperature survey 19 March, 1992. 1 day after injection test

Depth (feet)	Temperature (F)	Pressure (psig)
1000	53	133
2000	61	669
2400	74	744
2500	89	
2600	95	834
2800	159	
3000	213	1000
4000	251	1390
5000	320	1779

The temperature data is plotted on figure 7 along with the static survey of 24 March, 1991 when the well was in temperature equilibrium. The March 19 survey shows the well is still warming after the injection test. However, it displays the same general shape as the equilibrium survey indicating the temperature profile was returning to the original equilibrium condition.

The measured pressure at 5,000 feet on March 19 was 1779 psig. This is similar to the pressure of 1786 measured 7 hours after shut-in (see table 4). The injectivity index given by this pressure is; $820 \text{ gpm} / (2261 - 1779) \text{ psi} = 1.7 \text{ gpm/psi}$.

TABLE 5

JOB NO. 2711
DATE DEC. 04, 1990
PAGE 1 OF 2

LABORATORY ANALYSIS REPORT (1)

TO: PUNA GEOTHERMAL VENTURE ATTN:
ADDRESS: P.O. BOX 1337 PHONE:
HILO, HAWAII 96721
SAMPLES OF: WATER
SAMPLED BY: CLIENT SAMPLING DATE: 11/20/90 TIME: 1415
RECEIPT DATE: 11/21/90 TIME: 1150

DATE SAMPLE ANALYZED		11/28/90			
TIME SAMPLE ANALYZED					
SAMPLE TYPE					
SAMPLE DESCRIPTION		KS 3-1 WELL WATER #1			
	UNITS				
METALS:					
ARSENIC	mg/L	<0.002			
BARIUM	mg/L	<0.1			
CADMIUM	mg/L	0.01			
CHROMIUM	mg/L	0.05			
LEAD	mg/L	0.06			
MERCURY	mg/L	0.0011			
SELENIUM	mg/L	<0.002			
SILVER	mg/L	<0.01			
CALCIUM	mg/L	10.8			
MAGNESIUM	mg/L	3.6			
NICKEL	mg/L	0.06			
POTASSIUM	mg/L	3.3			
SODIUM	mg/L	33.4			
VANADIUM	mg/L	0.7			
LITHIUM	mg/L	0.01			
BORON	mg/L	2.8			
SILICA	mg/L	41.8			

LABORATORY REMARKS: Samples analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency, March, 1979 and/or "Microbiological Methods for Monitoring the Environment", Environmental Protection Agency, August, 1978.

Douglas Post

PUNA GEOTHERMAL VENTURE
WELL KS-3 INJECTION TEST AND MECHANICAL INTEGRITY TESTS
October 1992

Summary

Mechanical integrity tests and a 13-hour injection test were performed on Injection Well KS-3 following a workover to install a cemented 7-in. tieback casing string. The workover was done because of a leak in the 9%-in. casing at 2,500 ft. Following installation of the tieback casing, it was pressure tested to 2,000 psi.

On October 7, a 13-hour injection test was performed and shut-in temperature surveys were run at times of 12 and 45 hours after stopping injection. Results indicate that the well has an injection capacity of 189 gpm at 150 psig wellhead pressure, and there is no leakage of injected water behind casing. The testing and logging results demonstrate that the well has good mechanical integrity and is suitable for injection service.

Workover and Casing Pressure Test

Beginning August 30, 1992, PGV conducted rig operations on KS-3 to inspect and pressure test the 9%-in. casing and install a hangdown liner. A casing inspection caliper log indicated severe localized corrosion damage in the 9%-in. casing at a depth of 2,500 ft. This resulted from external corrosion by acidic geothermal fluid in a fracture zone at that depth. Pressure testing confirmed a small leak in the corroded casing. The leak was squeeze cemented with an acid-resistant latex polymer modified cement and was successfully pressure tested to 600 psig surface pressure with water in the hole. A 7-inch hangdown liner was then installed and the annulus was displaced with compressed air to a pressure of 1,450 psig. The air pressure slowly declined to 860 psig, indicating a small leak remained at 2,500 ft. It was concluded that it would not be practical to achieve a gas-tight repair of the leak by squeeze cementing, and for that reason, the 7-inch hangdown liner was pulled out of the well pending planning and procurement of the necessary equipment for a permanent repair. Operations on KS-3 were temporarily suspended on September 8, and the rig was moved to begin drilling KS-4.

The drilling rig was moved back to KS-3 on September 25, 1992, and a workover was done to squeeze cement the casing leak at 2,500 ft again and install tieback casing. The tieback string is 7-in. 29 lb/ft L-80 casing cemented from 3,724 ft KB to surface. A diagram of the well with tieback casing is shown in Figure 1. Copies of the daily drilling reports covering installation and testing of the tieback casing are included in the Appendix. As described in the reports, the tieback casing was pressure tested to 2,000 psi for 15 minutes on October 1, 1992. The test was approved

by a DLNR representative.

Injection Test

On October 7, 1992, an injection test was performed on KS-3. It was planned as a nominal 12-hour test, but was extended to 13 hours because of delays in beginning the temperature/pressure logging near the end of the test. The longer test is actually preferable, but was not planned because of concern that the pump trucks would exceed allowable noise limits which are more stringent between 7:00 pm and 7:00 am. The test data, listed in Table 1, show a stable injection rate of 189 gpm at 150 psig wellhead pressure for the final five hours of the test. The increasing injectivity during the first six hours of the test is characteristic of this well's behavior when injection resumes after an extended shut-in period.

Figure 2 is a graph of pressure at a depth of 3,700 ft as a function of elapsed time from stopping injection. It begins 12 minutes before shut-in and records the pressure falloff for eight hours after shut-in. The data were logged by Flo-Log with an electric line pressure and temperature logging tool. A listing of the data is given in Table 2.

The pressure falloff is essentially complete at 1,365 psia three hours after shut-in. After that, there are some perturbations which are attributable to thermal effects. The final injection pressure was 1,741 psia. The injectivity index (II) is calculated as:

$$\begin{aligned} \text{II} &= \text{Injection rate} / (\text{injection pressure} - \text{static pressure}) \\ &= 189 \text{ gpm} / (1,741 \text{ psia} - 1,365 \text{ psia}) = 0.50 \text{ gpm/psi} \end{aligned}$$

The temperature at 3,700 ft was also recorded during the final 12 minutes of injection and for eight hours after. As shown in the data listing, the water temperature during the final 12 minutes of injection was 95°F.

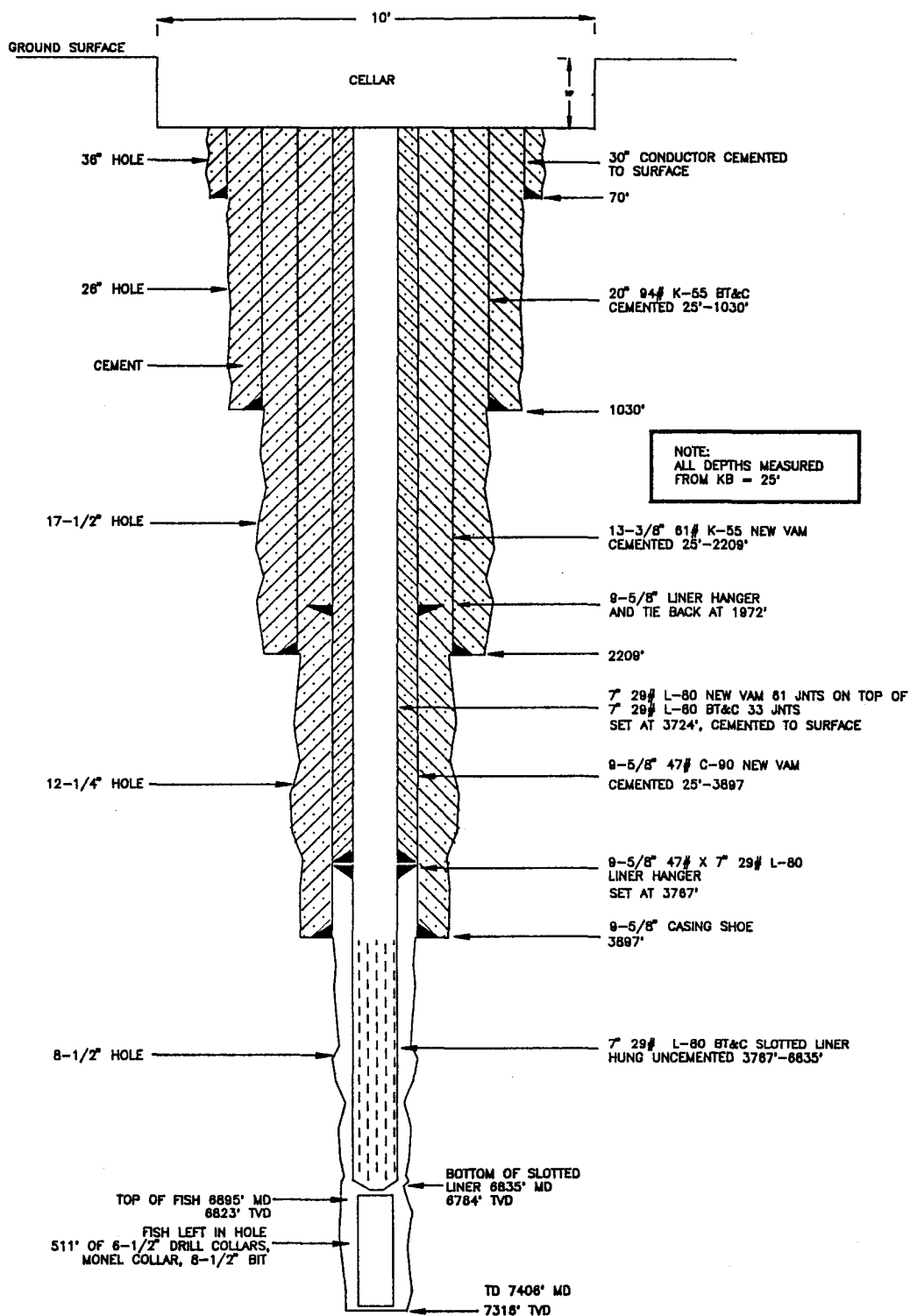
Shut-in Temperature Logs

Shut-in temperature logs were run in KS-3 at elapsed times of 12 and 45 hours after stopping injection. Both logs are plotted in Figure 3 and superimposed on a plot of the March 24, 1991 static profile. Both shut-in logs were run by Flo-Log using "memory tools" run with the electric line logging unit. Data listings are included in the Appendix. The bottoms of the logged intervals are at 3,910 ft and 3,920 ft, respectively, in the two logs because the logging tool stopped on an obstruction which is probably debris left in the liner during the workover. In spite of the obstruction, the logged intervals extend below the first "confining layer" above the casing shoe (approximately 3,600 - 3,800 ft), and

therefore, are adequate to test mechanical integrity.

It was originally intended that the logs be run at times of eight hours and 36 hours after shut-in. However, problems with the logging equipment caused delays, and the logs were actually run at 12 hours and 45 hours after shut-in. This did not adversely affect the results, however, because the logs adequately show the temperature recovery. The temperature profiles in Figure 3 indicate a normal recovery. The important feature is the rapid heat-up below a depth of 3,000 ft, which indicates clearly that injected water is not invading the permeable intervals above 3,900 ft.

Another feature of the temperature profiles in Figure 3 which has prompted discussion of some previous mechanical integrity tests is that there is no significant temperature contrast among the logs above 1,500 ft, in the groundwater interval. This is because the injection water temperature was close to that of the groundwater, and for that reason, the shut-in temperature logs would not be useful to reveal a direct leak into the groundwater aquifer. However, in the case at hand, a direct leak is ruled out by the casing pressure test, and the only remaining leak path to the groundwater aquifer is upward behind casing from a depth at or near the shoe of the 9 $\frac{5}{8}$ -in. casing. The shut-in temperature logs on October 8 and 9, 1992, rule out that possibility.



PUNA GEOTHERMAL VENTURE

KS-3 COMPLETION
AS OF 10/3/92

DATE 10/10/82

REV. 2

BY W. TEPELOW

FILE: POKS3COMPL.DWG

FIGURE NO. 1

FLO-LOG, INC.
PRESSURE TEMPERATURE LOG

COMPANY	:	PUNA GEOTHERMAL VENTURE
WELL	:	KS - 3
FIELD	:	KAPOHO STATE
COUNTY	:	HAWAII
DATE	:	10-9-92
PERMANENT DATA	:	GROUND LEVEL
LOG MEASURED FROM	:	25' ABOVE GROUND LEVEL
TOTAL DEPTH	:	7400'
TYPE OF FLUID IN HOLE	:	WATER
OBSERVED DEPTH (PICKUP)	:	3920'
BOTTOM LOGGED INTERVAL	:	3920'
FLUID LEVEL	:	300'
WELL STATUS	:	STATIC
BOTTOM TEMPERATURE	:	355 DEGREES
LOGGING UNIT	:	FLH1
TOOLS USED	:	PRESSURE TEMPERATURE #H002
TOOL DIAMETER	:	3"
LINE SIZE	:	5/16"
LINE LENGTH	:	14,000'
WITNESSED BY	:	CARL FISHER
LOG RECORDED BY	:	DICK EKBERG

CASTING RECORD

	SIZE	WEIGHT	FROM	TO
	13 3/8"	61#	0'	2209'
	9 5/8"	47#	0'	1972'
	9 5/8"	47#	1972'	3897'
	7"	29#	3767'	6835'
	7"	29#	0'	3724'
	5"	TO BE INSTALLED LATER		

REMARKS : STATIC SURVEY 45 HOURS AFTER SHUT IN AT
2000 HRS. 10/07/92

BEGAN DOWNLOG AT 1646 HRS. 10/09/92

COMPLETED UP LOG AT 1832 HRS. 10/09/92

DEPTH FT	PRESS PSIA	PRESS GRAD	TEMP DEG/F	TEMP GRAD
100.00	12.57		74.50	
150.00	12.61	0.0008	74.50	0.0000
200.00	12.63	0.0004	74.30	-0.0040
250.00	12.68	0.0010	74.10	-0.0040
300.00	22.24	0.1912	76.50	0.0480
350.00	38.07	0.3166	77.80	0.0260
400.00	58.45	0.4076	77.00	-0.0160
450.00	79.58	0.4226	76.80	-0.0040
500.00	100.97	0.4278	79.20	0.0480
550.00	122.41	0.4288	81.80	0.0520
600.00	144.10	0.4338	83.50	0.0340
650.00	166.89	0.4558	84.00	0.0100
700.00	189.78	0.4578	84.40	0.0080
750.00	211.68	0.4380	84.40	0.0000
800.00	235.20	0.4704	83.20	-0.0240
850.00	257.30	0.4420	82.10	-0.0220
900.00	279.04	0.4348	81.80	-0.0060
950.00	301.98	0.4588	81.80	0.0000
1000.00	323.09	0.4222	81.20	-0.0120
1050.00	345.64	0.4510	81.70	0.0100
1100.00	367.73	0.4418	83.00	0.0260
1150.00	389.39	0.4332	83.80	0.0160
1200.00	411.08	0.4338	84.40	0.0120
1250.00	433.70	0.4524	85.60	0.0240
1300.00	456.19	0.4498	86.60	0.0200
1350.00	478.77	0.4516	86.60	0.0000
1400.00	500.15	0.4276	86.40	-0.0040
1450.00	522.96	0.4562	86.80	0.0080
1500.00	543.13	0.4034	86.60	-0.0040
1550.00	565.99	0.4572	87.30	0.0140
1600.00	587.27	0.4256	88.40	0.0220
1650.00	609.77	0.4500	89.90	0.0300
1700.00	631.67	0.4380	91.30	0.0280
1750.00	653.19	0.4304	92.90	0.0320
1800.00	675.08	0.4378	94.20	0.0260
1850.00	697.92	0.4568	95.00	0.0160
1900.00	718.55	0.4126	95.80	0.0160
1950.00	739.47	0.4184	96.70	0.0180
2000.00	759.12	0.3930	98.40	0.0340
2050.00	770.38	0.2252	103.80	0.1080
2100.00	792.13	0.4350	109.60	0.1160

2150.00	813.21	0.4216	115.90	0.1260
2200.00	834.53	0.4264	125.40	0.1900
2250.00	855.92	0.4278	129.10	0.0740
2300.00	876.94	0.4204	130.50	0.0280
2350.00	898.50	0.4312	131.20	0.0140
2400.00	919.38	0.4176	133.00	0.0360
2450.00	940.61	0.4246	138.70	0.1140
2500.00	961.83	0.4244	137.90	-0.0160
2550.00	982.76	0.4186	139.50	0.0320
2600.00	1004.18	0.4284	146.50	0.1400
2650.00	1025.04	0.4172	150.50	0.0800
2700.00	1046.37	0.4266	156.20	0.1140
2750.00	1067.46	0.4218	182.30	0.5220
2800.00	1088.35	0.4178	233.10	1.0160
2850.00	1108.26	0.3982	276.20	0.8620
2900.00	1128.57	0.4062	298.30	0.4420
2950.00	1148.52	0.3990	308.00	0.1940
3000.00	1168.16	0.3928	304.90	-0.0620
3050.00	1188.18	0.4004	306.10	0.0240
3100.00	1208.02	0.3968	302.20	-0.0780
3150.00	1227.65	0.3926	293.50	-0.1740
3200.00	1247.67	0.4004	300.40	0.1380
3250.00	1267.58	0.3982	314.50	0.2820
3300.00	1287.65	0.4014	327.20	0.2540
3350.00	1307.44	0.3958	317.60	-0.1920
3400.00	1330.22	0.4556	312.90	-0.0940
3450.00	1346.11	0.3178	319.10	0.1240
3500.00	1365.52	0.3882	335.80	0.3340
3550.00	1384.99	0.3894	321.80	-0.2800
3600.00	1404.43	0.3888	320.60	-0.0240
3650.00	1424.06	0.3926	324.20	0.0720
3700.00	1444.05	0.3998	334.10	0.1980
3750.00	1462.42	0.3674	353.90	0.3960
3800.00	1482.01	0.3918	354.30	0.0080
3850.00	1501.40	0.3878	355.60	0.0260
3900.00	1520.08	0.3736	355.20	-0.0080
3920.00	1527.96	0.3940	352.60	-0.1300

LOG UP

DEPTH FT	PRESS PSIA	PRESS GRAD	TEMP DEG/F	TEMP GRAD
3900.00	1520.08		354.70	
3800.00	1481.55	0.3853	354.90	-0.0020
3700.00	1444.25	0.3730	349.80	0.0510
3600.00	1404.10	0.4015	324.70	0.2510
3500.00	1365.51	0.3859	334.60	-0.0990
3400.00	1326.14	0.3937	315.10	0.1950
3300.00	1286.67	0.3947	326.10	-0.1100
3200.00	1246.95	0.3972	305.90	0.2020
3100.00	1207.25	0.3970	297.10	0.0880
3000.00	1168.07	0.3918	305.30	-0.0820
2900.00	1127.81	0.4026	303.20	0.0210
2800.00	1083.60	0.4421	258.60	0.4460

2700.00	1045.86	0.3774	174.30	0.8430
2600.00	1003.50	0.4236	149.60	0.2470
2500.00	960.44	0.4306	139.10	0.1050
2400.00	918.47	0.4197	135.50	0.0360
2300.00	876.14	0.4233	131.40	0.0410
2200.00	834.12	0.4202	127.70	0.0370
2100.00	791.60	0.4252	115.60	0.1210
2000.00	748.69	0.4291	101.00	0.1460
1900.00	705.65	0.4304	95.30	0.0570
1800.00	662.93	0.4272	92.30	0.0300
1700.00	619.74	0.4319	89.20	0.0310
1600.00	576.98	0.4276	87.10	0.0210
1500.00	533.82	0.4316	86.90	0.0020
1400.00	490.06	0.4376	86.90	0.0000
1300.00	444.76	0.4530	86.00	0.0090
1200.00	403.84	0.4092	83.60	0.0240
1100.00	358.84	0.4500	81.90	0.0170
1000.00	317.96	0.4088	81.80	0.0010
900.00	274.98	0.4298	83.10	-0.0130
800.00	231.09	0.4389	84.30	-0.0120
700.00	188.15	0.4294	84.10	0.0020
600.00	144.77	0.4338	81.10	0.0300
500.00	99.89	0.4488	77.50	0.0360
400.00	57.85	0.4204	76.80	0.0070
300.00	18.44	0.3941	76.70	0.0010
200.00	13.17	0.0527	76.40	0.0030
100.00	13.14	0.0003	76.40	0.0000
50.00	13.13	0.0002	76.70	-0.0060

JOB NO. 2711
DATE DEC. 04, 1990
PAGE 2 OF 2

LABORATORY ANALYSIS REPORT (2)

PUNA GEOTHERMAL VENTURE

ATTN:

ADDRESS: P.O. BOX 1337

PHONE:

