D NAKANO

OESI Power Corporation

June 17, 1991

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

Subj: REPORT ON UNCONTROLLED FLOW EVENT AS PER CONDITIONS #13 AND #26, ATC NO. A-833-795, ATTACHMENT II, WELLFIELD

Dear Dr. Lewin,

Attached is the Puna Geothermal Venture (PGV) report on the uncontrolled flow event of June 12, 1991, relative to Conditions #13 and #26 of the ATC No. A-833-795, Attachment II, Wellfield. We assume this report will be condfidential in nature.

If you have any questions concerning this submission or require additional information please do not hesitate to contact me.

Respectfully,

Thomas G. Kizis

Thomas G. Kizis
Permit Coordinator

Attachment:

TK/cd

cc: W. Paty, DLNR
M. Tagamori, DLNR
D. Nakano, DLNR
E. Tanaka, DLNR
N. Hayashi, Planning
C. Hew, DOH
N. Hirai, DLNR
B. Clark, PGV
B. Teplow, PGV
File: 7.13.2, 14.3.13, 14.3.26

(20799F/cd)

PUNA GEOTHERMAL VENTURE

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REPORT ON UNCONTROLLED FLOW EVENT AS PER CONDITIONS #13 AND #26, ATC NO. A-833-795, ATTACHMENT II, WELLFIELD

This report covers the following five (5) items:

I. Probable cause of the blowout.
II. Actions that have or will be taken.
III. Estimated time before the well is controlled.
IV. Analysis of air quality impact from unabated emissions.
V. Air quality monitoring plan.

I. PROBABLE CAUSE OF THE BLOWOUT

The probable cause of failure was insufficient flow capacity to relieve the pressure kick. The insufficient relief flow area caused the annular preventer element to fail. The failed preventer element choked the flow path of the spacer between the Hydril and the rotating head. This resulted in a second rupture that damaged the mud line and the flow line. One of the ruptures caused the rig floor to be displaced. This prevented the driller from staying on the brake resulting in the kelly dropping down. The position of the kelly interfered with the complete closure of the pipe rams. The leakage around the pipe rams totally engulfed the rig floor in steam.

The complete lack of visibility on the rig floor and the displacement of the floor plates and other parts of the rig necessitated waiting until daylight before proceeding.

The rupture of the Hydril to rotating head spacer damaged the mud lines and the flow lines and some other features under the rig floor.

See Appendix for brief listing of events prior to well kick.

II. ACTIONS THAT HAVE OR WILL BE TAKEN
Evening of 6-12-91/11:06 p.m.-well kicked

1. Portions of the blow out preventer stack were damaged at the time that the steam or CO2 blew out above the Hydril.

2. The Hydril annular preventer was damaged by the excessive pressure impulse of the gas. The Hydril was inoperative.

3. The driller was forced away from the brake and the kelly dropped into the area of the pipe ram closure. Pipe rams will not close completely around the hexagonal kelly, therefore there was leakage around the kelly which prevented working on the floor. The rig floor was engulfed in steam.

4. The location was cleared and all personnel were accounted for.

5. Agencies and PGV personnel were notified.

6. The following decisions were made:

   a. Shut down electric power to the rig drawworks at the SCR panel.

   b. Air/Safety trailer was to be moved from the site to a location above the site and away from the well head.

   c. It was also decided to wait till daylight to reassess the situation and to take other actions around the rig and on the rig floor.

7. Personnel with safety gear moved the safety trailer from the site to a location above the site and away from the well head.

It is now the morning of 6/13/91. 6:00 AM

8. At dawn the HCR valve was opened venting the well through the choke manifold and the leakage around the kelly in the pipe rams.

9. It was at this point that it became known that

   a. The Hydril was inoperative

   b. The damage to the kill line and to the mud line had caused the pumps to pump onto the drill site and not down the drill pipe. The mud pits were dry.

   c. The bottom metal to metal pipe rams and the blind rams were still open.

10. Halliburton was mobilized to pump cold water down the drill pipe.

11. Parker crews rigged the Halliburton pumping lines to the standpipe and closed the lower valve. This established the path to pump fluids down the drill pipe.