HILO, HAWAII 96721

SAMPLES OF: WATER

SAMPLED BY: CLIENT

SAMPLING DATE: 11/20/90

TIME: 1415

RECEIPT DATE: 11/21/90

TIME: 1150

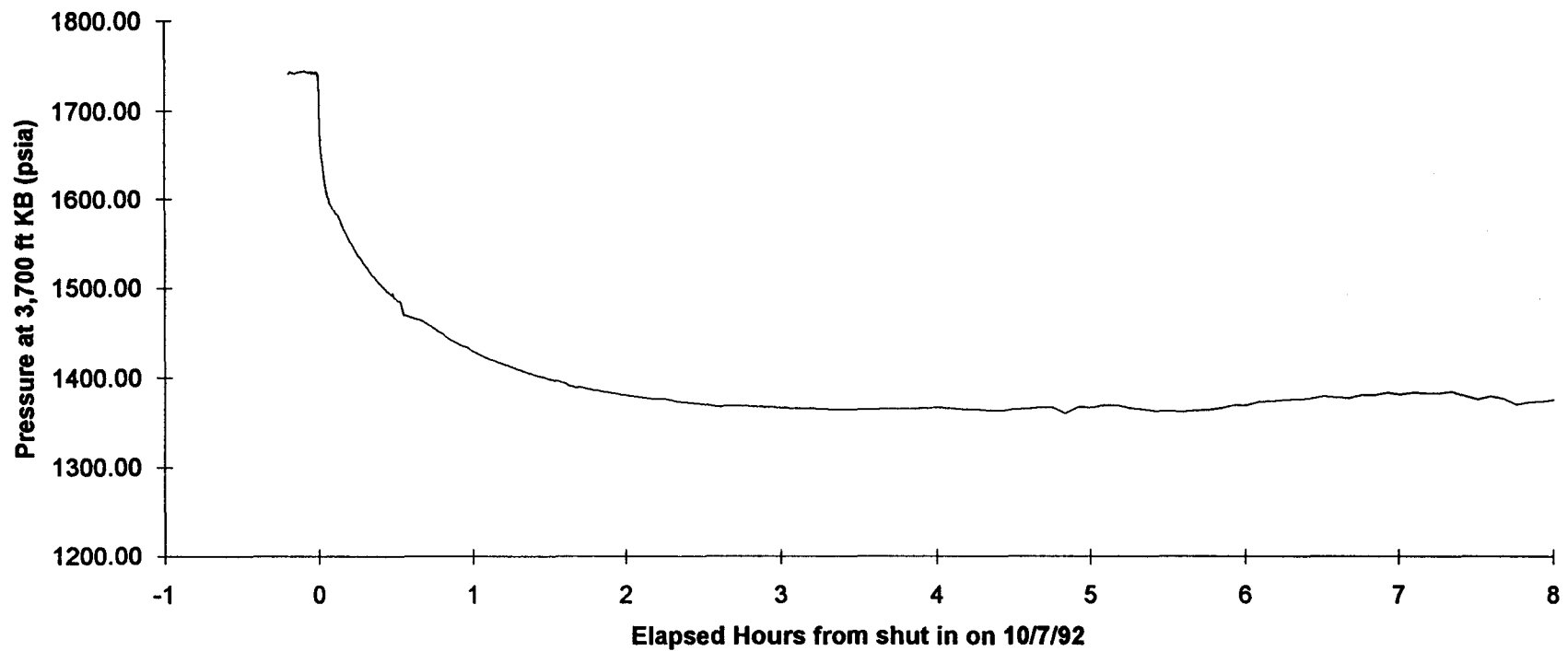
DATE SAMPLE ANALYZED		11/28-12/03/90			
TIME SAMPLE ANALYZED					
SAMPLE TYPE					
SAMPLE DESCRIPTION			WELL WATER #1		DETECTION LIMITS
	UNITS				
ENDRIN	mg/L		ND		0.0002
LINDANE	mg/L		ND		0.0002
METHOXYCHLOR	mg/L		ND		0.0010
TOXAPHENE	mg/L		ND		0.005
2,4-D	mg/L		ND		0.005
2,4,5-TP (Silvex)	mg/L		ND		0.001
NITRATE	mg/L		1.39		
FLUORIDE	mg/L		0.41		
CHLORIDE	mg/L		7		
TOTAL DISSOLVED	mg/L		388		
SOLIDS					

LABORATORY REMARKS: Samples analyzed according to "Test Methods for the Evaluation of Solid Waste Physical/Chemical Methods", SW-846, U.S. EPA Office of Solid Waste, Washington, DC 20460.

ND = NOT DETECTED

Douglas Root

Figure 2
KS-3 Injection Pressure and Pressure Falloff
October 7-8, 1992



PUNA GEOTHERMAL VENTURE KS-3 STATIC TEMPERATURE SURVEYS

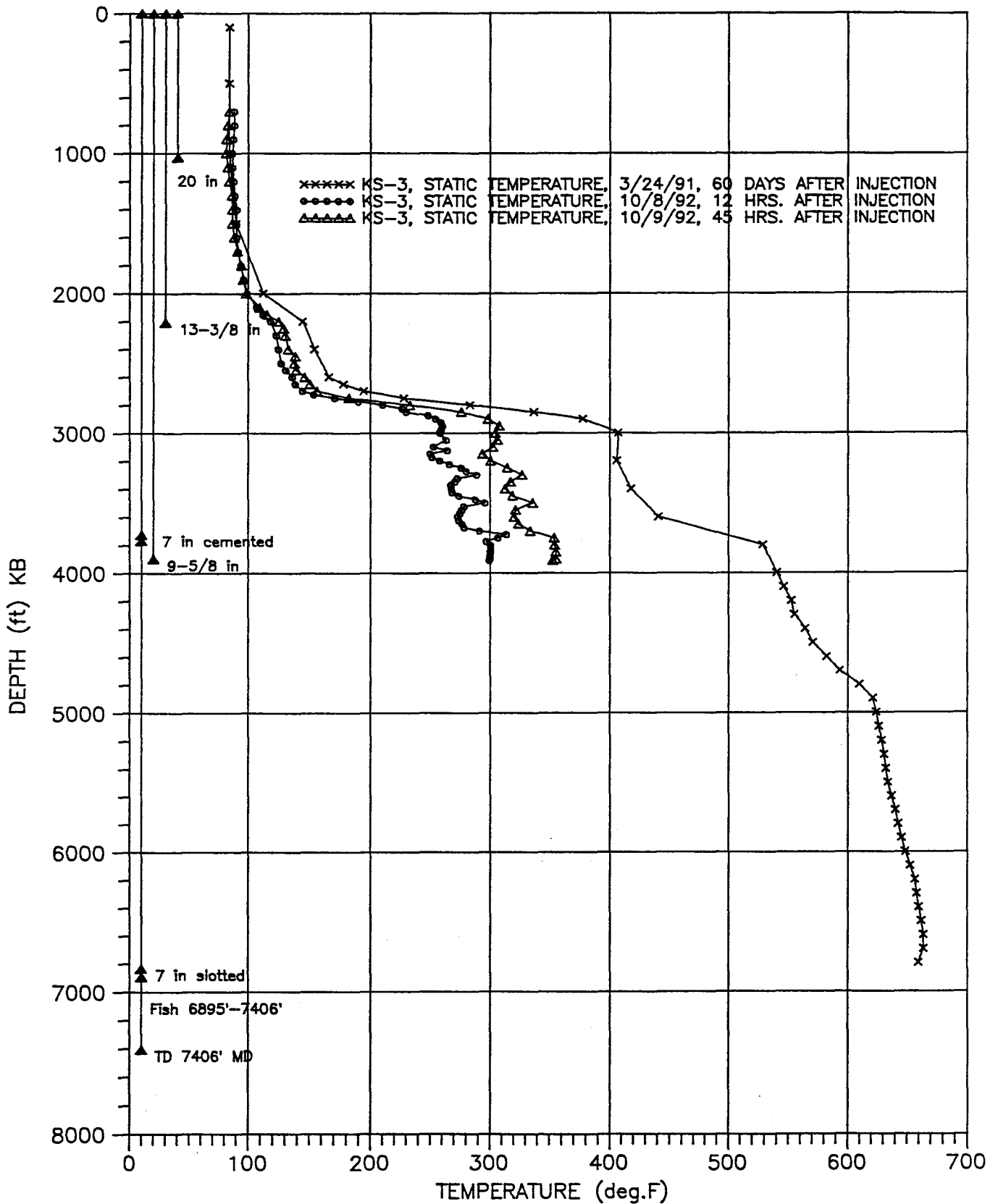


FIGURE 3

Table 1
KS-3 INJECTION TEST
10/7/92

Time	WHP (psig)	Injection Rate (bbl/min) (gpm)		Note
6:45	0	0.00	0.0	Rig up to inject
6:50	0	0.00	0.0	
7:00	175	3.00	126.0	Start injection with one Halliburton pump
7:30	150	2.50	105.0	
8:00	140	2.50	105.0	
8:30	150	3.00	126.0	
9:00	148	3.50	147.0	
9:30	145	3.50	147.0	
10:00	140	3.25	136.5	
10:10	140	3.25	136.5	
10:11	150			
10:30	150	3.50	147.0	Inject with two Halliburton pumps
11:00	152	4.00	168.0	
11:30	157	4.00	168.0	
12:00	155	4.00	168.0	
12:30	150	4.00	168.0	
13:00	152	4.00	168.0	
13:30	152	4.50	189.0	
14:00	147	5.00	210.0	
14:30	155	5.00	210.0	
15:00	151	4.50	189.0	
15:30	152	4.50	189.0	
16:00	148	4.50	189.0	Start rigging up Flo-Log
16:30	152	4.75	199.5	
17:00	150	4.50	189.0	
17:30	148	4.50	189.0	
18:00	148	4.50	189.0	
18:30	153	4.50	189.0	
19:00	147	4.50	189.0	
19:30	150	4.50	189.0	Flo-Log in hole with tools
20:00	150	4.50	189.0	Shut off Injection

Table 2

KS-3 Injection Test
Pressure and Temperature at 3700ft
vs. Elapsed Time from Stopping Injection
10/7 - 8/92

Elapsed Time (hrs)	Press PSIA	Temp F	Time
-0.199	1742.10	95.60	19:47:33
-0.199	1741.42	95.64	19:47:35
-0.192	1743.65	95.76	19:48:01
-0.158	1741.96	95.90	19:50:01
-0.125	1743.80	95.98	19:52:01
-0.092	1744.05	96.02	19:54:01
-0.075	1742.77	95.98	19:55:01
-0.071	1743.84	95.96	19:55:15
-0.067	1742.15	95.93	19:55:31
-0.063	1743.87	95.90	19:55:45
-0.058	1742.04	95.86	19:56:01
-0.054	1743.35	95.83	19:56:15
-0.050	1743.97	95.75	19:56:31
-0.046	1741.27	95.70	19:56:45
-0.042	1743.47	95.65	19:57:01
-0.038	1743.79	95.57	19:57:15
-0.033	1742.13	95.46	19:57:31
-0.029	1743.13	95.40	19:57:45
-0.025	1741.19	95.36	19:58:01
-0.021	1743.38	95.28	19:58:15
-0.017	1743.56	95.17	19:58:31
-0.013	1741.04	95.08	19:58:45
-0.008	1742.74	94.98	19:59:01
-0.004	1735.74	94.88	19:59:15
0.000	1740.69	94.79	19:59:31
0.004	1706.61	94.61	19:59:45
0.008	1678.00	94.50	20:00:01
0.012	1666.15	94.49	20:00:15
0.017	1655.57	94.53	20:00:31
0.021	1648.08	94.56	20:00:45
0.025	1640.85	94.63	20:01:01
0.029	1635.12	94.73	20:01:15
0.033	1629.44	94.87	20:01:31
0.037	1624.86	95.24	20:01:45
0.042	1620.21	95.56	20:02:01
0.046	1616.73	95.80	20:02:15
0.050	1612.79	96.03	20:02:31
0.054	1609.34	96.17	20:02:45
0.058	1605.84	96.37	20:03:01
0.062	1603.27	96.62	20:03:15
0.064	1602.07	96.75	20:03:21
0.071	1597.68	97.24	20:03:47
0.075	1595.89	97.50	20:04:01

0.079	1594.18	97.51	20:04:15
0.083	1592.93	97.74	20:04:31
0.087	1591.49	98.11	20:04:45
0.092	1590.18	98.56	20:05:01
0.096	1588.92	98.23	20:05:15
0.100	1587.46	98.68	20:05:31
0.104	1586.77	99.02	20:05:45
0.108	1585.58	99.24	20:06:01
0.112	1584.50	99.46	20:06:15
0.117	1583.35	99.76	20:06:31
0.121	1582.34	99.92	20:06:45
0.125	1581.63	100.11	20:07:01
0.129	1580.33	100.15	20:07:15
0.133	1578.51	100.24	20:07:31
0.137	1576.93	100.39	20:07:45
0.142	1575.04	100.60	20:08:01
0.146	1573.55	100.58	20:08:15
0.150	1571.80	100.79	20:08:31
0.154	1570.36	100.93	20:08:45
0.158	1568.57	101.04	20:09:01
0.162	1567.17	101.19	20:09:15
0.167	1565.70	101.35	20:09:31
0.171	1564.26	101.54	20:09:45
0.175	1562.63	101.68	20:10:01
0.179	1561.19	101.82	20:10:15
0.183	1559.71	101.99	20:10:31
0.187	1558.45	102.10	20:10:45
0.192	1556.99	102.25	20:11:01
0.196	1555.70	102.39	20:11:15
0.200	1554.30	102.65	20:11:31
0.204	1553.08	102.71	20:11:45
0.208	1551.77	102.88	20:12:01
0.212	1550.52	103.11	20:12:15
0.217	1549.22	103.27	20:12:31
0.221	1548.12	103.43	20:12:45
0.225	1546.68	103.60	20:13:01
0.229	1545.57	103.73	20:13:15
0.233	1544.34	103.94	20:13:31
0.237	1543.14	104.10	20:13:45
0.242	1541.86	104.36	20:14:01
0.246	1540.85	104.49	20:14:15
0.250	1539.64	104.63	20:14:31
0.254	1538.68	104.74	20:14:45
0.258	1537.41	104.92	20:15:01
0.262	1536.35	105.09	20:15:15
0.267	1535.22	105.23	20:15:31
0.271	1534.25	105.42	20:15:45
0.275	1533.10	105.57	20:16:01
0.279	1532.17	105.75	20:16:15
0.283	1531.02	105.93	20:16:31
0.287	1530.14	106.10	20:16:45

0.292	1529.05	106.25	20:17:01
0.296	1528.08	106.35	20:17:15
0.300	1526.97	106.63	20:17:31
0.304	1526.16	106.81	20:17:45
0.308	1525.08	107.03	20:18:01
0.312	1524.10	107.21	20:18:15
0.317	1523.05	107.33	20:18:31
0.321	1522.25	107.52	20:18:45
0.325	1521.15	107.68	20:19:01
0.329	1520.30	107.87	20:19:15
0.333	1519.11	107.98	20:19:31
0.337	1518.26	108.33	20:19:45
0.342	1517.26	108.44	20:20:01
0.346	1516.36	108.54	20:20:15
0.350	1515.46	108.67	20:20:31
0.354	1514.54	108.81	20:20:45
0.358	1513.90	109.00	20:21:01
0.362	1513.06	109.13	20:21:15
0.367	1512.31	109.44	20:21:31
0.371	1511.46	109.55	20:21:45
0.375	1510.52	109.69	20:22:01
0.379	1509.75	109.79	20:22:15
0.383	1508.88	110.01	20:22:31
0.387	1508.07	110.09	20:22:45
0.392	1507.19	110.35	20:23:01
0.396	1506.56	110.44	20:23:15
0.400	1505.76	110.57	20:23:31
0.404	1504.95	110.83	20:23:45
0.408	1503.97	110.92	20:24:01
0.412	1503.26	111.10	20:24:15
0.417	1502.28	111.39	20:24:31
0.421	1501.71	111.36	20:24:45
0.425	1500.97	111.61	20:25:01
0.429	1500.30	111.68	20:25:15
0.433	1499.51	111.81	20:25:31
0.437	1498.74	111.95	20:25:45
0.446	1497.27	112.29	20:26:15
0.450	1496.43	112.49	20:26:31
0.454	1495.77	112.49	20:26:45
0.458	1494.99	112.72	20:27:01
0.462	1494.34	112.87	20:27:15
0.467	1493.43	113.06	20:27:31
0.471	1492.80	113.31	20:27:45
0.475	1491.97	113.52	20:28:01
0.479	1493.65	113.58	20:28:15
0.483	1492.28	113.67	20:28:31
0.487	1494.53	113.94	20:28:45
0.492	1490.76	114.07	20:29:01
0.496	1489.95	114.20	20:29:15
0.500	1489.02	114.42	20:29:31
0.504	1488.44	114.55	20:29:45

0.508	1487.71	114.68	20:30:01
0.512	1486.94	114.75	20:30:15
0.517	1486.36	115.08	20:30:31
0.521	1485.52	115.17	20:30:45
0.525	1485.56	115.18	20:31:00
0.541	1484.63	115.19	20:32:00
0.558	1469.99	115.28	20:33:00
0.575	1469.00	116.21	20:34:00
0.591	1468.01	117.47	20:35:00
0.608	1467.02	118.57	20:36:00
0.625	1466.03	119.73	20:37:00
0.641	1465.04	119.99	20:38:00
0.658	1464.28	120.41	20:39:00
0.675	1463.42	120.62	20:40:00
0.691	1462.14	121.32	20:41:00
0.708	1459.83	121.89	20:42:00
0.725	1457.91	122.45	20:43:00
0.741	1456.30	122.91	20:44:00
0.758	1454.17	123.61	20:45:00
0.775	1452.31	124.02	20:46:00
0.791	1450.02	124.57	20:47:00
0.808	1448.46	125.20	20:48:00
0.825	1446.07	125.53	20:49:00
0.841	1444.29	126.14	20:50:00
0.858	1442.53	126.56	20:51:00
0.875	1441.04	127.25	20:52:00
0.891	1439.37	127.59	20:53:00
0.908	1437.80	128.06	20:54:01
0.925	1436.42	128.53	20:55:00
0.942	1435.14	128.87	20:56:01
0.958	1434.56	129.29	20:57:01
0.975	1432.95	129.76	20:58:01
0.992	1430.30	130.22	20:59:01
1.008	1428.88	130.75	21:00:01
1.025	1427.56	131.19	21:01:01
1.042	1426.38	131.77	21:02:01
1.058	1425.18	132.11	21:03:01
1.075	1423.70	132.64	21:04:01
1.092	1422.50	133.07	21:05:01
1.108	1421.21	133.64	21:06:01
1.125	1420.02	134.24	21:07:01
1.142	1418.93	134.53	21:08:01
1.158	1417.84	134.91	21:09:01
1.175	1416.68	135.45	21:10:01
1.192	1415.76	135.79	21:11:01
1.208	1414.64	135.43	21:12:01
1.225	1413.66	136.00	21:13:01
1.242	1412.59	136.44	21:14:01
1.258	1411.72	136.62	21:15:01
1.275	1410.57	136.99	21:16:01
1.292	1409.51	137.47	21:17:01

1.308	1408.36	137.93	21:18:01
1.325	1407.37	138.29	21:19:01
1.342	1406.39	138.38	21:20:01
1.358	1405.40	138.77	21:21:01
1.375	1404.60	139.11	21:22:01
1.392	1403.80	139.43	21:23:01
1.408	1402.86	139.94	21:24:01
1.425	1402.26	140.25	21:25:01
1.442	1401.47	140.53	21:26:01
1.458	1400.65	141.04	21:27:01
1.475	1399.88	141.41	21:28:01
1.492	1399.02	141.78	21:29:01
1.508	1398.14	142.13	21:30:01
1.525	1397.34	142.58	21:31:01
1.542	1396.53	142.90	21:32:01
1.558	1395.89	143.39	21:33:01
1.575	1395.12	143.49	21:34:01
1.599	1393.97	144.06	21:35:29
1.624	1392.89	144.69	21:36:58
1.626	1391.81	145.31	21:37:06
1.641	1390.73	145.94	21:38:00
1.658	1389.92	146.06	21:39:00
1.675	1388.73	146.18	21:40:00
1.691	1389.65	146.56	21:41:00
1.708	1389.57	146.72	21:42:00
1.725	1388.77	146.98	21:43:00
1.741	1388.27	147.19	21:44:00
1.758	1387.66	147.51	21:45:00
1.775	1387.03	147.85	21:46:00
1.791	1386.38	148.14	21:47:00
1.808	1386.50	148.45	21:48:00
1.825	1385.38	148.77	21:49:00
1.841	1384.88	149.05	21:50:00
1.858	1384.36	149.44	21:51:00
1.875	1384.05	149.83	21:52:00
1.891	1383.64	150.07	21:53:00
1.908	1383.11	150.31	21:54:00
1.925	1382.67	150.74	21:55:00
1.941	1382.17	151.05	21:56:00
1.958	1381.79	151.27	21:57:00
1.975	1381.24	151.44	21:58:00
1.991	1380.82	151.70	21:59:00
2.008	1380.49	152.05	22:00:00
2.091	1378.37	153.73	22:05:00
2.175	1376.09	156.12	22:10:00
2.258	1376.12	156.10	22:15:01
2.342	1372.94	159.92	22:20:01
2.425	1371.78	161.64	22:25:01
2.508	1370.52	163.09	22:30:01
2.592	1367.49	164.94	22:35:01
2.675	1368.74	166.22	22:40:01

2.758	1368.19	168.06	22:45:01
2.842	1367.72	169.64	22:50:01
2.925	1367.32	171.02	22:55:01
3.008	1366.42	172.33	23:00:01
3.092	1365.97	173.48	23:05:01
3.175	1365.95	174.61	23:10:01
3.258	1365.30	176.00	23:15:01
3.342	1364.54	176.67	23:20:01
3.425	1364.63	177.98	23:25:01
3.508	1364.68	179.10	23:30:01
3.592	1364.70	180.47	23:35:01
3.675	1364.88	181.88	23:40:01
3.758	1365.28	182.88	23:45:01
3.842	1365.31	183.43	23:50:01
3.925	1365.74	184.44	23:55:01
4.008	1366.43	186.03	0:00:01
4.092	1366.14	187.66	0:05:01
4.175	1364.34	189.69	0:10:01
4.258	1364.69	191.07	0:15:01
4.342	1363.40	191.13	0:20:01
4.425	1363.27	192.77	0:25:01
4.508	1364.38	194.33	0:30:01
4.592	1365.42	194.98	0:35:01
4.675	1366.27	196.14	0:40:01
4.758	1366.79	196.72	0:45:01
4.842	1359.79	197.38	0:50:01
4.925	1367.16	198.74	0:55:01
5.008	1366.53	199.25	1:00:01
5.092	1369.13	199.62	1:05:01
5.175	1369.30	200.94	1:10:01
5.258	1365.54	201.48	1:15:01
5.342	1364.46	202.93	1:20:01
5.425	1362.50	202.17	1:25:01
5.508	1362.50	203.75	1:30:01
5.592	1361.86	203.06	1:35:01
5.675	1363.08	204.07	1:40:01
5.758	1363.75	204.07	1:45:01
5.842	1366.07	203.81	1:50:01
5.925	1369.40	203.38	1:55:01
6.008	1369.11	204.57	2:00:01
6.092	1373.19	205.17	2:05:01
6.175	1373.92	204.93	2:10:01
6.258	1375.34	204.50	2:15:01
6.342	1375.84	204.79	2:20:01
6.425	1376.20	205.13	2:25:01
6.508	1378.71	205.43	2:30:01
6.592	1377.66	206.31	2:35:01
6.675	1376.87	205.76	2:40:01
6.758	1380.03	205.57	2:45:01
6.842	1380.37	205.57	2:50:01
6.925	1382.68	206.09	2:55:01

7.008	1381.10	205.67	3:00:01
7.092	1383.01	205.23	3:05:01
7.175	1382.35	206.41	3:10:01
7.258	1382.63	207.01	3:15:01
7.342	1383.88	207.94	3:20:01
7.425	1380.01	208.63	3:25:01
7.508	1375.94	210.52	3:30:01
7.592	1378.78	213.11	3:35:01
7.675	1376.55	215.55	3:40:01
7.758	1369.73	220.50	3:45:01
7.842	1372.33	220.24	3:50:01
7.925	1373.05	230.79	3:55:01
8.008	1374.71	235.28	4:00:01

Puna Geothermal Venture

Well No: K9-3

REPORT NO. 19 DATE 9/30/92 CHG NO. 6162K803
 CONTRACTOR PDC RIG NO. _____
 RIG DAYS 15 + 8 DRLD. DAYS _____
 DEPTH @2400 HRS. 7406 FOOTAGE DRLD. _____
 HRS. DRILLED 8 HRS. TRIPPED _____
 HRS. REPAIR 8 HRS. OTHER _____

30" CSG. 70'
 20" CSG. 1030
 1330 CSG. 2209
 928" 1972-3897
 " _____

FORM DRLD _____ FLOW LINE _____ OF SUCTION _____ OF MAX. _____ OF COOLING TOWER _____
 MUD WT. _____ VIS. _____ W. L. _____ CK. _____ PH _____ CHL _____ YP _____
 P.V. _____ GELS _____ BAND _____ % SOLIDS _____ % LOST CIR. MTL. _____ G.E.C. _____ LBS/BSL
 GALVANIC PRB. _____ CORRATOR _____ SULPHIDE _____ OXY _____ AIR-H2O RATIO _____
 AIR COMP. NO. _____ CFM _____ PSI _____ TEMP. _____ CHEM. _____ RATIO _____ G.P.M. _____
 PUMP LINER STROKE RPM GPM TOTAL PSI NOZZLE VEL. ANNULUS VEL. _____

BIT# SIZE MAKE TYPE SER. NO. JETS IN OUT FL HRS. WL. RPM COND. _____

BOTTOM HOLE ASSEMBLY: _____

STRING WT. _____ PICKUP WT. _____ TORQUE _____

SURVEYS / STEAM ENTRIES: _____

REMARKS FOR 24 HOUR PERIOD: <u>W.O.C., @2482', Test csg. + Plug w/ 1000 PSI, Clean out cont. F-2482-2523, T.I.H.</u>	SUPER & LABOR	1900
<u>Clean out cont F-3643-3734', Press. Test well bore + csg. w/ 1000 PSI, T.O.H., Rig up to Run</u>	LOCATION	
<u>Csg. Ran 31 Jts, 7", 1.80 BT4C, + 61 Jts 7" 29", 1.80, New VAM Total Length 3725.24', Shore 3724'</u>	RIG MOVE	
<u>Float at 3643, Pumped in 1000 cu. ft. of H₂O, Cont.</u>	RIG	8475
<u>Premixed w/ 40% GF, 27% gel + 1.25% CFA-3, displaced</u>	ABATEMENT	1475
<u>w/ 139 Bbls. H₂O, CIP @ 1800 PPM. Good Cont</u>	BITS	
<u>Returns on Cont. To Surface, W.O.C.</u>	RMRS. STABS	
<u>W.O.C. + Take Borehole out of B.O.P.</u>	RENTALS	1550
	FUEL, H2O	
	MUD, CHEM.	339
	GMT & SVCS.	20,000
	AIR COMPS.	1925
	LOGGING	
	DIRECTIONAL	25
	FISHING	42
	TRANSPORT	150
	EQUIP. MAINT.	
	CASING & EQUIP.	30,000
OPERATION @ 0800 FOLLOWING DAY: <u>W.O.C., Nipple down</u>	PROD. EQUIP.	
<u>B.O.P. @ 545 AM. Shut off on Csg. + prep. to</u>	OTHER Cudd	333
<u>To Remove B.O.P.,</u>	DAILY TOTAL	66,214
PLANNED ACTIVITIES FOLLOWING DAY: <u>Put off 7 csg</u>	FORWARD	434,071
<u>+ Set out BOP + install w/ Hard Equip.</u>	ACCU. TOTAL	500,285
D.P. ON LOC. RTF 4.5 JTB 138 RTF JTB		500,285

Puna Geothermal Venture

Well No: K5-03

REPORT NO. 20 DATE 10-1-92 CHG NO. _____
 CONTRACTOR PDC RIG NO. 231
 RIG DAYS 16-8 DRLD. DAYS _____
 DEPTH @2400 HRS. 7406 FOOTAGE DRLD. _____
 HRS. DRILLED 1 1/2 HRS. TRIPPED 3 1/2
 HRS. REPAIR _____ HRS. OTHER 19

30" " CSG. 70
20" " CSG. 1030
13 3/8" " CSG. 2209
9 5/8" " 1977-3897
7" " surface to 3724

FORM DRLD _____ FLOW LINE _____ OF SUCTION _____ OF MAX. _____ OF COOLING TOWER _____
 MUD WT. _____ VISC. _____ W. L. _____ CK. _____ PH _____ CHL _____ YP _____
 P.V. _____ GELS 4 210 SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____ C.E.C. _____ LBS/BBT

GALVANIC PRB. _____ CORRATOR _____ SULPHIDE _____ OXY _____ AIR-H2O RATIO _____
 AIR COMP. NO. _____ CFM _____ PSI _____ TEMP. _____ CHEM. _____ RATIO _____ G.P.M. _____

PUMP	LINER	STROKE	SPM	GPM	TOTAL	PSI	NOZZLE VEL.	ANNULUR VEL.
<u>1</u>	<u>6</u>	<u>10</u>	<u>100</u>	<u>8.3</u>	<u>8.3</u>	<u>1200</u>		
<u>2</u>	<u>6</u>	<u>10</u>	<u>Idle</u>					

BIT#	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FL.	HRS.	WT.	RPM	COND.
<u>2</u>	<u>5 7/8</u>	<u>Sec</u>	<u>M4NS</u>	<u>398778</u>	<u>out</u>	<u>3564</u>		<u>53</u>	<u>1 1/2</u>	<u>84</u>	<u>60</u>	<u>1</u>

BOTTOM HOLE ASSEMBLY: Bit Bit Sub 1x DC Pro nipple 3x D.C. Jars 2x D.C. 221
 STRING WT. _____ PICKUP WT. _____ TORQUE _____

SURVEYS / STEAM ENTRIES: _____

	SUPER & LABOR	<u>1900</u>
REMARKS FOR 24 HOUR PERIOD: <u>Picked up BOP cut off 7"</u>	LOCATION	
<u>CSG and Brucelaf top for Bit Guide. Repacked</u>	RIG MOVE	
<u>expansion spool installed 2x11" Hanger spool and</u>	RIG	<u>8475</u>
<u>Nippled Back up. Tested expansion spool Packing</u>	ABATEMENT	<u>1475</u>
<u>to 2050 PSI Held 15 minutes OK! Finished</u>	BITS	
<u>tightening Flanges on BOE and tested casing</u>	RMR9. STABS	
<u>and Blinds - Master valve all 3" WKM's 14CR</u>	RENTALS	<u>1550</u>
<u>and manual BOE' valves all OK 5000 PSI</u>	FUEL, H2O	
<u>Finished nipping up Grant Head Flow Line.</u>	MUD, CHEM.	<u>339</u>
	CMT & SVC9.	<u>17000</u>
	AIR COMPS.	<u>1925</u>
	LOGGING	<u>4958</u>
	DIRECTIONAL	<u>25</u>
	FISHING	<u>42</u>
	TRANSPORT	<u>400</u>
	EQUIP. MAINT.	
	CASING welding	<u>202</u>

OPERATION @ 0800 FOLLOWING DAY: Pick up BHA and T1H to
cmt @ 3564 Drilling cmt 36.1%

	DAILY TOTAL	<u>38624</u>
PLANNED ACTIVITIES FOLLOWING DAY: <u>C/p cmt shoe and P. test</u>	FORWARD	<u>546504.00</u>
	ACCU. TOTAL	<u>585128</u>

D.P. ON LOC., SIZE 2 1/2 JTS. 122 SIZE _____ JTS. _____
 FUEL ON HAND _____ USED _____ 16 SUPERVISOR DWH

FLO-LOG, INC.
PRESSURE TEMPERATURE LOG

COMPANY : PUNA GEOTHERMAL VENTURE
WELL : KS - 3
FIELD : KAPOHO STATE
COUNTY : HAWAII
DATE : 10-8-92
PERMANENT DATA : GROUND LEVEL
LOG MEASURED FROM : 25' ABOVE GROUND LEVEL
TOTAL DEPTH : 7406'
TYPE OF FLUID IN HOLE : WATER
OBSERVED DEPTH (PICKUP) : 3910'
BOTTOM LOGGED INTERVAL : 3910'
FLUID LEVEL : 300'
WELL STATUS : STATIC
BOTTOM TEMPERATURE : 299 DEGREES
LOGGING UNIT : FLH1
TOOLS USED : PRESSURE TEMPERATURE #M002
TOOL DIAMETER : 3"
LINE SIZE : 5/16"
LINE LENGTH : 14,000'
WITNESSED BY : CARL FISHER
LOG RECORDED BY : DICK EKBERG

CASING RECORD

	SIZE	WEIGHT	FROM	TO
13	3/8"	61#	0'	2209'
9	5/8"	47#	0'	1972'
9	5/8"	47#	1972'	3897'
	7"	29#	3767'	6835'
	7"	29#	0'	3724'
	5"	TO BE INSTALLED LATER		

REMARKS : STATIC SURVEY 12 HOURS AFTER SHUT IN AT
2000 HRS. 10/07/92

DEPTH FT	PRESS PSIA	PRESS GRAD	TEMP DEG/F	TEMP GRAD
50.00	7.46	0.0000	77.70	0.0000
75.00	7.49	0.0012	78.70	0.0400
100.00	7.53	0.0016	79.30	0.0240
125.00	7.51	-0.0008	79.50	0.0080
150.00	7.54	0.0012	79.60	0.0040
175.00	7.57	0.0012	79.70	0.0040
200.00	7.56	-0.0004	79.80	0.0040
225.00	7.58	0.0008	79.80	0.0000
250.00	7.60	0.0008	79.80	0.0000
275.00	7.60	0.0000	79.70	-0.0040
300.00	7.66	0.0024	79.80	0.0040
325.00	7.71	0.0020	80.00	0.0080
350.00	7.68	-0.0012	80.40	0.0160
375.00	7.72	0.0016	80.60	0.0080
400.00	7.70	-0.0008	80.90	0.0120
425.00	16.02	0.3328	82.60	0.0680
450.00	26.89	0.4348	82.90	0.0120
475.00	37.91	0.4408	83.40	0.0200
500.00	48.70	0.4316	83.40	0.0000
525.00	59.55	0.4340	83.50	0.0040
550.00	70.41	0.4344	83.90	0.0160
575.00	81.36	0.4380	84.50	0.0240
600.00	92.11	0.4300	86.00	0.0600
625.00	103.13	0.4408	87.10	0.0440
650.00	114.10	0.4388	87.30	0.0080
675.00	125.13	0.4412	87.70	0.0160
700.00	135.90	0.4308	88.10	0.0160
725.00	146.75	0.4340	88.60	0.0200
750.00	157.69	0.4376	88.60	0.0000
775.00	168.41	0.4288	88.60	0.0000
800.00	179.38	0.4388	88.50	-0.0040
825.00	190.32	0.4376	88.20	-0.0120
850.00	200.35	0.4012	87.90	-0.0120
875.00	212.48	0.4852	88.10	0.0080
900.00	223.10	0.4248	87.70	-0.0160
925.00	233.94	0.4336	87.50	-0.0080
950.00	245.34	0.4560	87.00	-0.0200
975.00	255.71	0.4148	87.00	0.0000
1000.00	266.59	0.4352	86.70	-0.0120
1025.00	277.47	0.4352	86.30	-0.0160
1050.00	287.49	0.4008	86.40	0.0040
1075.00	299.30	0.4724	86.40	0.0000
1100.00	310.13	0.4332	86.80	0.0160
1125.00	321.22	0.4436	86.70	-0.0040
1150.00	331.81	0.4236	86.70	0.0000
1175.00	342.80	0.4396	87.40	0.0280
1200.00	353.68	0.4352	87.90	0.0200

1225.00	364.51	0.4332	88.20	0.0120
1250.00	375.55	0.4416	88.20	0.0000
1275.00	386.21	0.4264	88.20	0.0000
1300.00	397.07	0.4344	88.80	0.0240
1325.00	407.97	0.4360	89.30	0.0200
1350.00	418.99	0.4408	89.60	0.0120
1375.00	429.59	0.4240	89.90	0.0120
1400.00	440.66	0.4428	90.30	0.0160
1425.00	451.33	0.4268	90.30	0.0000
1450.00	462.17	0.4336	90.10	-0.0080
1475.00	472.21	0.4016	90.10	0.0000
1500.00	483.77	0.4624	90.10	0.0000
1525.00	494.59	0.4328	90.20	0.0040
1550.00	505.70	0.4444	90.40	0.0080
1575.00	516.17	0.4188	90.30	-0.0040
1600.00	527.13	0.4384	90.20	-0.0040
1625.00	537.96	0.4332	90.60	0.0160
1650.00	548.57	0.4244	90.90	0.0120
1675.00	559.44	0.4348	91.30	0.0160
1700.00	570.45	0.4404	91.70	0.0160
1725.00	581.10	0.4260	92.40	0.0280
1750.00	591.69	0.4236	92.80	0.0160
1775.00	602.55	0.4344	93.30	0.0200
1800.00	613.39	0.4336	93.70	0.0160
1825.00	624.16	0.4308	94.40	0.0280
1850.00	634.84	0.4272	94.90	0.0200
1875.00	645.66	0.4328	95.30	0.0160
1900.00	656.31	0.4260	95.90	0.0240
1925.00	666.31	0.4000	96.30	0.0160
1950.00	677.79	0.4592	96.70	0.0160
1975.00	688.55	0.4304	97.30	0.0240
2000.00	699.33	0.4312	99.20	0.0760
2025.00	710.08	0.4300	101.40	0.0880
2050.00	720.88	0.4320	103.20	0.0720
2075.00	731.42	0.4216	104.80	0.0640
2100.00	742.31	0.4356	107.10	0.0920
2125.00	752.30	0.3996	109.40	0.0920
2150.00	763.73	0.4572	112.30	0.1160
2175.00	774.49	0.4304	116.30	0.1600
2200.00	785.13	0.4256	118.40	0.0840
2225.00	805.73	0.8240	121.10	0.1080
2250.00	817.17	0.4576	122.00	0.0360
2275.00	825.75	0.3432	122.50	0.0200
2300.00	830.69	0.1976	123.10	0.0240
2325.00	838.70	0.3204	123.00	-0.0040
2350.00	848.72	0.4008	123.50	0.0200
2375.00	859.77	0.4420	123.80	0.0120
2400.00	870.34	0.4228	125.00	0.0480
2425.00	881.01	0.4268	127.60	0.1040
2450.00	891.68	0.4268	131.00	0.1360
2475.00	902.11	0.4172	130.90	-0.0040
2500.00	912.85	0.4296	127.30	-0.1440
2525.00	923.53	0.4272	128.10	0.0320
2550.00	934.13	0.4240	130.90	0.1120
2575.00	944.16	0.4012	133.90	0.1200

2600.00	955.09	0.4372	136.30	0.0960
2625.00	965.67	0.4232	138.50	0.0880
2650.00	976.27	0.4240	138.50	0.0000
2675.00	986.74	0.4188	139.50	0.0400
2700.00	997.23	0.4196	144.50	0.2000
2725.00	1007.70	0.4188	153.70	0.3680
2750.00	1018.28	0.4232	170.70	0.6800
2775.00	1029.07	0.4316	190.20	0.7800
2800.00	1040.10	0.4412	210.10	0.7960
2825.00	1050.02	0.3968	226.60	0.6600
2850.00	1058.68	0.3464	229.90	0.1320
2875.00	1070.76	0.4832	248.50	0.7440
2900.00	1081.05	0.4116	255.00	0.2600
2925.00	1091.35	0.4120	259.50	0.1800
2950.00	1101.65	0.4120	260.80	0.0520
2975.00	1111.95	0.4120	259.80	-0.0400
3000.00	1122.30	0.4140	258.50	-0.0520
3050.00	1149.79	0.5498	263.30	0.0960
3100.00	1154.27	0.0896	252.90	-0.2080
3125.00	1162.99	0.3488	264.20	0.4520
3150.00	1173.62	0.4252	250.40	-0.5520
3175.00	1194.25	0.8252	251.70	0.0520
3200.00	1204.25	0.4000	258.20	0.2600
3225.00	1214.57	0.4128	266.40	0.3280
3250.00	1224.83	0.4104	279.90	0.5400
3275.00	1234.96	0.4052	280.10	0.0080
3300.00	1245.30	0.4136	288.60	0.3400
3325.00	1255.25	0.3980	272.90	-0.6280
3350.00	1265.33	0.4032	270.80	-0.0840
3375.00	1275.68	0.4140	267.60	-0.1280
3400.00	1285.66	0.3992	268.20	0.0240
3425.00	1295.66	0.4000	268.80	0.0240
3450.00	1306.18	0.4208	274.00	0.2080
3475.00	1316.13	0.3980	287.40	0.5360
3500.00	1326.22	0.4036	295.40	0.3200
3525.00	1336.25	0.4012	278.00	-0.6960
3550.00	1346.30	0.4020	276.30	-0.0680
3575.00	1356.37	0.4028	274.70	-0.0640
3600.00	1366.46	0.4036	273.10	-0.0640
3625.00	1376.49	0.4012	273.90	0.0320
3650.00	1386.49	0.4000	276.50	0.1040
3675.00	1396.76	0.4108	278.20	0.0680
3700.00	1406.83	0.4028	291.20	0.5200
3725.00	1416.55	0.3888	314.00	0.9120
3750.00	1426.54	0.3996	306.60	-0.2960
3775.00	1436.58	0.4016	296.90	-0.3880
3800.00	1446.45	0.3948	300.50	0.1440
3825.00	1456.70	0.4100	300.60	0.0040
3850.00	1466.42	0.3888	300.50	-0.0040
3875.00	1476.42	0.4000	300.30	-0.0080
3900.00	1486.19	0.3908	299.60	-0.0280
3910.00	1490.37	0.4180	299.10	-0.0500