12. Halliburton was rigged to pump down the drill pipe through cementing lines. (6/13/91 10:30 A.M.)

13. Closed in the choke line. Pumping 9.5 bbls/min. Pressure 1700 psi decreasing to 900 psi.

14. All operations consisted of:

    a. cleaning rig floor

    b. test operated draw work

    c. rig-up remote brake/clutch on drawworks

    d. lift kelly through B.O.P. to allow ram closure

    e. closed rams secured mass flow at approximately 6:30 a.m. on 6/14/91

15. Rigged up lines to Halliburton to pump down the annulus. Pump 5 bbls/min down the annulus. Initial pressure 1700 psi reducing to 1000 psi. Pumping down the drill pipe 4 bbls/min pressure still 900 psi. (6/14/91 4:00 AM)

16. Pumped LCM to plug off steel pipe rams. Flow was totally controlled. (6/15/91 10:00 AM)

17. Change out the top pipe rams. Steel rams with LCM held.(6/16/91 12:00 NOON)

18. Open steel pipe rams. Top pipe rams are closed. The choke line is closed. Continued to pump down the drill pipe and annulus.

19. Clean and reconstruct rig floor.

20. Repair Hydril. (6/17/91 2:00 AM)

21. Repairing rig and mud system.

THE FOLLOWING LIST OF ACTIVITIES ARE ONGOING

1. Continue to pump 4 bbls/min down the drill pipe and 5 1/2 bbls/min down the back side using Halliburton or rig pumps.

2. Continue to make rig repairs and alterations determined to be needed before proceeding.

3. Test for bottom hole pressure. Shut in pumps, measure shut in drill pipe pressure and shut in casing pressure.

4. If conditions permit run Kuster tools inside the drill pipe to determine whether there is interzone flow near bottom. Interzone flow will require using lost circulation material to shut off the outflow zone so that the source zone (and the outflow zone) can be cemented.

5. Determine kill weight mud.

6. Using drillers method circulate kill weight mud.

7. Circulate for 4 hours while recording mud temperature in and out.

8. Check for flow every 20 minutes.

9. With any indication of flow-bull head cold fluid to bottom. Prepare to cement through the bit nozzles.

III. Changes and repairs to the operational techniques beyond those indicated are being worked on at the present time. Changes to the well control design are being investigated with equipment being procedure as required.

The well as of this writing is under control, this meaning that all flows are contained, the well is being cooled nd pressure is dropping, preparation and planning is being made to evaluate the correct mud kill weight and to kill the well, subsequent to this a cement plug will be placed at 3475' and well prepared for complete installation of the 9-5/8 casing to insure well integrity is at its highest degree. At this point a finding of the analysis should be found and corrective measures taken, the permanent wellhead configuration will be installed as well as the drilling out of the cement plug.

IV. ANALYSIS OF AIR QUALITY IMPACT FROM UNABATED EMISSIONS

Please refer to attached data.

V. AIR QUALITY MONITORING

PGV initiate increased air quality monitoring activity immediately following the uncontrolled flow of PGV well KS-8.

Included in this program were:

- Increased hourly monitoring of our existing air quality stations.
- Hourly measurements for H2S at selected sites within a one mile radius of well KS-8.
- Regular monitoring in the plume.
- Immediate responses to requests from residents to monitor air quality near their homes.

Our PGV Jerome 631-X Hydrogen Sulfide Analyzer was used to monitor the air quality during this expanded effort. This instrument has a detection limit of 1 ppb.

APPENDIX

Events prior to well kick:

6/9/91

Well depth 3401, circulated and built mud weight from 9 #/gal to 10.5 #/gal in 1/10 #/gal increments. Spotted 11.2 #/gal mud pill on bottom. Pulled out of hole with mud motor and angle building assembly, well flowed 1 inch stream continuosly. Ran in hole open ended with 5 inch drill pipe, circulated bottoms up at 13 3/8 inch casing shoe. Ran in hole to bottom, circulated bottoms up.