FLO-LOG, INC.
PRESSURE TEMPERATURE LOG

COMPANY : PUNA GEOTHERMAL VENTURE
WELL : KS - 3
FIELD : KAPOHO STATE
COUNTY : HAWAII
DATE : 10-9-92
PERMANENT DATA : GROUND LEVEL
LOG MEASURED FROM : 25' ABOVE GROUND LEVEL
TOTAL DEPTH : 7406'
TYPE OF FLUID IN HOLE : WATER
OBSERVED DEPTH (PICKUP) : 3920'
BOTTOM LOGGED INTERVAL : 3920'
FLUID LEVEL : 300'
WELL STATUS : STATIC
BOTTOM TEMPERATURE : 355 DEGREES
LOGGING UNIT : FLH1
TOOLS USED : PRESSURE TEMPERATURE #M002
TOOL DIAMETER : 3"
LINE SIZE : 5/16"
LINE LENGTH : 14,000'
WITNESSED BY : CARL FISHER
LOG RECORDED BY : DICK EKBERG

CASING RECORD

	SIZE	WEIGHT	FROM	TO
	13 3/8"	61#	0'	2209'
	9 5/8"	47#	0'	1972'
	9 5/8"	47#	1972'	3897'
	7"	29#	3767'	6835'
	7"	29#	0'	3724'
	5"	TO BE INSTALLED LATER		

REMARKS : STATIC SURVEY 45 HOURS AFTER SHUT IN AT
2000 HRS. 10/07/92

BEGAN DOWNLOG AT 1646 HRS. 10/09/92

COMPLETED UP LOG AT 1832 HRS. 10/09/92

DEPTH FT	PRESS PSIA	PRESS GRAD	TEMP DEG/F	TEMP GRAD
100.00	12.57		74.50	
150.00	12.61	0.0008	74.50	0.0000
200.00	12.63	0.0004	74.30	-0.0040
250.00	12.68	0.0010	74.10	-0.0040
300.00	22.24	0.1912	76.50	0.0480
350.00	38.07	0.3166	77.80	0.0260
400.00	58.45	0.4076	77.00	-0.0160
450.00	79.58	0.4226	76.80	-0.0040
500.00	100.97	0.4278	79.20	0.0480
550.00	122.41	0.4288	81.80	0.0520
600.00	144.10	0.4338	83.50	0.0340
650.00	166.89	0.4558	84.00	0.0100
700.00	189.78	0.4578	84.40	0.0080
750.00	211.68	0.4380	84.40	0.0000
800.00	235.20	0.4704	83.20	-0.0240
850.00	257.30	0.4420	82.10	-0.0220
900.00	279.04	0.4348	81.80	-0.0060
950.00	301.98	0.4588	81.80	0.0000
1000.00	323.09	0.4222	81.20	-0.0120
1050.00	345.64	0.4510	81.70	0.0100
1100.00	367.73	0.4418	83.00	0.0260
1150.00	389.39	0.4332	83.80	0.0160
1200.00	411.08	0.4338	84.40	0.0120
1250.00	433.70	0.4524	85.60	0.0240
1300.00	456.19	0.4498	86.60	0.0200
1350.00	478.77	0.4516	86.60	0.0000
1400.00	500.15	0.4276	86.40	-0.0040
1450.00	522.96	0.4562	86.80	0.0080
1500.00	543.13	0.4034	86.60	-0.0040
1550.00	565.99	0.4572	87.30	0.0140
1600.00	587.27	0.4256	88.40	0.0220
1650.00	609.77	0.4500	89.90	0.0300
1700.00	631.67	0.4380	91.30	0.0280
1750.00	653.19	0.4304	92.90	0.0320
1800.00	675.08	0.4378	94.20	0.0260
1850.00	697.92	0.4568	95.00	0.0160
1900.00	718.55	0.4126	95.80	0.0160
1950.00	739.47	0.4184	96.70	0.0180
2000.00	759.12	0.3930	98.40	0.0340
2050.00	770.38	0.2252	103.80	0.1080
2100.00	792.13	0.4350	109.60	0.1160

2150.00	813.21	0.4216	115.90	0.1260
2200.00	834.53	0.4264	125.40	0.1900
2250.00	855.92	0.4278	129.10	0.0740
2300.00	876.94	0.4204	130.50	0.0280
2350.00	898.50	0.4312	131.20	0.0140
2400.00	919.38	0.4176	133.00	0.0360
2450.00	940.61	0.4246	138.70	0.1140
2500.00	961.83	0.4244	137.90	-0.0160
2550.00	982.76	0.4186	139.50	0.0320
2600.00	1004.18	0.4284	146.50	0.1400
2650.00	1025.04	0.4172	150.50	0.0800
2700.00	1046.37	0.4266	156.20	0.1140
2750.00	1067.46	0.4218	182.30	0.5220
2800.00	1088.35	0.4178	233.10	1.0160
2850.00	1108.26	0.3982	276.20	0.8620
2900.00	1128.57	0.4062	298.30	0.4420
2950.00	1148.52	0.3990	308.00	0.1940
3000.00	1168.16	0.3928	304.90	-0.0620
3050.00	1188.18	0.4004	306.10	0.0240
3100.00	1208.02	0.3968	302.20	-0.0780
3150.00	1227.65	0.3926	293.50	-0.1740
3200.00	1247.67	0.4004	300.40	0.1380
3250.00	1267.58	0.3982	314.50	0.2820
3300.00	1287.65	0.4014	327.20	0.2540
3350.00	1307.44	0.3958	317.60	-0.1920
3400.00	1330.22	0.4556	312.90	-0.0940
3450.00	1346.11	0.3178	319.10	0.1240
3500.00	1365.52	0.3882	335.80	0.3340
3550.00	1384.99	0.3894	321.80	-0.2800
3600.00	1404.43	0.3888	320.60	-0.0240
3650.00	1424.06	0.3926	324.20	0.0720
3700.00	1444.05	0.3998	334.10	0.1980
3750.00	1462.42	0.3674	353.90	0.3960
3800.00	1482.01	0.3918	354.30	0.0080
3850.00	1501.40	0.3878	355.60	0.0260
3900.00	1520.08	0.3736	355.20	-0.0080
3920.00	1527.96	0.3940	352.60	-0.1300

LOG UP

DEPTH FT	PRESS PSIA	PRESS GRAD	TEMP DEG/F	TEMP GRAD
3900.00	1520.08		354.70	
3800.00	1481.55	0.3853	354.90	-0.0020
3700.00	1444.25	0.3730	349.80	0.0510
3600.00	1404.10	0.4015	324.70	0.2510
3500.00	1365.51	0.3859	334.60	-0.0990
3400.00	1326.14	0.3937	315.10	0.1950
3300.00	1286.67	0.3947	326.10	-0.1100
3200.00	1246.95	0.3972	305.90	0.2020
3100.00	1207.25	0.3970	297.10	0.0880
3000.00	1168.07	0.3918	305.30	-0.0820
2900.00	1127.81	0.4026	303.20	0.0210
2800.00	1083.60	0.4421	258.60	0.4460

2700.00	1045.86	0.3774	174.30	0.8430
2600.00	1003.50	0.4236	149.60	0.2470
2500.00	960.44	0.4306	139.10	0.1050
2400.00	918.47	0.4197	135.50	0.0360
2300.00	876.14	0.4233	131.40	0.0410
2200.00	834.12	0.4202	127.70	0.0370
2100.00	791.60	0.4252	115.60	0.1210
2000.00	748.69	0.4291	101.00	0.1460
1900.00	705.65	0.4304	95.30	0.0570
1800.00	662.93	0.4272	92.30	0.0300
1700.00	619.74	0.4319	89.20	0.0310
1600.00	576.98	0.4276	87.10	0.0210
1500.00	533.82	0.4316	86.90	0.0020
1400.00	490.06	0.4376	86.90	0.0000
1300.00	444.76	0.4530	86.00	0.0090
1200.00	403.84	0.4092	83.60	0.0240
1100.00	358.84	0.4500	81.90	0.0170
1000.00	317.96	0.4088	81.80	0.0010
900.00	274.98	0.4298	83.10	-0.0130
800.00	231.09	0.4389	84.30	-0.0120
700.00	188.15	0.4294	84.10	0.0020
600.00	144.77	0.4338	81.10	0.0300
500.00	99.89	0.4488	77.50	0.0360
400.00	57.85	0.4204	76.80	0.0070
300.00	18.44	0.3941	76.70	0.0010
200.00	13.17	0.0527	76.40	0.0030
100.00	13.14	0.0003	76.40	0.0000
50.00	13.13	0.0002	76.70	-0.0060

PUNA GEOTHERMAL VENTURE
COMBINED INJECTION DATA

Quantities of Fluid Injected (M pounds)					Quantities of Chemicals Added (gallons)						
Date	Geofluid Supp	Wtr Code	Other		Total	Amer-					
			Quantity			site Wrico	WPD	West	Midland	Mill-	NaOH
						(R)2 Oxy 11	11-306	R-322	203	(R)302	
10/01/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/02/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/03/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/04/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/05/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/06/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/07/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/08/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/09/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/10/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/11/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/12/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/13/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/14/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/15/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/16/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/17/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/18/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/19/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/20/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/21/92	0	0	0		0	0.0	0.0	0.0	0.0	0.0	0.0
10/22/92	1299	204	0		1503	0.0	0.0	0.0	0.0	0.0	0.0
10/23/92	2848	125	0		2973	0.0	16.3	13.8	0.0	0.0	0.0
10/24/92	3272	96	0		3368	0.0	5.8	14.6	0.0	0.0	0.0
10/25/92	3502	67	0		3569	0.0	6.7	13.3	0.0	0.0	0.0
10/26/92	3477	21	0		3498	0.0	6.3	13.3	0.0	0.0	0.0
10/27/92	3950	34	0		3984	0.0	10.0	13.4	0.0	0.0	0.0
10/28/92	4045	46	0		4090	0.0	7.5	0.0	0.0	0.0	0.0
10/29/92	4270	60	0		4330	0.0	11.6	22.1	0.0	0.0	0.0
10/30/92	4863	81	0		4943	0.0	2.5	12.9	0.0	0.0	0.0
10/31/92	5716	111	0		5826	0.0	19.2	3.3	0.0	0.0	0.0
No. Total	37240	843	0		38083	0.0	85.9	106.7	0.0	0.0	0.0

PUNA GEOTHERMAL VENTURE
KS-3 INJECTION WELL DATA

Quantities of Fluid Injected (M pounds)

Date	Hours On Inj.	Geofluid	Supp	Wtr	Code	Quantity	Total	Wellhead Average Press, psig		Average N2 Press (psig)	Average Inj Temp (Deg F)
								Avg.	Max.		
10/01/92	0	0	0	0		0	0	0	0	0	
10/02/92	0	0	0	0		0	0	0	0	0	
10/03/92	0	0	0	0		0	0	0	0	0	
10/04/92	0	0	0	0		0	0	0	0	0	
10/05/92	0	0	0	0		0	0	0	0	0	
10/06/92	0	0	0	0		0	0	0	0	0	
10/07/92	0	0	0	0		0	0	0	0	0	
10/08/92	0	0	0	0		0	0	0	0	0	
10/09/92	0	0	0	0		0	0	0	0	0	
10/10/92	0	0	0	0		0	0	0	0	0	
10/11/92	0	0	0	0		0	0	0	0	0	
10/12/92	0	0	0	0		0	0	0	0	0	
10/13/92	0	0	0	0		0	0	0	0	0	
10/14/92	0	0	0	0		0	0	0	0	0	
10/15/92	0	0	0	0		0	0	0	0	0	
10/16/92	0	0	0	0		0	0	0	0	0	
10/17/92	0	0	0	0		0	0	0	0	0	
10/18/92	0	0	0	0		0	0	0	0	0	
10/19/92	0	0	0	0		0	0	0	0	0	
10/20/92	0	0	0	0		0	0	0	0	0	
10/21/92	0	0	0	0		0	0	0	0	0	
10/22/92	0	0	0	0		0	0	0	0	0	
10/23/92	0	0	0	0		0	0	0	0	0	
10/24/92	0	0	0	0		0	0	0	0	0	
10/25/92	0	0	0	0		0	0	0	0	0	
10/26/92	0	0	0	0		0	0	0	0	0	
10/27/92	0	0	0	0		0	0	0	0	0	
10/28/92	0	0	0	0		0	0	0	0	0	
10/29/92	0	0	0	0		0	0	0	0	0	1120
10/30/92	24	1519		25		0	1544	64	62	93	1340
10/31/92	24	1786		35		0	1820	76	60	120	150
No. Total	48	3305		59		0	3364				

PUNA GEOTHERMAL VENTURE
KS-1A INJECTION WELL DATA

Quantities of Fluid Injected (M pounds)

Date	Hours	On Inj.	Geofluid	Supp	Wtr	Code	Quantity	Total	Wellhead		Average	Annulus	Average
									Average Press, psig	Inj Rate	N2 Press	Inj Temp	
									Avg.	Max.	(psig)	(Deg F)	
10/01/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/02/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/03/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/04/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/05/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/06/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/07/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/08/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/09/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/10/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/11/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/12/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/13/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/14/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/15/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/16/92	0	0	0	0	0	0	0	0	0	0	0	0	
10/17/92	0	0	0	0	0	0	0	0	0	0	0	0	1160
10/18/92	0	0	0	0	0	0	0	0	0	0	0	0	1176
10/19/92	0	0	0	0	0	0	0	0	0	0	0	0	1160
10/20/92	0	0	0	0	0	0	0	0	0	0	0	0	1180
10/21/92	0	0	0	0	0	0	0	0	0	0	0	0	1192
10/22/92	15	1299		204	0	0	1503	100	80	170	1315	145	
10/23/92	24	2848		125	0	0	2973	124	95	155	1370	155	
10/24/92	24	3272		96	0	0	3368	140	72	75	1361	156	
10/25/92	24	3502		67	0	0	3569	149	62	95	1360	155	
10/26/92	24	3477		21	0	0	3498	146	68	80	1360	155	
10/27/92	24	3950		34	0	0	3984	166	89	125	1373	155	
10/28/92	24	4045		46	0	0	4090	170	116	125	1370	164	
10/29/92	24	4270		60	0	0	4330	180	95	110	1368	162	
10/30/92	24	3344		56	0	0	3399	142	38	42	1350	160	
10/31/92	24	3930		76	0	0	4006	167	54	78	1350	158	
No. Total	231	33935		784	0	0	34719						

8/28/92

CHEMISTRY RESULTS OF KS-8 FLOWTEST:

DATE(TIME)	LOCATION	Brine pH (temp. °C)	brine press.	Cl mg/l	alkal. mgCaCO3/l	H2S mg/kg
8/13 1340	wellhead	6.2(25.0)		90.6	3.29	
8/13 1455	wellhead	6.2(25.0)			2.28	
8/13 1750	ba1a					
8/14 1050	ba2a	6.19(25.0)	218	24.5	2.48	7.7
8/14 1730	ba2a	5.77(36.9)	220			
8/15 0850	ba2a	5.59(41.7)	222	32		
8/15 1830	ba2a		222			
8/16 1410	ba2a		222			
8/17 1050	ba2a		215	25.5		
8/18 0935	ba2a	5.61(43.0)	212	29.6	2.1	
ACID BL				4.22		

STRY RESULTS OF KS-8 FLOWTEST:

RAW DATA

BRINE

DATE(TIME)	Ca mg/l	K mg/l	Li mg/l	Mg mg/l	Na mg/l	SiO2 mg/l
8/13 1340	26.9	41.9	0.0281	0.153	15.47	126
8/13 1455	18.4	2.9	0.0081	0.037	9.28	141
8/13 1750	21.4	2.39	0.0064	0.186	8.92	165
8/14 1050	10.6	2.5	0.0124	0.236	10.6	151
8/14 1730	6.41	1.42	0.00216	0.116	6.58	196
8/15 0850	4.67	1.42	0.00108	0.131	6.86	186
8/15 1830	15.4	1.47	0.0016	0.052	6.12	218
8/16 1410	11.6	1.74	0.0032	0.064	7.26	187
8/17 1050	3.6	0.937	-0.002	0.028	4.72	207
8/18 0935	5.86	1.04	-0.001	0.097	4.78	206
ACID BL	5.61	0.232	-0.004	0.051	3.03	26.3

CHEMISTRY RESULTS OF KS-8 FLOWTEST:

RAW DATA

BRINE						
DATE(TIME)	Al mg/l	As mg/l	B mg/l	Ba mg/l	Cd mg/l	Cu mg/l
8/13 1340	0.063	0.104	3.23	1.69	0	0
(std.dev.)	(0.045)		(0.019)	(0.011)		
8/13 1455	0.077		3.26	1.68	0.002	0.001
	(.051)		(.034)	(.002)	0	(.001)
8/13 1750	0.04		3.65	1.56	0	-0.007
	(.022)		(.031)	(.006)		
8/14 1050	-0.039		3.67	0.463	0	-0.006
			(.027)	(.001)		
8/14 1730	-0.003	0.134	4.56	1.16	0	0.003
			(0)	(.005)		(.007)
8/15 0850	0.021		4.61	0.26	0.003	0.01
	(.028)		(.012)	(.002)	(0)	(.001)
8/15 1830	0.157	0.014	5.13	1.33	0	0.007
	(.018)		(.018)	(.009)		(.005)
8/16 1410	0.033	0.124	4.79	0.305	0	0.005
	(.072)		(.029)	(.001)		(.010)
8/17 1050	0.022	0.105	5.41	0.201	0	0
	(.025)		(.046)			
8/18 0935	0.042	0.117	5.47	0.189	0.003	-0.008
	(.040)		(.010)			
ACID BL	-0.027	0.014	-0.001	-0.007	0	-0.003

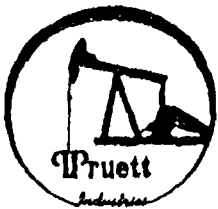
DATE(TIME)	Fe mg/l	Mn mg/l	Ni mg/l	Pb mg/l	Sr mg/l	Zn mg/l
8/13 1340	0.22	0.2	0.013	0.023	0.644	0.006
(std.dev.)	(.003)	(.001)	(.002)	(.011)	(.004)	(0)
8/13 1455	0.129	0.136	0	0.003	0.333	0.001
	(.002)	(0)		(.015)	(.002)	(.001)
8/13 1750	0.066	0.066	0	0.005	0.254	0.001
	(0)	(0)		(.014)	(.001)	(.001)
8/14 1050	0.652	0.447	0	-0.002	0.241	0.001
	(.006)	(.002)			(.004)	(.001)
8/14 1730	0.353	0.324	-0.003	-0.014	0.089	0.001
	(.003)	(.001)			(.002)	(.002)
8/15 0850	0.247	0.272	-0.003	-0.008	0.077	0.005
	(0)	(.001)			(.001)	(.001)
8/15 1830	0.059	0.022	0.001	-0.012	0.206	0.001
	(.002)	(0)	(.008)		(.001)	
8/16 1410	0.202	0.167	-0.006	-0.005	0.223	0
	(.005)	(0)			(.001)	
8/17 1050	0.202	0.101	-0.003	0.006	0.044	0.003
	(.001)	(.001)		(.004)	(0)	(.001)
8/18 0935	0.308	0.122	0.003	0.012	0.107	0.002
	(.003)	(.001)	(.005)		(0)	(.001)
ACID BL	0.002	0.001	-0.002	-0.023	0	0

CHEMISTRY RESULTS OF KS-8 FLOWTEST:

08/28/92

STEAM PHASE

DATE(TIME)	H2S mg/kg	CO2 mg/kg
8/12 1120	1428	
8/13 1400		2910
8/14 0920	1039	3283
8/15 1800	941	3919
8/16 ?	1033	
8/17 1030	1030	2807
8/18 1020	904	2373



PRUETT INDUSTRIES, INC.

8915 Rosedale Highway
Bakersfield, California 93312
(805) 589-2768

FIELD REPORT

COMPANY P.C.V. FIELD Puma WELL NAME K S #8 Run#2
CASINO _____ ELEV _____ DATE 7-6-91
LINER DESCRIPTION: _____ ZERO POINT _____
PERFORATION: _____ DEPTH _____
TUBING DETAIL _____ ZONE _____

PUMP SHOE _____ GAS ANCHOR _____ INTAKE _____
PURPOSE _____
ELEMENT SERIAL NO. CLOCK TURN
ELEMENT SERIAL NO. CLOCK TURN
ENGAGE STYLUS _____ DISENGAGE STYLUS _____
OBS. T.B. PRESS. _____ OBS. CSG. PRESS. _____
COR. T.B. PRESS. _____ COR. CSG. PRESS. _____
PICKUP @ _____ TIME ON BOTTOM _____ MAX. °F _____
WELL STATUS _____ TIME OFF BOTTOM _____
SHUT IN: _____ ON PRODUCTION: _____

STABILIZATION PERIOD

GROSS OIL RATE _____
NET OIL RATE _____
FORMATION GAS _____
GOR. CFT/BSL _____
CIRCULATED GAS _____
OIL DRY GAS _____
BEAN SIZE _____

Temp 1519						Temp 1518						Pressure 1518					
TIME	DEPTH	DEFL	P-T	GRAD	I/O	TIME	DEPTH	DEFL	P-T	GRAD	I/O	TIME	DEPTH	DEFL	P-T	GRAD	I/O
500	.046	105.5				500	.063	100.1				11	.050	100.0			
1000	.048	106.0				1000	.066	101.1				12	.062	101.0			
1100	.049	106.5					.070	102.4				13	.060	100.0			
12	.049	106.5					.070	102.4				14	.052	107.5			
13	.052	107.5				1300	.072	103.0				15	.053	107.8			
14	.052	107.5					.072	103.0				16	.051	108.8			
1500	.053	107.8				1500	.074	103.6				17	.058	109.5			
16	.051	108.8					.077	104.6				18	.060	110.1			
17	.058	109.5					.074	103.6				19	.060	110.1			
18	.060	110.1				1800	.076	104.3				2000	.061	110.5			
19	.060	110.1					.084	107				21	.061	110.5			
2000	.061	110.5					.084	107				22	.061	110.5			
21	.061	110.5				2100	.084	107				23	.083	614.3			
22	.061	110.5					.084	107				24	.070	619			
23	.083	614.3					.715	606				2500	.070	619.5			
24	.070	619					.740	614				26	.072	620.5			
2500	.070	619.5				2500	.077	616				27	.074	621.1			
26	.072	620.5					.077	617				28	.076	622.2			
27	.074	621.1				2700	.152	618				29	.078	622.4			
28	.076	622.2					.153	618				3000	.072	623.4			
29	.078	622.4					.156	619				31	.075	624.7			
3000	.072	623.4				3000	.153	620				32	.073	628.3			
31	.075	624.7					.165	622				3300	.1740	624.6			
32	.073	628.3					.169	623									
3300	.1740	624.6					.175	625									

COMMENTS:

12 drops

TABLE 4-1

PUNA GEOTHERMAL VENTURE

CHEMICAL ANALYSIS CHECKLIST FOR ATC COMPLIANCE
OF GEOTHERMAL STEAM, STEAM CONDENSATE AND BRINE

LABORATORIES:	
BEI	Brewer Environmental Industries, Papaikou, HI
UURI	University of Utah Research Institute, Salt Lake City, UT
T-Chem	Thermochem, Santa Rosa CA

BRINE

ANALYTE	LAB	DETECT LIMIT	S.P.	DATE	TIME	I.D. No.	SAMPLER
Benzene	BEI	0.001 mg/l					
Ammonium	UURI	0.05 ppm					
Arsenic	UURI	0.005 mg/l					
Lead	UURI	0.002 mg/l					
Cadmium	UURI	0.005 mg/l					
Bicarbonates	UURI	1.0 ppm					
Carbonates	UURI	1.0 ppm					
Sulfates	UURI	1.0 ppm					
Chlorides	UURI	1.0 ppm					
Nitrate	UURI	0.01 ppm					
Hydrogen Sulfide	BEI	1.0 ppm					
Fluoride	UURI	0.05 ppm					
Mercury	UURI	0.0005 mg/l					
Total Dissolved Solids	UURI	4.0 ppm					
Total Suspended Solids	UURI	5.0 ppm					
pH	UURI	N/A					

STEAM CONDENSATE, UNABATED

ANALYTE	LAB	DETECT LIMIT	S.P.	DATE	TIME	I.D. No.	SAMPLER
Benzene	BEI	0.001 mg/l					
Ammonium	UURI	0.05 ppm					
Arsenic	UURI	0.005 mg/l					
Lead	UURI	0.002 mg/l					
Cadmium	UURI	0.005 mg/l					
Bicarbonates	UURI	1.0 ppm					
Carbonates	UURI	1.0 ppm					
Sulfates	UURI	1.0 ppm					
Chlorides	UURI	1.0 ppm					
Nitrate	UURI	0.01 ppm					
Hydrogen Sulfide	BEI	1.0 ppm					
Fluoride	UURI	0.05 ppm					
Mercury	UURI	0.0005 mg/l					
Total Dissolved Solids	UURI	4.0 ppm					
Total Suspended Solids	UURI	5.0 ppm					
pH	UURI	N/A					

STEAM CONDENSATE, ABATED

ANALYTE	LAB	DETECT LIMIT	S.P.	DATE	TIME	I.D. No.	SAMPLER
Benzene	BEI	0.001 mg/l					
Ammonium	UURI	0.05 ppm					
Arsenic	UURI	0.005 mg/l					
Lead	UURI	0.002 mg/l					
Cadmium	UURI	0.005 mg/l					
Bicarbonates	UURI	1.0 ppm					
Carbonates	UURI	1.0 ppm					
Sulfates	UURI	1.0 ppm					
Chlorides	UURI	1.0 ppm					
Nitrate	UURI	0.01 ppm					
Hydrogen Sulfide	BEI	1.0 ppm					
Fluoride	UURI	0.05 ppm					
Mercury	UURI	0.0005 mg/l					
Total Dissolved Solids	UURI	4.0 ppm					
Total Suspended Solids	UURI	5.0 ppm					
pH	UURI	N/A					

STEAM, NON-CONDENSIBLE GASES

ANALYTE	LAB	DETECT LIMIT	S.P.	DATE	TIME	I.D. No.	SAMPLER
% NC Gases	T-Chem	N/A					
Benzene	T-Chem	0.00028 ppm					
Hydrogen Sulfide	T-Chem	0.20 ppm					
Ammonia	T-Chem	0.10 ppm					
Radon 222	T-Chem	50 pCi/kg					
Mercury	T-Chem	0.001 ppm					
Carbon Dioxide	T-Chem	5.0 ppm					
Sulfur Dioxide	T-Chem	0.10 ppm					
Methane	T-Chem	0.2 ppm					
Total Hydrocarbons:	T-Chem						
Methane		0.2 ppm					
Ethylene		0.00006 ppm					
Ethane		0.00008 ppm					
Propylene		0.00007 ppm					
Propane		0.00007 ppm					
Isobutane		0.00008 ppm					
1-Butene		0.00006 ppm					
Butane		0.00008 ppm					
2,2-Dimethylpropane		0.0001 ppm					
2-Methylbutane		0.00008 ppm					
1-Pentane		0.00006 ppm					
Pentane		0.00007 ppm					
2,2-Dimethylpentane		0.00007 ppm					
2 and 3-Methylpentane		0.00009 ppm					
Hexene		0.00006 ppm					
Hexane		0.00008 ppm					
Additional Hydrocarbons		N/A					

TABLE 4-2
COMPONENTS OF WINDSHIELD DEPOSITS
PGV REPORT, ELEMENT III, PART I

COMPONENT	VALUE	UNITS
Lead	678	ppmw
Nickel	90	ppmw
Chromium	72	ppmw
Manganese	118	ppmw
Copper	16.3	ppmw
Zinc	19.2	ppmw
Arsenic	<10	ppmw
Iron	6.53	%
Aluminum	1.56	%

TABLE 4-3
ESTIMATES OF STEAM COMPOSITION
KS-3 AND KS-1A
PGV REPORT, ELEMENT III, PART I

COMPONENT	LOWER	UPPER	UNITS
Hydrogen Sulfide	493	1200	ppmw
Ammonia	0.168	1.49	ppmw
Arsenic	N/A	N/A	
Lead	N/A	N/A	
Cadmium	N/A	N/A	
Chlorides	N/A	N/A	
Boron	N/A	N/A	
Mercury	N/A	N/A	
pH	N/A	N/A	
Total Dissolved Solids	N/A	N/A	
Total Suspended Solids	N/A	N/A	
Nickel	N/A	N/A	
Chrome	N/A	N/A	

TABLE 4-4
ESTIMATES OF STEAM COMPOSITION USING
KS-1A PRE-FLASH AND POST FLASH VALUES
PGV REPORT, ELEMENT III, PART I

COMPONENT	POST FLASH	TOTAL BRINE	STEAM	UNITS
Arsenic	0.49	0.1	0.00182	ppmw
Mercury	0.0017	0.0003	0.00005	ppmw
Boron	8.43	1.7	0.00591	ppmw
Silica	1170	235.27	0.02128	ppmw
Aluminum	<2.50	<0.5	N/A	ppmw
Barium	32.3	6.5	0.00560	ppmw
Manganese	8.13	1.63	0.00619	ppmw
Chloride	18,500	3,720	0.36299	ppmw
Fluoride	0.91	0.18	0.00548	ppmw
Sulfate	14.2	2.86	0.00548	ppmw
Total Dissolved Solids	33,100	6,656	0.65089	ppmw

TABLE 4-5
PUNA GEOTHERMAL VENTURE
FLOW TEST KS-8
FREQUENCY OF CHEMICAL SAMPLING AND ANALYSIS

ENVIRONMENTAL AND HEALTH

SAMPLE DESCRIPTION	ANALYSIS	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
1. Steam Condensate											
a. metals	LAB		1			1			1		
b. anions	LAB		1			1			1		
c. mercury	LAB		1			1			1		
d. NC gases	LAB		1			1			1		
2. Brine											
a. metals	LAB		1			1			1		
b. anions, TDS	LAB		1			1			1		
metalloids	LAB		1			1			1		
c. silica	LAB		1			1			1		
d. sulfide	LAB		1			1			1		
e. ammonia	LAB		1			1			1		
f. TSS	LAB		1			1			1		

RESERVOIR EVALUATION

SAMPLE DESCRIPTION	ANALYSIS	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
1. Brine:ICP+anions	LAB	4	3	4	4	3	4	4	3	4	4
2. NC Gases	LAB	2	1	2	2	1	2	2	1	2	2

ENGINEERING DESIGN

SAMPLE DESCRIPTION	ANALYSIS	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
1. Brine line corrosion											
a. pH, Cl, Si, Fe, Mn	FIELD	2	2	2	2	2	2	2	2	2	2
b. ICP+anions @ 2nd station	LAB		1			1				1	
2. Steam line corrosion pH, Cl, Fe, Mn	FIELD			1		1		1		1	
3. Separator Efficiency pH, Cl, Si, conductivity	FIELD	1	1	1	1	1	1	1	1	1	1
4. Steam Purity Ion chromatography	FIELD	1		1	1		1	1		1	1
4. Filtration Test	LAB				1			1			1
5. Jar Test	FIELD/LAB			1			1			1	

FACSIMILE COVER SHEET

TO: DEPARTMENT ATTENTION FAX NO.
 COUNTY:
Corporation Counsel Michael Matsukawa 969-7049
 Glenn Shiigi 969-7049
Office of the Mayor Lorraine Inouye 961-6553
 Barry Mizuno 961-6553
Planning Department Tad Nagasako 961-9615
 Rodney Nakano 961-9615

STATE:
Dept. of Business &
 Economic Development Dean Anderson 586-2536
 Murray Towill 586-2377
Dept. of Health Dr. Bruce Anderson 548-3263
 Jerry Haruno 548-1173
 Harold Matsuura 933-4492
 Aaron Ueno 933-4669
Dept. of Land & Natural
 Resources Dean Nakano 548-6052
 William Paty 548-6461
 ~~Erie Tanaka~~ ~~933-4249~~

FROM: Harry Kim, Administrator
 Hawaii County Civil Defense Agency
 920 Ululani Street
 Hilo, Hawaii 96720
 FAX: 935-6460

DATE: Aug. 30, 1991

SUBJECT: Puna Geothermal Venture Daily Report(s) for
 Aug 29/30 1991 on MW-3 and KS-8 Wells

Fax consists of 2 pages, including this page. If there are any problems in receiving this fax, please contact Audrey or Dot at 935-0031.

Janet

Hawaii County Civil Defense Agency

920 Ululani Street

Hilo, Hawaii 96720

TELEPHONE: 935-0031 FAX: 935-6460

FACSIMILE COVER SHEET

TO: DEPARTMENT ATTENTION FAX NO.
COUNTY:

Corporation Counsel	Michael Matsukawa	969-7049
	Glenn Shilgi	969-7049
Office of the Mayor	Lorraine Inouye	961-6553
	Barry Mizuno	961-6553
Planning Department	Tad Nagasako	961-9615
	Rodney Nakano	961-9615

STATE:

Dept. of Business & Economic Development	Gerald Lesperance	586-2536
	Murray Towill	586-2377
Dept. of Health	Dr. Bruce Anderson	548-3263
	Clifford Furukado	933-4669
	Jerry Haruno	548-1173
	Harold Matsuura	933-4669
	Wendell Sano	548-8222 548-7226
	Aaron Ueno	933-4669
Dept. of Land & Natural Resources	Dean Nakano	548-6052
	William Paty	548-6461

FROM: Harry Kim, Administrator

DATE: Sept. 30, 1991

SUBJECT: Puna Geothermal Venture Daily Drilling Activity Summary for
Sept 28 + 29, 1991 on KS-8 Well

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PUNA GEOTHERMAL VENTURE - CONSTRUCTION

P.O. BOX 1337, HILO, HI 96721-1337
TEL: (808) 961-2786 FAX: (808) 965-7254

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FILE #: _____ CC: BT/BR
NUMBER OF PAGES (INCLUDING COVER SHEET): 1

IF YOU HAVE DIFFICULTIES RECEIVING THIS FAX PLEASE CALL
(808) 961-2786 ASK FOR: TK

PGV DAILY DRILLING ACTIVITY SUMMARY

DATE: 9/28/91

TIME: 0755

KS-8

PREVIOUS 24 HRS ACTIVITY

- NIPPLE DOWN EXPANSION SPOOL
- NIPPLE UP VALVES ON WELLHEAD & HOOKUP KILL LINES
- NIPPLE UP BOPE

PLANNED ACTIVITIES NEXT 24 HRS

- TEST BOPE
- clean out casing & run bond log

TEL No.

Sep 29.91 8:27 No.001 P.01

PUNA GEOTHERMAL VENTURE - CONSTRUCTION

P.O. BOX 1337, HILO, HI 96721-1337
TEL: (808) 961-2786 FAX: (808) 965-7254

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IF YOU HAVE DIFFICULTIES RECEIVING THIS FAX PLEASE CALL
(808) 961-2786 ASK FOR: TK

PGV DAILY ACTIVITY SUMMARY (9/29/91)

KS-8

PREVIOUS 24 HR ACTIVITY

- TEST master valve, using 5 BOPE
- clean out cement to 1872' & test lap

planned activities next 24 hrs

- clean out in 7" casing & run logs

Hawaii County Civil Defense Agency

920 Ululani Street

Hilo, Hawaii 96720

TELEPHONE: 935-0031

FAX: 935-6460

FACSIMILE COVER SHEET

TO:

DEPARTMENTATTENTIONFAX NO.COUNTY:

Corporation Counsel

Michael Matsukawa

969-7049

Glenn Shilgi

969-7049

Office of the Mayor

Lorraine Inouye

961-6553

Barry Mizuno

961-6553

Planning Department

Tad Nagasako

961-9615

Rodney Nakano

961-9615

STATE:

Dept. of Business &

Economic Development Gerald Lesperance

586-2536

Murray Towill

586-2377

Dept. of Health

Dr. Bruce Anderson

548-3263

Clifford Furukado

933-4669

Jerry Haruno

548-1173

Harold Matsuura

933-4669

Wendell Sano

~~548-8222~~ 548-7226

Aaron Ueno

933-4669

Dept. of Land & Natural

Resources

Dean Nakano

548-6052

William Paty

548-6461

FROM:

Harry Kim, Administrator

DATE:

Oct. 1, 1991

SUBJECT:

Puna Geothermal Venture Daily Drilling Activity Summary for
Oct. 1, 1991 on KS-8 Well

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JUL 11 1991
HAWAII COUNTY
LAND & NATURAL RESOURCES
STATE OF HAWAII

456
Janet
Dean

PUNA GEOTHERMAL VENTURE - CONSTRUCTION

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TEL: (808) 961-2786 FAX: (808) 965-7254

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NUMBER OF PAGES (INCLUDING COVER SHEET): 1

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(808) 961-2786 ASK FOR: TIC

PGU DAILY ACTIVITY SUMMARY (10-1-91)

KS-8

PREVIOUS 24HR ACTIVITY

- RUN TEMP & PRESSURE SURVEYS
- RUN CBL LOG
- close in & secure well

PLANNED ACTIVITIES NEXT 24 HRS

LAY DOWN DERRICK

SECTION GEOLOGIC

September 19, 1991

PGV KS-2

ROPE Pressure Test

Time Pressure (psig)

04:30:00 52.9
 04:31:00 75.2
 04:32:00 558.8
 04:33:00 49.5
 04:34:00 622.0
 04:35:00 604.7
 04:36:00 599.3
 04:37:00 596.4
 04:38:00 1097.1
 04:39:00 1051.0
 04:40:00 1040.5
 04:41:00 1045.4
 04:42:00 1036.8
 04:43:00 1030.7
 04:44:00 1025.1
 04:45:00 1020.7
 04:46:00 1016.3
 04:47:00 1012.6
 04:48:00 1009.0
 04:49:00 1006.0
 04:50:00 1002.6
 04:51:00 997.7
 04:52:00 997.0
 04:53:00 994.1
 04:54:00 991.6
 04:55:00 142.5
 04:56:00 80.5
 04:57:00 82.2
 04:58:00 82.7
 04:59:00 83.0
 05:00:00 83.5
 05:01:00 93.0
 05:02:00 575.6
 05:03:00 1068.5
 05:04:00 1043.4
 05:05:00 1030.7
 05:06:00 1022.7
 05:07:00 1017.0
 05:08:00 1011.9
 05:09:00 1008.0
 05:10:00 1005.8
 05:11:00 1000.7
 05:12:00 997.0
 05:13:00 994.3
 05:14:00 991.7
 05:15:00 988.7
 05:16:00 574.9

Test 1

4:54
 - 4:38
 16 min

5" pipe ram
 HCR Valve
 Kill line valve
 main stack - lower end & upper double

- 108 P.S.I.
 loss

Test 2

5:03
 - 5:15
 12 min

5" pipe ram
 4" manual valve
 2nd 2" manual Kill line valve
 stack below ram

- 80 P.S.I.
 12 min

05:17:00 94.5
 05:18:00 78.6
 05:19:00 79.1
 05:20:00 116.7
 05:21:00 987.5
 05:22:00 1054.4
 05:23:00 1036.6
 05:24:05 1023.9
 05:25:00 1015.8
 05:26:05 1008.5
 05:27:00 1002.9
 05:28:05 997.5
 05:29:00 979.9
 05:30:05 74.7
 05:31:00 76.6
 05:32:05 77.4
 05:33:00 77.6
 05:34:00 78.0
 05:35:00 92.0
 05:36:05 842.0
 05:37:00 1053.6
 05:38:00 1032.9
 05:39:00 1021.9
 05:40:00 1013.9
 05:41:05 1007.5
 05:42:00 1002.9
 05:43:00 998.5
 05:44:05 994.6
 05:45:00 991.6
 05:46:00 989.2
 05:47:00 204.1
 05:48:00 12.2
 05:49:00 12.7

-5'22" Test 3

pipe rams
 check valve on kill line
 4 inboard valves on choke manifold

-5'29" - 7 min P.S.I. 75

Test 4

Hydril on annular
 3 outboard valves on choke manifold

-65 P.S.I. 9 min

TO: INITIAL: PLEASE: REMARKS:

Cabinet 2
F# 11

FOR YOUR:

____ Approval
____ Signature
____ Information

M. TAGOMORI
S. Kokubun

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

RECEIVED

January 9, 1992

32 JAN 15 AIO: 59

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

DIV. OF WATER &
LAND DEVELOPMENT

SUBJ: WEEKLY WELL REPORT

Dear Dr. Lewin,

Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated March 13, 1991. MW-2 and KS-7 are monitored every day. MW-1 and MW-2 are sampled once per week for fluid chemistry changes. This report covers the period between December 22 and December 28, 1991. Included are tabulated temperature and depth to water level data for KS-8 and MW-2. Also included in this report are the latest water chemistry analyses performed by Brewer Laboratories.

Should you have any questions, please call me.