6/10/91

Cemented at 3401 in 12 1/4 inch hole through drill pipe with 50 sxs Hawaii cement, 20 % AA1, .75% CFR-3, and Halad-22. Displaced cement with 59 bbls. drilling mud. Pulled 3 stands and circulated, well continued to flow. Waited on cement, ran in hole and tagged cement at 3289 ft. Cemented through open ended drill pipe with 28 sxs Hawaii cement, 20 % AA-1, .75% CFR-3, .05% Halad-22A, displaced cement with 58 bbls of drilling mud. Pulled out of hole with drill pipe. Picked up drilling assembly and ran in hole to top of cement at 3151 ft. Drilled cement in 12 1/4 inch hole from 3151ft. to 3350 ft. Circulated to cool hole, conditioned mud.

6/11/91

Checked well for flow, well still flowing 1 inch stream to mud pits. Pulled out of hole and ran in hole open ended to 2135 ft., circulated, ran in hole to 3350 ft., circulated bottoms up. Spotted cement plug; cemented through drill pipe with 50 sxs Hawaii cement, 40% SAA1, .75% CFR-3, .3% Halad 22, displaced cement with 58 bbls. of drilling mud. Pulled up to 2135 ft., circulated and waited on cement. Ran in hole and tagged top of cement at 3140 ft. Circulated, pumped cement through drill pipe at 3120 ft; cemented with 35 sxs Hawaii cement, 40% SAA1, .75% CFR-3, .3% Halad-22, displaced cement with 54 bbls. drilling mud. Pulled 5 stands and squeezed cement at 2660 ft. Closed in well, squeezed away 3 bbls, at 300 psi. Pulled out of hole, picked up drilling assembly and ran in hole to 13 3/8 inch casing shoe, circulated.

6/12/91

Finished trip in hole, tagged top of cement at 2845 ft. Drilled cement in 12 1/4 hole from 2845 ft. to 3350 ft., circulated and conditioned mud in hole for log, pulled out of hole 8 stands, gained 20 bbls mud in pits, ran in hole to bottom, circulated and cooled hole. Checked for flow, 1 inch flow to pits, pulled out of hole, rigged up HLS logging services to run temperature log.

NOTE: The reasons for running the temperature logs at this depth were to develop diagnostics in an attempt to determine a correlation of temperatures in well KS-8 as compared to the temperatures encountered and logged in well KS-3.

Two HLS logging services logging runs were run, temperatures were continually displayed in the HLS logging truck and recorded on both magnetic tape and a standard paper temperture log. Well KS-8 was logged to a depth of 3325 ft., the top of cement at this time was at 3350 ft. The logging tool was not allowed to run into the bottom of the hole in order to avoid becoming stuck in the cement aat 3350 ft. The first temperature logging run encountered a maximum temperature of 370 degrees F. at a depth of 3325 ft. The temperature data was plotted on a graph of depth vs. temperature, on the same graph a temperature graph of well KS-3 was also plotted to obtain correlation between KS-8 and KS-3. (Graphs are part of this report).

A temperature correlation was obtained between KS-3 and KS-8 and it was determined from the correlation that based on temperature well KS-8 encountered temperatures equivalent to well KS-3 but at a depth of approximately 550 ft. deeper in well KS-8; ie, the temperature of 370 degrees F. encountered in well KS-8 was encountered at a depth of 3400 ft. wheras the temperature of 370 degrees F. was encountered in well KS-3 at a depth of 2850 ft. At the conclusion of HLS temperature log run # 1 while pulling out of the hole and attempting to log up the hole the HLS tool failed most likely because of excess temperature. (HLS wire-line was rated to a max temperature of 500 degrees F.)

It was decided by PGV personel to run an additional temperature log in well KS-8 in order to gain some idea of the rate of temperature buildup in the well. Another temperature tool was selected and HLS rigged up to run an additional temperature survey. In addition to the temperature tool it was decided to run two MRT's on top of the logging tool. MRT (maximum recording temperature). The HLS temperature tool lwas run in the well and temperature recording was commenced at a depth of 2204 ft, the shoe depth of the 13 3/8 inch casing. The HLS tool logged down to a depth of 3325 ft. where the tool failed due to excess temperature above what the tool and logging wireline were rated for. The HLS tool was brought out of the hole and the two MRT's

were examined to determine the maximum temperature to which they were exposed. The top MRT was broken and no data were obtainable, the bottom MRT failed to register a maximum temperature due it is thought to a faulty thermometer.

Afternoon of 6/12/91

A meeting was called in the offices of PGV, attendees were as per recall:

Bill Teplow
Jeff Sternfield
Bill Livesay
Butch Clark
Terry Crowson
Wendell Howard

It was decided at the meeting referred to above that PGV would elect to drill deeper in order to set the 9 5/8 inch casing in the well at a depth nearer to 4000 ft. as originally detailed in the well prognosis. It was decided to drill out the cement in the bottom of the well after circulating bottoms up at 3350 ft. It was decided to maintain a mud weight of 10.5 #/gal in circulating bottoms up and to drill ahead with this mud weight. Itwas also decided to make MRT runs inside the drill pipe at every stand after drilling recommended. It was planned to plot theMRT data on the temperature graphs and by means of this data to acertain when to run 9 5/8 inch casing.

RETURN TO DAILY DRILLING REPORTS

6/13/91

Ran HLS logs, DLS, GR, GRD, Temperature, logged down to 3325 ft. started to log up HLS tool failed while coming up hole. Re-rigged HLS and ran temperature tool only, tool was run in to 2204 ft. and logging commenced from that depth on down, HLS tool failed at or near well depth of 3325 ft. Pulled out of hole with HLS tool and rigged down lubricator. Picked up bottom hole assembly and ran in hole to top of cement at 3350 ft. Drilled out cement in 12 1/4 inch hole from 3350 ft. to 3401 ft. Drilled out of cement and drilled new formation from 3401 ft. to 3476 ft. Well unloaded, indications to the driller were that pump pressure was increasing and the driller was picking up the Kelly to close the BOP's when the well unloaded.

6/14/91

Attempts were made to kill Well KS-8. (DETAILS ARE LISTED IN ANOTHER PART OF THIS REPORT)

BRIEF OUTLINE OF WELL KILL PROCEDURE.

Picked up on kelly, closed bottom pipe rams,(steel rams). Rams even though closed , leaked steam and water, closed in on top rams and opened on 4 inch kill line. Rigged up on standpipe and closed standpipe valve, pumped water through standpipe and kelly hose with Halliburton, pumped down drill pipe at 9 bbls/minute. Opened up choke line to divert flow from under the rig. Closed choke line pumping 9 bbls/min down drill pipe at 1400 psi. Worked on getting in to bottom of cellar to hook up to 13 3/8 inch casing head valves in order to dead head water into well.

6/15/91

Continued to attempt to kill well, worked in cellar, hooked up to 13 3/8 inch wing valves on casing head. Rigged Halliburton to wing valves, pumped down 13 3/8 inch annulus at 5 bbls/minute with water at 1700 psi, pressure gradually decreased to 1000 psi., concurrently with pumping into annulus pumped down drill pipe with water at 5 bbls/ minute at 900 psi.

6/16/91

Pumped lost circulation material into 13 3/8 inch wing valves in an attempt to seal off around pipe rams and to stop leakage of steam and water around stack. Lost circulation material succeeded in plugging off leaks around pipe rams. Cleared off rig floor, worked toward rig repair. Continued to pump down drill pipe and into casing annulus.

Drill pipe	4 bbls/min	900 psi.
Casing	4 bbls/min	950 psi.

6/17/91

Worked on Parker Drilling Co. mud lines, Changed out top drill pipe rams in BOP stack. Closed top rams on drill pipe, opened bottom set of rams, stack held O.K.. Changed over from pumping with Halliburton to pumping with Parker Drilling Co. pumps (rig pumps). Released Haliburton, changed out Hydril rubber. Continued pumping into well.

Drill pipe	4 bbls/min	900 psi.
Casing annulus	4 bbls/min	950 psi.