Sincerely,



Thomas G. Kizis
Environmental Coordinator

JS/cd

Attachments

cc: C. Hew, DOH
W. Paty, DLNR
D. Nakano, DLNR
D. Berube
B. Teplow
J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18 (KS-7), 7.12.MW-1, 7.12.MW-2

(21096F/cd)

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
23-Dec-91	09:30 AM	574.90	139
26-Dec-91	09:30 AM	574.87	140
27-Dec-91	09:10 AM	574.90	140

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
23-Dec-91	09:54 AM	34.21	147
26-Dec-91	09:00 AM	34.23	140
27-Dec-91	09:38 AM	34.25	135

Lost
wood



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

RECEIVED
OCT 16 1991

PUNA GEOTHERMAL VENTURE

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5314

SAMPLE LOCATION:

DATE: OCT. 09, 1991

Date/Time Sampled: 10/02/91
Date/Time Received: 10/02/91 @1520

Matrix: WATER
Analysis Date: 10/02/91-
10/07/91

ANALYSIS	SAMPLE ID MW-2 (1056)	SAMPLE ID MW-3 (1112)	Reporting Limits mg/l	Method Number
	RESULTS mg/l	RESULTS mg/l		
Sodium	465	59.2	0.01	273.1
Potassium	29.9	10.1	0.01	258.1
Magnesium	27.3	13.6	0.01	242.1
Calcium	43.4	20.7	0.01	215.1
Chlorides	813	20	0.5	325.3
Sulfates	112	198	1.0	375.4
Alkalinity (mgCaCO3/l)	63	39	1.0	310.1
Total Dissolved Solids	1714	524		160.1
Silica	79.8	102	0.2	370.1
pH (units)	8.0	7.6		150.1

Approved By: *Jana Malcoch-Brown*

BREWER ENVIRONMENTAL SERVICES

a Department of Brewer Environmental Industries

P.O. BOX 552 PAPAIIKOU, HAWAII 96781 PHONE: 964-5522 FAX: 964-5309

JOB NO. 5131

DATE — SEPT. 18, 1991

PAGE — 1 OF 1

LABORATORY ANALYSIS REPORT (1)

TO: PUNA GEOTHERMAL VENTURE ATTN: MR. JEFFREY STERNFELD

ADDRESS: P.O. BOX 1337 PHONE:

HILO, HAWAII 96721

SAMPLES OF: WATER

SAMPLED BY: J. STERNFELD SAMPLING DATE: AS NOTED TIME: AS NOTED

RECEIPT DATE: 09/11/91 TIME: 1300

DATE SAMPLE ANALYZED		09/11-17/91	09/11-17/91		
TIME SAMPLE ANALYZED					
SAMPLE TYPE					
SAMPLE DESCRIPTION		MW-1 09/11/91 (1100)	MW-2 09/10/91 (1400)		
	UNITS				
SODIUM	mg/l	60.4	154		
POTASSIUM	mg/l	10.1	12.7		
MAGNESIUM	mg/l	13.3	13.8		
CALCIUM	mg/l	20.2	14.3		
CHLORIDES	mg/l	19	350		
SULFATES	mg/l	82	75.2		
ALKALINITY	mgCaCO ₃ /l	30	37		
TOTAL DISSOLVED SOLIDS	mg/l	452	800		
SILICA	mg/l	102	72.8		
pH	units	7.8	7.9		

LABORATORY REMARKS: Samples analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S.

Environmental Protection Agency, March, 1979 and/or "Microbiological Methods for Monitoring the Environment",

U.S. Environmental Protection Agency, August, 1978.

Jana Malcolm-Brown

BREWER ENVIRONMENTAL SERVICES

a Department of Brewer Environmental Industries

P.O. BOX 552 PAPA'IKOU, HAWAII 96781 PHONE: 964-5522 FAX: 964-5309

JOB NO. 5187

DATE SEPT. 20, 1991

PAGE 1 OF 1

LABORATORY ANALYSIS REPORT (1)

TO: PUNA GEOTHERMAL VENTURE ATTN: MR. JEFFREY STERNFELD

ADDRESS: P.O. BOX 1337 PHONE:

HILO, HAWAII 96721

SAMPLES OF: WATER

SAMPLED BY: CLIENT SAMPLING DATE: 09/18/91 TIME: AS NOTED

RECEIPT DATE: 09/18/91 TIME: 1530

DATE SAMPLE ANALYZED		09/18-20/91	09/18-20/91	09/18-20/91	
TIME SAMPLE ANALYZED					
SAMPLE TYPE					
SAMPLE DESCRIPTION		MW-1	MW-2	MW-3	
UNITS		(1425)	(1144)	(1420)	
SODIUM	mg/l	56.2	342	60.8	
POTASSIUM	mg/l	9.54	26.5	11.5	
MAGNESIUM	mg/l	12.0	19.6	13.2	
CALCIUM	mg/l	15.3	32.1	18.3	
CHLORIDES	mg/l	19.5	675	20	
SULFATES	mg/l	184	82.8	197	
ALKALINITY	mgCaCO ₃ /l	24	61	29	
TOTAL DISSOLVED SOLIDS	mg/l	493	1379	545	
SILICA	mg/l	74.0	53.5	86.6	
pH	units	7.5	8.3	7.5	

LABORATORY REMARKS: Samples analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S.

Environmental Protection Agency, March, 1979 and/or "Microbiological Methods for Monitoring the Environment",

U.S. Environmental Protection Agency, August, 1978.

Jane Malach-Brau

LABORATORY ANALYSIS REPORT (1)

TO: PUNA GEOTHERMAL VENTURE ATTN: MR. JEFFREY STERNFELD
 ADDRESS: P.O. BOX 1337 PHONE: _____
HILO, HAWAII 96721

SAMPLES OF: WATER
 SAMPLED BY: J. STERNFELD SAMPLING DATE: 09/25/91 TIME: AS NOTED
 RECEIPT DATE: 09/25/91 TIME: 1300

DATE SAMPLE ANALYZED		09/25-27/91	09/25-27/91		
TIME SAMPLE ANALYZED					
SAMPLE TYPE					
SAMPLE DESCRIPTION		MW-1	MW-2		
UNITS		(1201)	(1105)		
SODIUM	mg/l	59.3	400		
POTASSIUM	mg/l	< 0.01	22		
MAGNESIUM	mg/l	59.8	16.9		
CALCIUM	mg/l	54.5	36.8		
CHLORIDES	mg/l	20	663		
SULFATES	mg/l	190	70.3		
ALKALINITY	mgCaCO ₃ /l	28	59		
TOTAL DISSOLVED	mg/l	572	1383		
SOLIDS					
SILICA	mg/l	101	36.3		
pH	units	7.7	8.5		

LABORATORY REMARKS: Samples analyzed according to "Methods for Chemical Analysis of Water and Wastes", U.S. Environmental Protection Agency, March, 1979 and/or "Microbiological Methods for Monitoring the Environment", U.S. Environmental Protection Agency, August, 1978.

Jana Malach-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5443

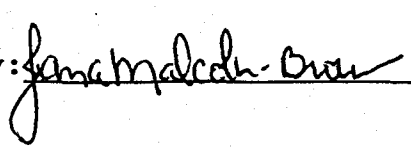
DATE: OCT. 26, 1991

SAMPLE LOCATION:

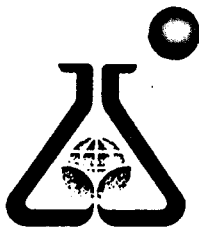
Date Sampled: 10/16/91
Date Received: 10/16/91

Matrix: WATER
Analysis Date: 10/16-18/91

ANALYSIS	SAMPLE ID MW-2	SAMPLE ID MW-3	Reporting Limits mg/l	Method Number
	RESULTS mg/l	RESULTS mg/l		
Sodium	399	75.2	0.01	273.1
Potassium	16.9	7.72	0.01	258.1
Magnesium	15.8	13.1	0.01	242.1
Calcium	30.8	18.7	0.01	215.1
Chlorides	688	20	0.5	325.3
Sulfates	61.2	190	1.0	375.4
Alkalinity (mgCaCO ₃ /l)	67.0	26.0	1.0	310.1
Total Dissolved Solids	1410	495		160.1
Silica	16.6	87.7	0.2	370.1
pH (units)	8.3	7.7		150.1

Approved By: 

BREWER ENVIRONMENTAL INDUSTRIES, INC.
P.O. BOX 552
PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309



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INDUSTRIES, INC.
a C BREWER company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURE
P.O. BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5504

DATE: NOV. 11, 1991

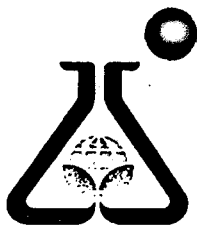
SAMPLE LOCATION:

Date Sampled: 10/22/91-10/23/91
Date Received: 10/23/91

Matrix: WATER
Analysis Date: 10/24-11/07/91

ANALYSIS	SAMPLE ID# MW-2	SAMPLE ID# MW-3	REPORTING LIMITS	Method Number
	RESULTS mg/l	RESULTS mg/l		
SODIUM	437	66	0.01	273.1
POTASSIUM	22.5	8.14	0.01	258.1
MAGNESIUM	20.9	13.3	0.01	242.1
CALCIUM	35.3	19.0	0.01	215.1
CHLORIDE	735	20	0.5	325.3
SULFATE	78.4	197	1.0	375.4
ALKALINITY (mgCaCO ₃ /l)	66	30	1.0	310.1
TOTAL DISSOLVED SOLIDS	1578	515		160.1
SILICA	38.7	103	0.2	370.1
pH (units)	8.2	7.7		150.1

Approved By: Jane Malcolm-Brown



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ENVIRONMENTAL
INDUSTRIES, INC.
A C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5651
Date: NOVEMBER 19, 1991

Date Sampled: 11/08/91
Date Received: 11/08/91

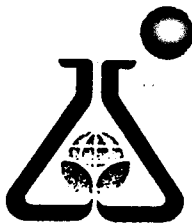
Matrix: WATER
Analysis Date: 11/13/91

	SAMPLE ID MW-2	SAMPLE ID MW-3		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	521	62.9	0.01	273.1
Potassium	19.4	8.32	0.01	258.1
Magnesium	17.9	12.7	0.01	242.1
Calcium	19.0	10.6	0.01	215.1
Chlorides	738	19.5	0.5	325.3
Sulfates	71.6	175	1.0	375.4
Alkalinity	65	30	1.0	310.1
Total Dissolved Solids	1500	518		160.1
Silica	32.1	101	0.2	370.1
pH (units)	8.4	7.7		150.1

ND = Not Detected

APPROVED BY:

Jana Malcolm-Brown



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ENVIRONMENTAL
INDUSTRIES, INC.
A C BREWER company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5746

DATE: DEC. 04, 1991

SAMPLE LOCATION:

Date Sampled: 11/20/91
Date Received: 11/20/91

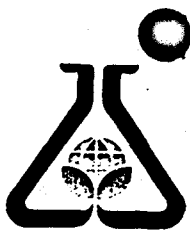
Matrix: WATER
Analysis Date: 11/20-12/03/91

ANALYSIS	SAMPLE ID MW-2	SAMPLE ID MW-3	Reporting Limits mg/l	Method Number
	RESULTS mg/l	RESULTS mg/l		
Sodium	487	57.9	0.01	273.1
Potassium	23.3	7.9	0.01	258.1
Magnesium	15.6	13.2	0.01	242.1
Calcium	29.1	16.3	0.01	215.1
Chlorides	725	20	0.5	325.3
Sulfates	66.6	197	1.0	375.4
Alkalinity (mg CaCO ₃ /l)	61	30	1.0	310.1
Total Dissolved Solids	1370	460	1.0	160.1
Silica	28.2	101	0.2	370.1
pH (units)	8.6	7.7		150.1

Page 1 of 2

Approved By: *Jana Malachuk-Bra*

BREWER ENVIRONMENTAL INDUSTRIES, INC.
P.O. BOX 552
PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5804

DATE: DEC. 11, 1991-

SAMPLE LOCATION:

Date Sampled: 11/27/91
Date Received: 11/27/91

Matrix: WATER
Analysis Date:

	SAMPLE ID# MW-2	SAMPLE ID# MW-3	SAMPLE ID# GTW-3			
ANALYSIS	RESULTS mg/l	RESULT mg/l	RESULT mg/l	ANALYSIS DATE	Reporting Limits mg/l	Method Number
Sodium	405	53.4	2140	12/5/91	0.01	273.1
Potassium	22.3	8.7	236	12/5/91	0.01	258.1
Magnesium	16.0	12.8	142	12/5/91	0.01	242.1
Calcium	28.4	10.5	172	12/5/91	0.01	215.1
Chlorides	763	19	4600	11/27/91	0.5	325.3
Sulfates	70.3	197	447	11/27/91	1.0	375.4
Alkalinity	61	30	33	11/27/91	1.0	310.1
Total Dissolved Solids	1430	504	8170	12/3/91		160.1
Silica	31.9	100	176	11/27/91	0.2	370.1
pH (units)	8.5	7.7	7.2	11/27/91		150.1

ND = Not Detected

APPROVED BY: Jana Malden-Brown

BREWER ENVIRONMENTAL INDUSTRIES, INC.
PO. BOX 552
PAIPAIKOU, HI 96781
PHONE (808) 964 5522
FAX (808) 964 5309

Wm.

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

RECEIVED

Cab #2
File #11

379

January 21, 1992

92 JAN 27 AIO: 56

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

DIV. OF WATER &
LAND DEVELOPMENT

Dear Dr. Lewin,

Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated march 13, 1991. MW-2 and KS-7 are monitored every day. MW-1 and MW-2 are sampled once per week for fluid chemistry changes. This report covers the period between December 29, 1991 and January 11, 1992. Included are tabulated temperature and depth to water level data for KS-7 and MW-2. Also included in this report are the latest water chemistry analysis performed by Brewer Laboratories.

If you have any questions, please call me.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Coordinator

Attachments

JS/cd

cc: C. Hew, DOH
W. Paty, DLNR
D. Nakano, DLNR
D. Berube
B. Teplow
J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18 (KS-7), 7.12.MW-1, 7.12.MW-2

(21108F/cd)

RECEIVED
DIV. OF WATER &
LAND DEVELOPMENT
STATE OF HAWAII
92 JAN 24 AIO: 52

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
30-Dec-91	10:20 AM	574.85	141
03-Jan-92	09:03 AM	574.88	141
06-Jan-92	02:19 PM	574.84	141
09-Jan-92	08:49 AM	574.81	142
10-Jan-92	09:01 AM	574.78	136

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
30-Dec-91	11:00 AM	34.31	150
03-Jan-92	02:25 PM	34.35	140
06-Jan-92	02:55 PM	35.19	143
09-Jan-92	09:25 AM	35.42	138
10-Jan-92	09:20 AM	35.51	126



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-A
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date: 12/11-16/91

ANALYSIS	SAMPLE ID MW-1	SAMPLE ID MW-2	Reporting Limits mg/l	Method Number
	RESULTS mg/l	RESULTS mg/l		
Sodium	58	478	0.01	273.1
Potassium	7.8	21	0.01	258.1
Magnesium	34	23	0.01	242.1
Calcium	14	23	0.01	215.1
Chlorides	20.5	775	0.5	325.3
Sulfates	185	63.7	1.0	375.4
Alkalinity	27	62	1.0	310.1
Total Dissolved Solids	354	1253		160.1
Silica	86.3	30.7	0.2	370.1
pH (units)	7.5	8.6		150.1

RECEIVED
JAN 14 1992

ND = Not Detected

Page 1 of 2

PUNA GEOTHERMAL VENTURE

APPROVED BY:

Jane Malick-Brown

BREWER ENVIRONMENTAL INDUSTRIES, INC.

LABORATORY ANALYSIS
REPORT

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

JOB NUMBER: 5891-B
Date: 1/7/92

SAMPLE LOCATION:

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date:

	SAMPLE ID MW-3	SAMPLE ID GTW3		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	52.5	3370	0.01	273.1
Potassium	9.5	304	0.01	258.1
Magnesium	12.7	17.7	0.01	242.1
Calcium	12.6	178	0.01	215.1
Chlorides	20.0	5400	0.5	325.3
Sulfates	197	500	1.0	375.4
Alkalinity	30	36	1.0	310.1
Total Dissolved Solids	338	8712		160.1
Silica	102	194	0.2	370.1
pH (units)	7.8	7.3		150.1

RECEIVED
JAN 14 1992

ND = Not Detected

Page 2 of 2

PUNA GEOTHERMAL VENTURE

APPROVED BY:

Jana Malulu-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
A C HIRSHWAL COMPANY

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-1
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	67	466	0.01	273.1
Potassium	8.9	22	0.01	258.1
Magnesium	12	14	0.01	242.1
Calcium	11	21	0.01	215.1
Chlorides	19.0	788	0.5	325.3
Sulfates	183	70.8	1.0	375.4
Alkalinity	32	61	1.0	310.1
Total Dissolved Solids	493	1529		160.1
Silica	97.5	32.6	0.2	370.1
pH (units)	7.9	8.5		150.1

ND = Not Detected

Page 1 of 2

APPROVED BY: Jana Malcolm-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER Company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-2
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

SAMPLE ID MW-3			
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	62	0.01	273.1
Potassium	8.7	0.01	258.1
Magnesium	12	0.01	242.1
Calcium	12	0.01	215.1
Chlorides	23.5	0.5	325.3
Sulfates	157	1.0	375.4
Alkalinity	30	1.0	310.1
Total Dissolved Solids	489		160.1
Silica	103	0.2	370.1
pH (units)	7.6		150.1

ND = Not Detected

Page 2 of 2

APPROVED BY: Jana Malach-Brau



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-A
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date: 12/11-16/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	58	478	0.01	273.1
Potassium	7.8	21	0.01	258.1
Magnesium	34	23	0.01	242.1
Calcium	14	23	0.01	215.1
Chlorides	20.5	775	0.5	325.3
Sulfates	185	63.7	1.0	375.4
Alkalinity	27	62	1.0	310.1
Total Dissolved Solids	354	1253		160.1
Silica	86.3	30.7	0.2	370.1
pH (units)	7.5	8.6		150.1

RECEIVED
JAN 14 1992

ND = Not Detected

Page 1 of 2

PUNA GEOTHERMAL VENTURE

APPROVED BY: Jane Malulu-Bran

BREWER ENVIRONMENTAL INDUSTRIES, INC.

LABORATORY ANALYSIS
REPORT

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-B
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date:

	SAMPLE ID MW-3	SAMPLE ID GTW3		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	52.5	3370	0.01	273.1
Potassium	9.5	304	0.01	258.1
Magnesium	12.7	17.7	0.01	242.1
Calcium	12.6	178	0.01	215.1
Chlorides	20.0	5400	0.5	325.3
Sulfates	197	500	1.0	375.4
Alkalinity	30	36	1.0	310.1
Total Dissolved Solids	338	8712		160.1
Silica	102	194	0.2	370.1
pH (units)	7.8	7.3		150.1

RECEIVED
JAN 14 1992

ND = Not Detected

Page 2 of 2

PUNA GEOTHERMAL VENTURE

APPROVED BY: Jane Malcolm-Brown

Rev. 11/90

DIVISION OF WATER RESOURCE MANAGEMENT

FROM: _____ DATE: _____ FILE IN: _____

TO: INITIAL: PLEASE: REMARKS:

_____	_____	G. AKITA	_____	See Me
_____	_____	L. Nanbu	_____	Take Action By _____
_____	_____	E. Sakoda	_____	Route to Your Branch
_____	_____	G. Matsumoto	_____	Review & Comment
_____	_____	E. Lau	_____	Draft Reply _____
_____	_____	L. Chang	_____	Acknowledge Receipt
_____	_____	Y. Shiroma	_____	Xerox _____ copies
_____	_____		_____	File
_____	_____		_____	Mail

*Cabinet
File # 11*

✓	_____	<i>Jo Janet</i>
✓	_____	<i>AF - Jonathan</i>
✓	_____	<i>Mark</i>
_____	_____	<i>Chris - please xerox</i>
_____	_____	
_____	_____	
_____	_____	M. TAGOMORI
_____	_____	S. Kokubun

FOR YOUR:

_____ Approval
_____ Signature
_____ Information

pages that have 2 wells - file separately. Thanks

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
14-Jan-92	02:44 PM	573.90	125
15-Jan-92	09:33 AM	574.21	139
17-Jan-92	01:28 PM	574.67	129
20-Jan-92	09:00 AM	574.74	130
22-Jan-92	01:39 PM	574.72	M.R.
23-Jan-92	08:38 AM	574.80	139
24-Jan-92	09:19 AM	574.79	138
27-Jan-92	12:58 PM	574.72	136

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
13-Jan-92	09:25 AM	34.35	140
14-Jan-92	03:53 PM	35.81	135
15-Jan-92	02:12 PM	35.87	120
17-Jan-92	01:57 PM	36.00	153
20-Jan-92	09:24 AM	36.20	144
22-Jan-92	03:26 PM	36.37	139
24-Jan-92	09:45 AM	36.67	144

File
this
and
Report to Rep.