PUNA GEOTHERMAL VENTURE
ATMOSPHERIC HYDROGEN SULFIDE CONCENTRATION
FIELD DATA SHEET

NO	DATE	TIME	LOCATION	H2S (ppm)	NOISE (dBa	COMMENTS
01	06-13-91	10:18	Southwest Station	0.29		
		10:20		0.507		
		10:27			95+	
02	06-13-91	10:36	Southeast	0	73	
03	06-13-91	10:46	Leilani/Pohoiki	0.15		
04	06-13-91	10:52	Irvine Residence	0.0835	82	
05	06-13-91	11:05	Leilani/Mohala	0.014		
06	06-13-91	11:10	Mohala/Kahukai	0		
07	06-13-91	11:12	Kaupili/Kahukai	0		
08	06-13-91	11:15	Leilani/Kahukai	0.18		
09	06-13-91	11:19	South end Hinalo	0.103		
10	06-13-91	11:24	Pad E Road Entrance, Gate 2	0		
11	06-13-91	13:19	Southwest Station	0.024	93	
12	06-13-91	13:44	Leilani/Pohoiki	0.055		
13	06-13-91	13:38	Leilani/Kahukai	0.13		
14	06-13-91	13:42	Irvine Residence	0.17		
15	06-13-91	13:46	Mohala/Kahukai	0		
16	06-13-91	13:50	Mohala/Leilani	0.006		
17	06-13-91	13:54	South end Hinalo	0.002		
18	06-13-91	13:59	Pad E Road Entrance, Gate 2	0		
19	06-13-91	16:03	Southwest Station	0.049	85	
		16:08			92	
20	06-13-91	16:15	Southeast Station	0.001	71	
21	06-13-91	16:24	Pohoiki/Leilani	0.045	85	
22	06-13-91	16:29	Leilani/Kahukai	0.021	85	
23	06-13-91	16:32	Irvine Residence	0	90	
24	06-13-91	16:36	Kahukai/Mohala	0	70	
25	06-13-91	16:39	Mohala/Leilani	0	85	
26	06-13-91	16:44	South end of Hinalo	0.04	80	
27	06-13-91	16:48	Hinalo/Pohoiki	0.001	90	
28	06-13-91	16:51	Pad E Entrance Rd., Gate 2	0	76	
29	06-13-91	19:22	Southwest Station	0	87	
30	06-13-91	19:37	Southeast Station	0		
		19:39			91	
31	06-13-91	19:44	Pohoiki/Leilani	0.125	96	
32	06-13-91	19:50	Leilani/Kahukai	0	85	
33	06-13-91	19:58	Irvine Residence		77	
34	06-13-91	20:01	Hinalo/Pohoiki	0.017	92	
35	06-13-91	20:07	Hinalo/Lauone	0	86	
36	06-13-91	10:03	Pohoiki Rd, Laughlin House	0	82	
37	06-13-91	10:10	Southwest Station	0	68.3	
		10:12			90	
38	06-13-91	10:22	Southeast Station	0	81	
39	06-13-91	10:30	Pohoiki/Leilani	0	82	
40	06-13-91	10:33	Pohoiki/Hinalo	0	94	

PUNA GEOTHERMAL VENTURE
ATMOSPHERIC HYDROGEN SULFIDE CONCENTRATION
FIELD DATA SHEET

NO.	DATE	TIME	LOCATION	H2S (ppm)	NOISE (dBa	COMMENTS
41	06-13-91	10:37	3/10 Mi. East of Pohoiki/Hinak	0.011	76	
42	06-13-91	10:45	6/10 Mi. East of Pohoiki/Hinalo	0	72	
43	06-13-91	10:49	1/2 Mi. East of Pohoiki/Hinalo	0.003	71	
44	06-13-91	10:55	Lauone/Hinalo	0.13	86	
45	06-13-91	11:00	Lauone (Brees #33)	0.125	78	
46	06-14-91	1:13 am	Southweet Station	0	84	
		1:15 am			84	
47	06-14-91	1:27 am	Southeast Station	0.014	78	
		1:29 am			85	
48	06-14-91	1:40 am	Pohoiki/Leilani	0	76	
49	06-14-91	1:43 am	Hinalo/Pohoiki	0	88	
50	06-14-91	1:46 am	1/2 Mi. East of Hinalo/Pohoiki	0.092	70	
51	06-14-91	1:52 am	6/10 Mi. East of Hinalo/Pohoik	0	78	
52	06-14-91	1:58 am	Lauone/Hinalo	0.2	86	
53	06-14-91	2:02 am	Lauone (Brees #33)	0.034	77	
54	06-14-91	2:08 am	Hinalo...End	0	72	
55	06-14-91	2:14 am	Hinalo 500 yrds from Pohoiki	0.002	85	
56	06-14-91	2:20 am	Irvine Residence	0	78	
57	06-14-91	4:11 am	Laughlin Residence, Pohoiki	0	70	
58	06-14-91	4:17 am	Southwest Station	0.001	80	
		4:19 am			80	
59	06-14-91	4:28 am	Southeast Station	0.001	80	
		4:30 am			79.6	
60	06-14-91	4:36 am	Pohoiki/Leilani	0.001	89	
61	06-14-91	4:40 am	Hinalo/Pohoiki	0.007	99	
62	06-14-91	4:44 am	1/2 Mi. East of Hinalo/Pohoiki	0	68	
63	06-14-91	4:50 am	AGR	0.012	75	
64	06-14-91	5:00 am	Hinalo 500 yds from Pohoiki	0.024	94	
65	06-14-91	5:05 am	Lauone/Hinalo	0.11	83	
66	06-14-91	5:07 am	Lauone (Brees #33)	0.001	79	
67	06-14-91	5:10 am	Irvine Residence	0	84	
68	06-14-91	17:28 pm	Pad E Road Entrance, Gate 2	0		
69	06-14-91	1500-				
		1600 pm	Southwest Station	0.017		Hourly Average
70	06-14-91	1600-				
		1700 pm	Southwest Station	0.000		Hourly Average
71	06-14-91	17:37 pm	Gate 3 (#GPA)	0.028		
72	06-14-91	17:38 pm	Gate 3	0		
73	06-14-91	1400-				
		1500 pm	Southeast Station	0		Hourly Average
74	06-14-91	1500-				
		1600 pm	Southeast Station	0		Hourly Average
75	06-14-91	1600-				
		1700 pm	Southeast Station	0		Hourly Average
76	06-14-91	17:47 pm	HGPA Parking Lot	0.170		