PUNA GEOTHERMAL VENTURE*A Hawaii Partnership*

RECEIVED

RECEIVED

February 3, 1992

92 FEB 12 A10:42 92 FEB 10 A 8:40

Dr. John C. Lewin, M.D.
 State of Hawaii
 Department of Health
 P.O. Box 3378
 Honolulu, Hawaii 96801

DIV. OF WATER &
 LAND DEVELOPMENT

DEPT. OF LAND
 & NATURAL RESOURCES
 STATE OF HAWAII

Dear Dr. Lewin,

Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated March 13, 1991. MW-2 and KS-7 are monitored every day. MW-1 and MW-2 are sampled once per week for fluid chemistry changes. This report covers the period between January 12 and 25, 1992. Included are tabulated temperature and depth to water level data for KS-7 and MW-2. Also included in this report are the latest water chemistry analyses performed by Brewer Laboratories.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
 Environmental Coordinator

JS/cd

Attachment

cc: C. Hew, DOH
 W. Paty, DLNR
 D. Nakano, DLNR
 D. Berube
 B. Teplow
 J. Sternfeld
 File: 7.13.2, 7.13.3, 7.12.18, 7.12.MW-1, 7.12.MW-2

(21118F/cd)

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
14-Jan-92	02:44 PM	573.90	125
15-Jan-92	09:33 AM	574.21	139
17-Jan-92	01:28 PM	574.67	129
20-Jan-92	09:00 AM	574.74	130
22-Jan-92	01:39 PM	574.72	M.R.
23-Jan-92	08:38 AM	574.80	139
24-Jan-92	09:19 AM	574.79	138
27-Jan-92	12:58 PM	574.72	136

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
13-Jan-92	09:25 AM	34.35	140
14-Jan-92	03:53 PM	35.81	135
15-Jan-92	02:12 PM	35.87	120
17-Jan-92	01:57 PM	36.00	153
20-Jan-92	09:24 AM	36.20	144
22-Jan-92	03:26 PM	36.37	139
24-Jan-92	09:45 AM	36.67	144

LABORATORY ANALYSIS
REPORT

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ 0900
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER

SAMPLE ID# MW-3				
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	ANALYSIS DATE	Method Number
Sodium	56.7	0.01	01/09/92	273.1
Potassium	8.5	0.01	01/09/92	258.1
Magnesium	12.0	0.01	01/09/92	242.1
Calcium	12.7	0.01	01/09/92	215.1
Chlorides	18.5	0.5	01/03/92	325.3
Sulfates	196	1.0	01/03/92	375.4
Alkalinity	30	1.0	01/03/92	310.1
Total Dissolved Solids	482		01/07-08/92	160.1
Silica	102	0.2	01/03/92	370.1
pH (units)	7.7		01/03/92	150.1

Approved By Janet Malcolm-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ as noted
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER
Analysis Date:

	SAMPLE ID MW-1	SAMPLE ID# MW-2			
Time Sampled:	0915	1051			
ANALYSIS	RESULTS	RESULTS	Reporting	ANALYSIS	Method
	mg/l	mg/l	Limits mg/l	DATE	Number
Sodium	60.7	489	0.01	01/09/92	273.1
Potassium	8.0	23.6	0.01	01/09/92	258.1
Magnesium	9.6	15.6	0.01	01/09/92	242.1
Calcium	13.4	19.9	0.01	01/09/92	215.1
Chlorides	20.5	800	0.5	01/03/92	325.3
Sulfates	189	69.7	1.0	01/03/92	375.4
Alkalinity	25	59	1.0	01/03/92	310.1
Total Dissolved Solids	455	1600		01/07-08/92	160.1
Silica	35.2	35.4	0.2	01/03/91	370.1
pH (units)	7.7	8.4		01/03/92	150.1

Page 1 of 2

Approved By

Jana Malcolm-Brewer

BREWER ENVIRONMENTAL INDUSTRIES, INC.
P.O. BOX 552
PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

TO:	INITIAL:	PLEASE:	REMARKS:
-----	----------	---------	----------

Cabinet 2
File # 11

Approval
Signature
Information

M. TAGOMORI
S. Kokubun

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

RECEIVED

02 FEB 14 AIO: 26

DIV. OF WATER &
LAND DEVELOPMENT

February 12, 1992

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin,

Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated March 13, 1991. MW-2 and KS-7 are currently being monitored a minimum of 3 times per week. Water samples from MW-1 and/or MW-3 and MW-2 are collected very other week for fluid chemistry changes. This report covers the period between January 26 and February 8, 1992. Included are temperature and depth to water level data for KS-7 and MW-2. Also included in this report are the latest water chemistry analyses performed by Brewer Laboratories.

Should you need any additional information or clarification, please do not hesitate to call me at 965-6233.

Sincerely,



Thomas G. Kizis
Environmental Coordinator

JS/va

Attachment

cc: C. Hew, DOH
W. Paty, DLNR
D. Nakano, DLNR
D. Berube
B. Teplow
J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18, 7.12.MW-1, 7.12.MW-2

(21118F/cd)

Puna Geothermal Venture
MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
27-Jan-92	12:58 PM	574.72	136
30-Jan-92	09:58 AM	574.75	134
31-Jan-92	08:42 AM	574.77	135
03-Feb-92	08:54 AM	574.86	135
05-Feb-92	11:01 AM	574.87	136
07-Feb-92	02:04 PM	574.87	135

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
27-Jan-92	01:33 PM	36.75	149
30-Jan-92	02:05 PM	37.05	152
31-Jan-92	09:08 AM	37.08	158
03-Feb-92	02:23 PM	37.32	150
05-Feb-92	11:25 AM	37.47	152
07-Feb-92	02:23 PM	37.53	148



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
A C HIRSH LTD. COMPANY

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-1
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	67	466	0.01	273.1
Potassium	8.9	22	0.01	258.1
Magnesium	12	14	0.01	242.1
Calcium	11	21	0.01	215.1
Chlorides	19.0	788	0.5	325.3
Sulfates	183	70.8	1.0	375.4
Alkalinity	32	61	1.0	310.1
Total Dissolved Solids	493	1529		160.1
Silica	97.5	32.6	0.2	370.1
pH (units)	7.9	8.5		150.1

ND = Not Detected

Page 1 of 2

APPROVED BY: Jana Malcolm-Brewer



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
AN ISO 9001 CERTIFIED COMPANY

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-2
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

SAMPLE ID MW-3			
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	62	0.01	273.1
Potassium	8.7	0.01	258.1
Magnesium	12	0.01	242.1
Calcium	12	0.01	215.1
Chlorides	23.5	0.5	325.3
Sulfates	157	1.0	375.4
Alkalinity	30	1.0	310.1
Total Dissolved Solids	489		160.1
Silica	103	0.2	370.1
pH (units)	7.6		150.1

ND = Not Detected

Page 2 of 2

APPROVED BY: Jana Malachuk-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ as noted
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER
Analysis Date:

	SAMPLE ID	SAMPLE ID#			
	MW-1	MW-2			
Time Sampled:	0915	1051			
ANALYSIS	RESULTS	RESULTS	Reporting	ANALYSIS	Meth
	mg/l	mg/l	Limits mg/l	DATE	Numb
Sodium	60.7	489	0.01	01/09/92	273.
Potassium	8.0	23.6	0.01	01/09/92	258.
Magnesium	9.6	15.6	0.01	01/09/92	242.
Calcium	13.4	19.9	0.01	01/09/92	215.
Chlorides	20.5	800	0.5	01/03/92	325.
Sulfates	189	69.7	1.0	01/03/92	375.
Alkalinity	25	59	1.0	01/03/92	310.
Total Dissolved Solids	455	1600		01/07-08/92	160.
Silica	35.2	35.4	0.2	01/03/91	370.
pH (units)	7.7	8.4		01/03/92	150.

Page 1 of 2

Approved By *Jana Malcolm-Brewer*

BREWER ENVIRONMENTAL INDUSTRIES, INC.
P.O. BOX 552
PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

LABORATORY ANALYSIS
REPORT

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

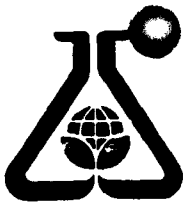
DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ 0900
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER

SAMPLE ID# MW-3				
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	ANALYSIS DATE	Method Number
Sodium	56.7	0.01	01/09/92	273.1
Potassium	8.5	0.01	01/09/92	258.1
Magnesium	12.0	0.01	01/09/92	242.1
Calcium	12.7	0.01	01/09/92	215.1
Chlorides	18.5	0.5	01/03/92	325.3
Sulfates	196	1.0	01/03/92	375.4
Alkalinity	30	1.0	01/03/92	310.1
Total Dissolved Solids	482		01/07-08/92	160.1
Silica	102	0.2	01/03/92	370.1
pH (units)	7.7		01/03/92	150.1



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-A
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date: 12/11-16/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	58	478	0.01	273.1
Potassium	7.8	21	0.01	258.1
Magnesium	34	23	0.01	242.1
Calcium	14	23	0.01	215.1
Chlorides	20.5	775	0.5	325.3
Sulfates	185	63.7	1.0	375.4
Alkalinity	27	62	1.0	310.1
Total Dissolved Solids	354	1253		160.1
Silica	86.3	30.7	0.2	370.1
pH (units)	7.5	8.6		150.1

ND = Not Detected

Page 1 of 2

APPROVED BY: *Jane Malcolm-Brian*

LABORATORY ANALYSIS
REPORT

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-B
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

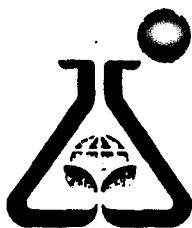
Matrix: WATER
Analysis Date:

ANALYSIS	SAMPLE ID MW-3	SAMPLE ID GTW3	Reporting Limits mg/l	Method Number
	RESULTS mg/l	RESULTS mg/l		
Sodium	52.5	3370	0.01	273.1
Potassium	9.5	304	0.01	258.1
Magnesium	12.7	17.7	0.01	242.1
Calcium	12.6	178	0.01	215.1
Chlorides	20.0	5400	0.5	325.3
Sulfates	197	500	1.0	375.4
Alkalinity	30	36	1.0	310.1
Total Dissolved Solids	338	8712		160.1
Silica	102	194	0.2	370.1
pH (units)	7.8	7.3		150.1

ND = Not Detected

Page 2 of 2

APPROVED BY: Jana Malen-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C. BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 5835

DATE: DEC. 16, 1991

SAMPLE LOCATION:

Date/Time Sampled: 12/04/91 @ ----
Date/Time Received: 12/04/91 @ 1520

Matrix: WATER

ANALYSIS	SAMPLE ID MW-2	SAMPLE ID GTW-3	Reporting Limits mg/l	ANALYSIS DATE	Metho Numbe
	RESULTS mg/l	RESULTS mg/l			
Sodium	466	2840	0.01	12/05/91	273.1
Potassium	22.2	266	0.01	12/05/91	258.1
Magnesium	15.7	173	0.01	12/05/91	242.1
Calcium	26.7	189	0.01	12/05/91	215.1
Chlorides	750	5140	0.5	12/04/91	325.3
Sulfates	68.8	518	1.0	12/13/91	375.4
Alkalinity (mg CaCO ₃ /l)	60	33	1.0	12/04/91	310.1
Total Dissolved Solids	1452	9540		12/06/91	160.1
Silica	33.1	187	0.2	12/13/91	370.1
pH (units)	8.4	6.9		12/04/91	150.1

Approved By: *Jane Malcolm-Brewer*

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

make 2 copies, file
"KS-7" MW-2"
Jan 23
Frank RT
Jonathan GZ
Chris

March 24, 1992

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

RECEIVED
DLNR
MAR 27 10:24
HONOLULU

Dear Dr. Lewin,

Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated March 13, 1991. MW-2 and KS-7 are currently being monitored a minimum of 3 times per week. Water samples from MW-1 and/or MW-3 and MW-2 are collected every other week for fluid chemistry changes. This report covers the period between February 9, and February 15, 1992. Included are temperature and depth to water level data for KS-7 and MW-2.

Should you need any additional information or clarification, please do not hesitate to call me at 965-6233.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

JS/va

Attachment

cc: C. Hew, DOH
W. Paty, DLNR
~~D. Nakano~~, DLNR
D. Berube
B. Teplow
J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18, 7.12.MW-1, 7.12.MW-2

(21118F/va)

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
03-Mar-92	04:31 PM	574.90	131
04-Mar-92	04:35 PM	574.82	134
06-Mar-92	11:03 AM	574.87	139

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
03-Mar-92	04:53 PM	39.47	124
05-Mar-92	03:22 PM	39.53	130
06-Mar-92	03:48 PM	39.69	130

MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
09-Mar-92	08:52 AM	574.88	135
11-Mar-92	10:32 AM	574.84	136
13-Mar-92	08:49 AM	574.86	136

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
09-Mar-92	09:27 AM	39.91	133
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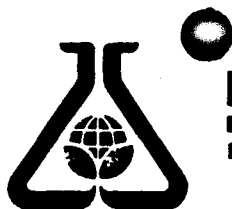
MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
16-Mar-92	07:37 AM	574.89	141
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KS - 7

Date	Time	W. L. (FT)	Temperature (F)
16-Mar-92	08:06 AM	40.35	126
19-Mar-92	02:29 PM	40.54	130
21-Mar-92	07:25 AM	40.56	127



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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6164

DATE: JAN. 22, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/16/92 @ 1054
Date/Time Received: 01/16/92 @ 1400

Matrix: WATER

SAMPLE ID# MW-3				
ANALYSIS	RESULT mg/l	REPORTING LIMIT mg/l	ANALYSIS DATE	Meth Numb
Sodium	63.9	0.01	01/21/92	273.
Potassium	5.1	0.01	01/21/92	258.
Magnesium	12.1	0.01	01/21/92	242.
Calcium	13.3	0.01	01/21/92	215.
Chlorides	20.0	0.5	01/16/92	325.
Sulfates	206	1.0	01/16/92	375.
Alkalinity (mgCaCO ₃ /l)	29	1.0	01/16/92	310.
Total Dissolved Solids	415		01/20/92	160.
Silica	101.2	0.2	01/16/92	370.
pH (units)	7.6		01/16/92	150.

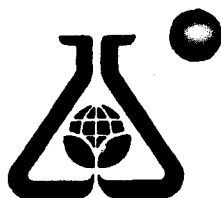
Page 2 of 2

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MAR 10 1992

PUNA GEOTHERMAL VENTURE

Approved by: *[Signature]*

BREWER ENVIRONMENTAL LABORATORIES
PO. BOX 552
PAPAIOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309



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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6164

DATE: JAN. 22, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/16/92 @ as noted
Date/Time Received: 01/16/92 @ 1400

Matrix: WATER

Time Sampled: ANALYSIS	SAMPLE ID MW-1 1047	SAMPLE ID MW-2 1021	REPORTING LIMIT mg/l	ANALYSIS DATE	Method Number
	RESULTS mg/l	RESULTS mg/l			
Sodium	65.3	482	0.01	01/21/92	273.1
Potassium	8.6	20.8	0.01	01/21/92	258.1
Magnesium	10.8	17.9	0.01	01/21/92	242.1
Calcium	13.4	25.3	0.01	01/21/92	215.1
Chlorides	20.0	838	0.5	01/16/92	325.3
Sulfates	196	74.3	1.0	01/16/92	375.4
Alkalinity (mgCaCO ₃ /l)	30	77	1.0	01/16/92	310.1
Total Dissolved Solids	388	1370		01/27/92	160.1
Silica	92.4	45.6	0.2	01/16/92	370.1
pH (units)	7.3	7.3		01/16/92	150.1

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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-2

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Analysis Date: 02/12-25/92

ANALYSIS	SAMPLE ID	SAMPLE ID		
Time Sampled:	MW-3	GTW-3		
	1130	1100		
	RESULTS	RESULTS	Reporting	Method
	mg/l	mg/l	Limits mg/l	Number
Sodium	37.40	2826	0.01	273.1
Potassium	8.13	191.7	0.01	258.1
Magnesium	13.00	170.0	0.01	242.1
Calcium	15.70	200.8	0.01	215.1
Chlorides	20	5650	0.5	325.3
Sulfates	193	466	1.0	375.4
Alkalinity (mgCaCO ₃ /l)	29	28	1.0	310.1
Total Dissolved Solids	510	9722		160.1
Silica	101	208	0.2	370.1
pH (units)	7.6	7.2		150.1

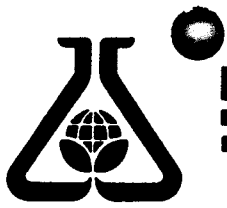
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Page 2 of 2 PUNA GEOTHERMAL VENTURE

BREWER ENVIRONMENTAL LABORATORIES
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FAX (808) 964-5309

Approved by

James Malachuk-Brown



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INDUSTRIES, INC.
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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-1

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Date Analyzed: 02/12-25/92

ANALYSIS	SAMPLE ID	SAMPLE ID		
Time Sampled:	MW-1	MW-2		
	1135	1000		
	RESULTS	RESULTS	Reporting	Method
	mg/l	mg/l	Limits mg/l	Number
Sodium	43.60	459	0.01	273.1
Potassium	7.43	24.10	0.01	258.1
Magnesium	12.30	16.90	0.01	242.1
Calcium	14.60	29.60	0.01	215.1
Chlorides	20	950	0.5	325.3
Sulfates	181	48.1	1.0	375.4
Alkalinity (mgCaCO ₃ /l)	24	73	1.0	310.1
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pH (units)	7.5	8.1		150.1

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Page 1 of 2

PUNA GEOTHERMAL VENTURE

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FAX (808) 964-5309

Approved by: *Jana Maledon-Bou*

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

Janet dz
Frank VT
Jonathan Q-F

make 2 copies file
"KS-7" MW-2

Chris

March 24, 1992

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Calvin 2
file #12

DIV. OF WATER &
LAND DEVELOPMENT

02 MAR 27 AID: 24

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Attached, please find the weekly well monitoring records for Kapoho State 7 and MW-2 as requested by the DLNR letter dated March 13, 1991. MW-2 and KS-7 are currently being monitored a minimum of 3 times per week. Water samples from MW-1 and/or MW-3 and MW-2 are collected every other week for fluid chemistry changes. This report covers the period between February 9, and February 15, 1992. Included are temperature and depth to water level data for KS-7 and MW-2.

Should you need any additional information or clarification, please do not hesitate to call me at 965-6233.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

JS/va

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cc: C. Hew, DOH
W. Paty, DLNR
~~D. Nakano~~, DLNR *Janet*
D. Berube
B. Teplow
J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18, 7.12.MW-1, 7.12.MW-2

(21118F/va)

Puna Geothermal Venture

MW-2 Water Level and Temperature Data

KS-7 Water Level and Temperature Data

MW - 2

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06-Mar-92	11:03 AM	574.87	139

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06-Mar-92	03:48 PM	39.69	130

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KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
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12-Mar-92	02:18 PM	40.14	122
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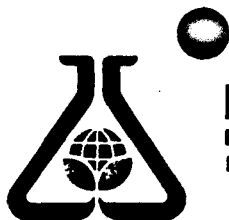
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KS-7 Water Level and Temperature Data

MW - 2

Date	Time	W. L. (FT)	Temperature (F)
16-Mar-92	07:37 AM	574.89	141
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19-Mar-92	02:29 PM	40.54	130
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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6164

DATE: JAN. 22, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/16/92 @ 1054
Date/Time Received: 01/16/92 @ 1400

Matrix: WATER

SAMPLE ID# MW-3				
ANALYSIS	RESULT mg/l	REPORTING LIMIT mg/l	ANALYSIS DATE	Meth Numb
Sodium	63.9	0.01	01/21/92	273.
Potassium	5.1	0.01	01/21/92	258.
Magnesium	12.1	0.01	01/21/92	242.
Calcium	13.3	0.01	01/21/92	215.
Chlorides	20.0	0.5	01/16/92	325.
Sulfates	206	1.0	01/16/92	375.
Alkalinity (mgCaCO3/l)	29	1.0	01/16/92	310.
Total Dissolved Solids	415		01/20/92	160.
Silica	101.2	0.2	01/16/92	370.
pH (units)	7.6		01/16/92	150.