PUNA GEOTHERMAL VENTURE
ATMOSPHERIC HYDROGEN SULFIDE CONCENTRATION
FIELD DATA SHEET

NO.	DATE	TIME	LOCATION	H2S (ppm)	NOISE (dBa	COMMENTS
77	06-14-91	17:50 pr	Pohoiki/Leilani	0.011		
78	06-14-91	17:53 pr	Irvine Residence	0.057		
79	06-14-91	17:53 pr	Robert Petricci Residence			
80	06-14-91	17:53 pr	Kahukai/Kaupili	0		
81	06-14-91	18:00 pr	Hill near Irvine Residence	0.057		
82	06-14-91	18:02 pr	Pohoiki/Hinalo	0		
83	06-14-91	18:04 pr	Hinalo/Lauone	0		
84	06-14-91	18:27 pr	Martinovich at Gate	0		
85	06-14-91	18:10 pr	Pohoiki between Leilani	0.042		
86	06-14-91	21:49 pr	Power Plant	0		
87	06-14-91	21:57 pr	600' West of KS-8	0.270		Directly Downwind
88	06-14-91	22:02 pr	Southeast Station	0		
89	06-14-91	22:07 pr	West end of Pad E	0.190		Downwind
90	06-14-91	22:17 pr	Pohoiki/Kapoho Road	0		
91	06-14-91	22:22 pr	Gate 2	0		
92	06-14-91	22:27 pr	HGPA Parking Log North end	0.130		Downwind
93	06-14-91	22:30 pr	Leilani/Pohoiki	0.280		
94	06-14-91	22:33 pr	Pohoiki/Hinalo	0		
95	06-14-91	22:37 pr	Wilson Residence, Hinalo9	0		
96	06-14-91	22:40 pr	Irvine Residence	0.057		Downwind
97	06-14-91	22:43 pr	Robert Petricci Residence	0		
98	06-14-91	22:51 pr	Mohala 0.3 Mi. N. of Leilani	0.083		
99	06-14-91	22:59 pr	Kaupili 0.2 Mi. N. of Leilani	0.082		Downwind
100	06-14-91	1:12 am	Kapoho/Pohoiki	0		
101	06-14-91	1:16 am	KGPA Parking Lot	0		
102	06-14-91	1:20 am	Pohoiki/Leilani	0.108		
103	06-14-91	1:24 am	Pohoiki/Hinalo	0		
104	06-14-91	1:25 am	Hinalo/Lauone	0		
105	06-14-91	1:27 am	West end Hinalo	0.016		
106	06-14-91	1:33 am	Irvine Residence	0		
107	06-14-91	1:35 am	Leilani/Kahukai	0.011		
108	06-14-91	1:39 am	Leilani, Kaupili	0		
109	06-14-91	1:42 am	Leilani between Kahukai and			
			and Mohala	0.006		
110	06-15-91	4:43 am	PGV Gate 1	0		No Wind
111	06-15-91	4:46 am	PGV Gate 2	0		No Wind
112	06-15-91	4:53 am	HGPA Parking Lot	0		No Wind
113	06-15-91	4:57 am	100' South East Pohoiki/Leilar	0.038		No Wind, low area
114	06-15-91	4:59 am	Hinalo/Pohoiki	0.014		No Wind, low area
115	06-15-91	5:03 am	300' East Hinalo/Pohoiki	0.001		No Wind, low area
116	06-15-91	5:08 am	HI. AG. Station/Pohoiki Road	0		No Wind, Trees
117	06-15-91	5:15 am	Hinalo/Lauone	0.062		Downwind
118	06-15-91	5:18 am	Lauone/Leary Residence	0		Light Wind
119	06-15-91	5:25 am	Top of Hinalo	0.046		Light Wind
120	06-15-91	5:29 am	Hinalo/Wilson Residence	0.003		Light Wind

PUNA GEOTHERMAL VENTURE
ATMOSPHERIC HYDROGEN SULFIDE CONCENTRATION
FIELD DATA SHEET

NO.	DATE	TIME	LOCATION	H2S (ppm)	NOISE (dBa	COMMENTS
121	06-15-91	5:00 am	Leilani/Kahukai	0		Light Wind
122	06-15-91	6:30 am	Kapoho/Pohoiki	0		Light Wind
123	06-15-91	6:32 am	PGV Gate 2	0.001		Downwind/Trees
124	06-15-91	6:34 am	Pohoiki/Leilani	0		Downwind/Trees
125	06-15-91	6:36 am	Pohoiki/Hinalo	0.120		Downwind
126	06-15-91	6:40 am	Pohoiki Road/HI.AG. Station	0.001		No Wind/Trees
127	06-15-91	6:43 am	Hinalo/Lauone	0.001		Light Wind
128	06-15-91	6:46 am	Lauone/Leary Residence	0		Light Wind
129	06-15-91	6:50 am	Top of Hinalo	0.041		Light Wind
130	06-15-91	6:55 am	Hinalo/Wilson Residence	0.034		Downwind
131	06-15-91	7:00 am	Kahukai/Irvine Residence	0.001		Light Wind
132	06-15-91	7:03 am	Kahukai/Petricci Residence	0		Light Wind
133	06-15-91	7:06 am	Hookupu/Marzl Residence	0		Light Wind
134	06-15-91	7:15 am	Hookupu/Leilani	0		Light Wind
135	06-15-91	7:20 am	Hookupu/Malama	0		Light Wind