Page 2 of 2

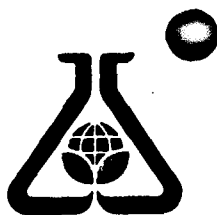
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MAR 10 1992

PUNA GEOTHERMAL VENTURE

Approved by

Jane Malcolm-Braz

BREWER ENVIRONMENTAL LABORATORIES
PO. BOX 552
PAPAIOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309



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INDUSTRIES, INC.
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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6164

DATE: JAN. 22, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/16/92 @ as noted
Date/Time Received: 01/16/92 @ 1400

Matrix: WATER

	SAMPLE ID MW-1	SAMPLE ID MW-2			
Time Sampled:	1047	1021			
ANALYSIS	RESULTS mg/l	RESULTS mg/l	REPORTING LIMIT mg/l	ANALYSIS DATE	Method Number
Sodium	65.3	482	0.01	01/21/92	273.1
Potassium	8.6	20.8	0.01	01/21/92	258.1
Magnesium	10.8	17.9	0.01	01/21/92	242.1
Calcium	13.4	25.3	0.01	01/21/92	215.1
Chlorides	20.0	838	0.5	01/16/92	325.3
Sulfates	196	74.3	1.0	01/16/92	375.4
Alkalinity (mgCaCO ₃ /l)	30	77	1.0	01/16/92	310.1
Total Dissolved Solids	388	1370		01/27/92	160.1
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MAR 10 1992

Page 1 of 2

PUNA GEOTHERMAL VENTURE

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PAPAIIKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by: *Jane Malcolm-Brown*



LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-2

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Analysis Date: 02/12-25/92

ANALYSIS	SAMPLE ID	SAMPLE ID		
Time Sampled:	MW-3	GTW-3		
	1130	1100		
	RESULTS	RESULTS	Reporting	Method
	mg/l	mg/l	Limits mg/l	Number
Sodium	37.40	2826	0.01	273.1
Potassium	8.13	191.7	0.01	258.1
Magnesium	13.00	170.0	0.01	242.1
Calcium	15.70	200.8	0.01	215.1
Chlorides	20	5650	0.5	325.3
Sulfates	193	466	1.0	375.4
Alkalinity (mgCaCO3/l)	29	28	1.0	310.1
Total Dissolved Solids	510	9722		160.1
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MAR 10 1992

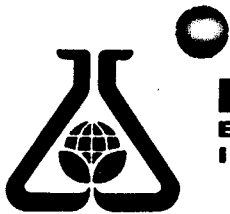
Page 2 of 2

PUNA GEOTHERMAL VENTURE

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PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by

Jana Malcolm-Brown



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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-1

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Date Analyzed: 02/12-25/92

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FAX (808) 964-5309

Approved by: *Jana Maledh-Bou*

PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

make 2 copies, file
"KS-7" MW-2"

Janet St.
Frank VT
Jonathan G. J.
Chris

March 24, 1992

Dr. John C. Lewin, M.D.
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

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MAR 27 10:24
DLNR
PUNA GEOTHERMAL VENTURE

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Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

JS/va

Attachment

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~~D. Nakano~~, DLNR *Janet*
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J. Sternfeld
File: 7.13.2, 7.13.3, 7.12.18, 7.12.MW-1, 7.12.MW-2

(21118F/va)

Puna Geothermal Venture

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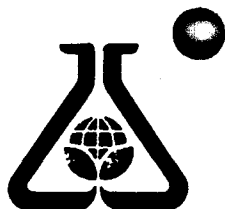
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LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P.O. BOX 30
PAHOA, HAWAII 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6164

DATE: JAN. 22, 1992

SAMPLE LOCATION:

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Matrix: WATER

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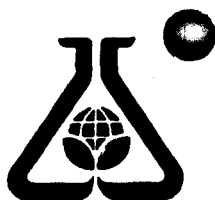
Page 2 of 2

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PUNA GEOTHERMAL VENTURE

Approved by: *[Signature]*

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DATE: JAN. 22, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/16/92 @ as noted
Date/Time Received: 01/16/92 @ 1400

Matrix: WATER

	SAMPLE ID	SAMPLE ID			
	MW-1	MW-2			
Time Sampled:	1047	1021			
ANALYSIS	RESULTS	RESULTS	REPORTING	ANALYSIS	Method
	mg/l	mg/l	LIMIT mg/l	DATE	Number
Sodium	65.3	482	0.01	01/21/92	273.1
Potassium	8.6	20.8	0.01	01/21/92	258.1
Magnesium	10.8	17.9	0.01	01/21/92	242.1
Calcium	13.4	25.3	0.01	01/21/92	215.1
Chlorides	20.0	838	0.5	01/16/92	325.3
Sulfates	196	74.3	1.0	01/16/92	375.4
Alkalinity (mgCaCO ₃ /l)	30	77	1.0	01/16/92	310.1
Total Dissolved Solids	388	1370		01/27/92	160.1
Silica	92.4	45.6	0.2	01/16/92	370.1
pH (units)	7.3	7.3		01/16/92	150.1

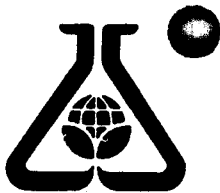
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MAR 10 1992

Page 1 of 2

PUNA GEOTHERMAL VENTURE

BREWER ENVIRONMENTAL LABORATORIES
P.O. BOX 552
PAPAIOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5308

Approved by: *James Malcolm Brewer*



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-2

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Analysis Date: 02/12-25/92

ANALYSIS	SAMPLE ID	SAMPLE ID		
Time Sampled:	MW-3	GTW-3		
	1130	1100		
	RESULTS	RESULTS	Reporting	Method
	mg/l	mg/l	Limits mg/l	Number
Sodium	37.40	2826	0.01	273.1
Potassium	8.13	191.7	0.01	258.1
Magnesium	13.00	170.0	0.01	242.1
Calcium	15.70	200.8	0.01	215.1
Chlorides	20	5650	0.5	325.3
Sulfates	193	466	1.0	375.4
Alkalinity (mgCaCO ₃ /l)	29	28	1.0	310.1
Total Dissolved Solids	510	9722		160.1
Silica	101	208	0.2	370.1
pH (units)	7.6	7.2		150.1

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MAR 10 1992

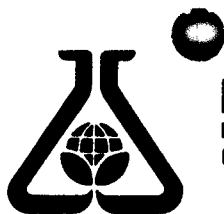
Page 2 of 2

PUNA GEOTHERMAL VENTURE

BREWER ENVIRONMENTAL LABORATORIES
P.O. BOX 552
PAPA'IKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by

James Malachuk-Brown



BREWER
ENVIRONMENTAL
INDUSTRIES, INC.
a C. BREWER company

LABORATORY ANALYSIS REPORT
Environmental Laboratories Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6403-1

DATE: FEB. 26, 1992

SAMPLE LOCATION:

Date/Time Sampled: 02/12/92 @ as noted
Date/Time Received: 02/12/92 @ 1330

Matrix: WATER
Date Analyzed: 02/12-25/92

ANALYSIS	SAMPLE ID	SAMPLE ID		
Time Sampled:	MW-1	MW-2		
	1135	1000		
RESULTS	RESULTS	Reporting	Method	
mg/l	mg/l	Limits mg/l	Number	
Sodium	43.60	459	0.01	273.1
Potassium	7.43	24.10	0.01	258.1
Magnesium	12.30	16.90	0.01	242.1
Calcium	14.60	29.60	0.01	215.1
Chlorides	20	950	0.5	325.3
Sulfates	181	48.1	1.0	375.4
Alkalinity (mgCaCO3/l)	24	73	1.0	310.1
Total Dissolved Solids	480	1685		160.1
Silica	91.8	37.7	0.2	370.1
pH (units)	7.5	8.1		150.1

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MAR 10 1992

Page 1 of 2

PUNA GEOTHERMAL VENTURE

BREWER ENVIRONMENTAL LABORATORIES
P.O. BOX 552
PAPAIKOU, HI 96781
PHONE (808) 964-5522
FAX (808) 964-5309

Approved by:

Jana M. Malden-Bou

PUNA GEOTHERMAL VENTURE

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92 DEC 16 A 6: 41

92 DEC 14 A 8: 28

December 9, 1992
DIV. OF WATER &
LAND DEVELOPMENT

Cabinet 1 File 7
DEPT. OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

MW-2

John C. Lewin, M.D., Director
State Department of Health
P.O. Box 3378
Honolulu, HI 96801

SUBJ: WELL MONITORING DATA

Dear Dr. Lewin,

Attached please find water level and temperature data for wells MW-2 and KS-7 for the period November 29, 1992 through December 5, 1992.

Please let me know if you have any questions.

Sincerely,

for Peter Hansen
Thomas G. Kizis
Environmental Manager

TGK/sls

cc: W. Paty (DLNR)
C. Hew (DOH)
N. Hayashi (HCPD)

Files: MW-2/KS-7
Memo: A:21444.TK

Puna Geothermal Venture
MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data
November 29 - December 5, 1992

MW-2

Date	Time	W. L. (FT)	Temperature (F)
30-Nov-92	09:30 AM	575.5	139
02-Dec-92	09:40 AM	575.51	147
04-Dec-92	07:30 AM	575.54	148

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
30-Nov-92	10:00 AM	52.67	127
02-Dec-92	10:40 AM	52.74	122
30-Nov-92	08:00 AM	53.54	120

PUNA GEOTHERMAL VENTURE
A Hawaii Partnership

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92 DEC 17 A 8: 22

92 DEC 18 P 3: 14

DIV. OF WATER &
LAND DEVELOPMENT

DEPT. OF LAND
& NATURAL RESOURCES
STATE OF HAWAII
Cabinet
File #7

December 14, 1992

MW-2

John C. Lewin, M.D., Director
State Department of Health
P.O. Box 3378
Honolulu, HI 96801

Subj: WELL MONITORING DATA

Dear Dr. Lewin,

Attached please find water level and temperature data for wells
MW-2 and KS-7 for the period December 6, 1992 through December 12,
1992.

Please let me know if you have any questions.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

/lg

cc: W. Paty (DLNR)
C. Hew (DOH)
N. Hayashi (HCPD)

Files: MW-2/KS-7
Memo: 21494

Puna Geothermal Venture
MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data
December 6 - 12, 1992

MW-2

Date	Time	W. L. (FT)	Temperature (F)
07-Dec-92	08:30 AM	575.58	147
09-Dec-92	10:00 AM	575.45	148
11-Dec-92	08:45 AM	575.4	148

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
07-Dec-92	09:15 AM	53.87	137
09-Dec-92	10:45 AM	52.99	128
11-Dec-92	09:30 AM	53.11	137

WJ
PUNA GEOTHERMAL VENTURE

A Hawaii Partnership

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Case # 2
File # B
(KS-7)

92 NOV 13 A 9: 29

92 NOV 12 A 9: 44

DIV. OF WATER &
LAND DEVELOPMENT

DEPT. OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

November 9, 1992

John C. Lewin, M.D., Director
State Department of Health
P.O. Box 3378
Honolulu, HI 96801

Ad
Hwy
Geo. S. Mf

SUBJ: WELL MONITORING DATA

Dear Dr. Lewin,

Attached please find water level and temperature data for wells MW-2 and KS-7 for the period October 9, 1992 through November 6, 1992.

Please let me know if you have any questions.

Sincerely,

Thomas G. Kizis

Thomas G. Kizis
Environmental Manager

TGK/sls

cc: W. Paty (DLNR)
C. Hew (DOH)
N. Hayashi (HCPD)

Files: MW-2/KS-7
Memo: 21444

Puna Geothermal Venture
MW-2 Water Level and Temperature Data
KS-7 Water Level and Temperature Data
October 9 - November 6, 1992

MW-2

Date	Time	W. L. (FT)	Temperature (F)
09-Oct-92	02:45 PM	51.1	126
27-Oct-92	02:00 PM	52.2	119
29-Oct-92	12:40 PM	52.3	124
31-Oct-92	12:00 PM	52.33	139
02-Nov-92	03:00 PM	52.49	133
05-Nov-92	10:00 AM	52.48	142
06-Nov-92	01:37 PM	52.5	141

KS - 7

Date	Time	W. L. (FT)	Temperature (F)
09-Oct-92	02:45 PM	51.1	126
27-Oct-92	02:00 PM	52.2	119
29-Oct-92	12:40 PM	52.3	124
31-Oct-92	12:00 PM	52.33	139
02-Nov-92	03:00 PM	52.49	133
05-Nov-92	10:00 AM	52.48	142
06-Nov-92	01:37 PM	52.5	141

09-Mar-91	11:30 AM	14.48	572.72	124
09-Mar-91	01:00 PM	14.54	572.72	126
09-Mar-91	03:00 PM	14.63	572.75	137
09-Mar-91	05:00 PM	14.71	572.75	132
09-Mar-91	07:00 PM	14.79	572.75	132
09-Mar-91	11:00 PM	14.96	572.75	122
10-Mar-91	03:00 AM	15.13	572.80	130
10-Mar-91	07:00 AM	15.29	572.80	132
10-Mar-91	10:45 AM	15.45	572.80	132
10-Mar-91	03:00 PM	15.63	573.00	130
10-Mar-91	07:00 PM	15.79	573.00	135
10-Mar-91	10:00 PM	15.92	573.00	138
11-Mar-91	02:00 AM	16.08	572.85	130
11-Mar-91	06:00 AM	16.25	572.85	128
11-Mar-91	08:40 AM	16.36	572.85	126

KAPOHO STATE 7 (KS-7)

DATE	TIME	CUM DAYS	WATER LEVEL	TEMPERATURE AT 730 FT
28-Feb-91	11:00 AM	0.46	19.10	120
01-Mar-91	10:00 AM	1.42	19.10	122
02-Mar-91	11:30 AM	2.48	19.20	142
03-Mar-91	10:00 AM	3.42	19.20	150
04-Mar-91	10:15 AM	4.43	19.20	149
05-Mar-91	09:50 AM	5.41	19.20	156
06-Mar-91	10:30 AM	6.44	19.20	159
07-Mar-91	11:30 AM	7.48	19.20	160
08-Mar-91	09:45 AM	8.41	19.30	164
09-Mar-91	09:45 AM	9.41	19.30	164
09-Mar-91	06:00 PM	9.75	19.20	166
10-Mar-91	09:45 AM	10.41	19.15	165
10-Mar-91	06:00 PM	10.75	19.15	165
11-Mar-91	08:15 AM	11.34	19.15	168



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ENVIRONMENTAL
INDUSTRIES, INC.
a C HIRSH Technology

**LABORATORY ANALYSIS
REPORT**

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-1
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Potassium	8.9	22	0.01	238.1
Magnesium	12	14	0.01	242.1
Calcium	11	21	0.01	215.1
Chlorides	19.0	788	0.5	325.3
Sulfates	183	70.8	1.0	375.4
Alkalinity	32	61	1.0	310.1
Total Dissolved Solids	493	1529		160.1
Silica	97.5	32.6	0.2	370.1
pH (units)	7.9	8.5		150.1

ND = Not Detected

Page 1 of 2

APPROVED BY: Jana Malcolm-Brown



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ENVIRONMENTAL
INDUSTRIES, INC.
a C HIRSH COMPANY



LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O Box 30
Pahoa, Hawaii 96778

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 6010-2
Date: 1/3/92

Date Sampled: 12/26/91
Date Received: 12/26/91

Matrix: WATER
Analysis Date: 12/27-12/31/91

SAMPLE ID MW-3			
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	62	0.01	273.1
Potassium	8.7	0.01	258.1
Magnesium	12	0.01	242.1
Calcium	12	0.01	215.1
Chlorides	23.5	0.5	325.3
Sulfates	157	1.0	375.4
Alkalinity	30	1.0	310.1
Total Dissolved Solids	489		160.1
Silica	103	0.2	370.1
pH (units)	7.6		150.1

ND = Not Detected

Page 2 of 2

APPROVED BY: Jana Malach-Brau



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ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS
REPORT

Environmental Services Division

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ as noted
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER
Analysis Date:

	SAMPLE ID	SAMPLE ID#			
	MW-1	MW-2			
Time Sampled:	0915	1051			
ANALYSIS	RESULTS	RESULTS	Reporting	ANALYSIS	Method
	mg/l	mg/l	Limits mg/l	DATE	Number
Sodium	60.7	489	0.01	01/09/92	273.1
Potassium	8.0	23.6	0.01	01/09/92	258.1
Magnesium	9.6	15.6	0.01	01/09/92	242.1
Calcium	13.4	19.9	0.01	01/09/92	215.1
Chlorides	20.5	800	0.5	01/03/92	325.3
Sulfates	189	69.7	1.0	01/03/92	375.4
Alkalinity	25	59	1.0	01/03/92	310.1
Total Dissolved Solids	455	1600		01/07-08/92	160.1
Silica	35.2	35.4	0.2	01/03/91	370.1
pH (units)	7.7	8.4		01/03/92	150.1

Page 1 of 2

Approved By

Jana Malcolm-Brewer

LABORATORY ANALYSIS
REPORT

CLIENT: PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN: JEFFREY STERNFELD

JOB NUMBER: 6041

DATE: JAN. 15, 1992

SAMPLE LOCATION:

Date/Time Sampled: 01/02/92 @ 0900
Date/Time Received: 01/03/92 @ 1315

Matrix: WATER

SAMPLE ID# MW-3				
ANALYSIS	RESULTS mg/l	Reporting Limits mg/l	ANALYSIS DATE	Method Number
Sodium	56.7	0.01	01/09/92	273.1
Potassium	8.5	0.01	01/09/92	258.1
Magnesium	12.0	0.01	01/09/92	242.1
Calcium	12.7	0.01	01/09/92	215.1
Chlorides	18.5	0.5	01/03/92	325.3
Sulfates	196	1.0	01/03/92	375.4
Alkalinity	30	1.0	01/03/92	310.1
Total Dissolved Solids	482		01/07-08/92	160.1
Silica	102	0.2	01/03/92	370.1
pH (units)	7.7		01/03/92	150.1

LABORATORY ANALYSIS
REPORT

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

JOB NUMBER: 5891-B
Date: 1/7/92

SAMPLE LOCATION:

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date:

	SAMPLE ID MW-3	SAMPLE ID GTW3		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	52.5	3370	0.01	273.1
Potassium	9.5	304	0.01	258.1
Magnesium	12.7	17.7	0.01	242.1
Calcium	12.6	178	0.01	215.1
Chlorides	20.0	5400	0.5	325.3
Sulfates	197	500	1.0	375.4
Alkalinity	30	36	1.0	310.1
Total Dissolved Solids	338	8712		160.1
Silica	102	194	0.2	370.1
pH (units)	7.8	7.3		150.1

ND = Not Detected

Page 2 of 2

APPROVED BY:

Jane Malcolm-Brown



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INDUSTRIES, INC.
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LABORATORY ANALYSIS
REPORT Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-A
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date: 12/11-16/91

	SAMPLE ID MW-1	SAMPLE ID MW-2		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	58	478	0.01	273.1
Potassium	7.8	21	0.01	258.1
Magnesium	34	23	0.01	242.1
Calcium	14	23	0.01	215.1
Chlorides	20.5	775	0.5	325.3
Sulfates	185	63.7	1.0	375.4
Alkalinity	27	62	1.0	310.1
Total Dissolved Solids	354	1253		160.1
Silica	86.3	30.7	0.2	370.1
pH (units)	7.5	8.6		150.1

D = Not Detected

Page 1 of 2

APPROVED BY: Jane Malachuk-Brian

LABORATORY ANALYSIS
REPORT

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-B
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date:

	SAMPLE ID MW-3	SAMPLE ID GTW3		
ANALYSIS	RESULTS mg/l	RESULTS mg/l	Reporting Limits mg/l	Method Number
Sodium	52.5	3370	0.01	273.1
Potassium	9.5	304	0.01	258.1
Magnesium	12.7	17.7	0.01	242.1
Calcium	12.6	178	0.01	215.1
Chlorides	20.0	5400	0.5	325.3
Sulfates	197	500	1.0	375.4
Alkalinity	30	36	1.0	310.1
Total Dissolved Solids	338	8712		160.1
Silica	102	194	0.2	370.1
pH (units)	7.8	7.3		150.1

ND = Not Detected

Page 2 of 2

PUNA GEOTHERMAL VENTURE

APPROVED BY:

Jane Malcolm-Brown



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ENVIRONMENTAL
INDUSTRIES, INC.
a C BREWER company

LABORATORY ANALYSIS

REPORT Environmental Services Division

CLIENT:
PUNA GEOTHERMAL VENTURES
P O BOX 1337
HILO, HAWAII 96721

ATTN:
JEFFREY STERNFELD

SAMPLE LOCATION:

JOB NUMBER: 5891-A
Date: 1/7/92

Date Sampled: 12/11/91
Date Received: 12/11/91

Matrix: WATER
Analysis Date: 12/11-16/91

ANALYSIS	SAMPLE ID	SAMPLE ID	Reporting Limits mg/l	Method Number
	MW-1	MW-2		
	RESULTS mg/l	RESULTS mg/l		
Sodium	58	478	0.01	273.1
Potassium	7.8	21	0.01	258.1
Magnesium	34	23	0.01	242.1
Calcium	14	23	0.01	215.1
Chlorides	20.5	775	0.5	325.3
Sulfates	185	63.7	1.0	375.4
Alkalinity	27	62	1.0	310.1
Total Dissolved Solids	354	1253		160.1
Silica	86.3	30.7	0.2	370.1
pH (units)	7.5	8.6		150.1

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JAN 14 1992

ND = Not Detected

Page 1 of 2
PUNA GEOTHERMAL VENTURE

APPROVED BY:

Jane Malichu-Brian

BREWER ENVIRONMENTAL INDUSTRIES, INC.