MEMORANDUM

TO: Dr. John Lewin, Director

FROM: Thomas G. Kizis TGK

DATE: June 19, 1991

SUBJ: REPORT DATED JUNE 17, 1991

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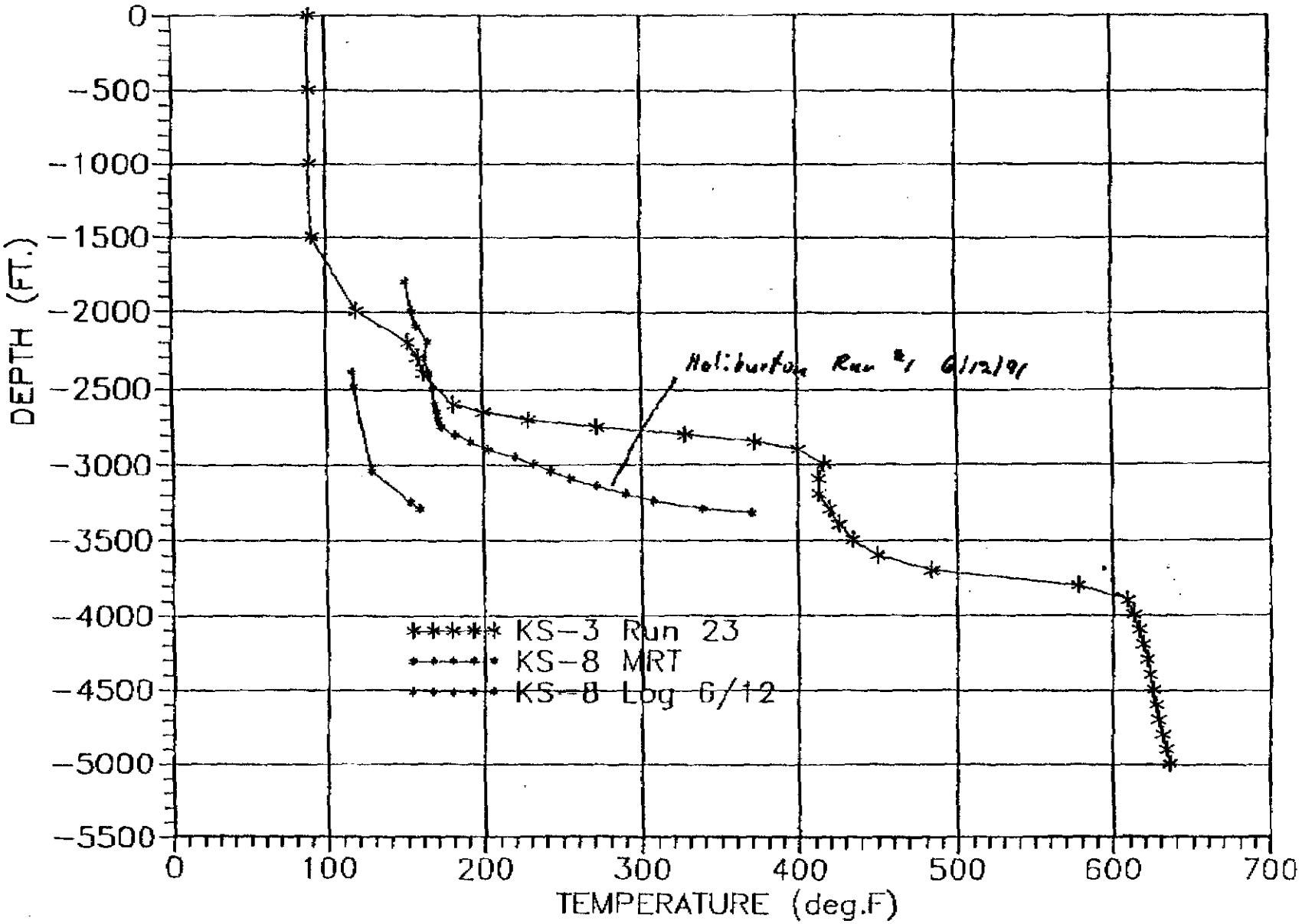
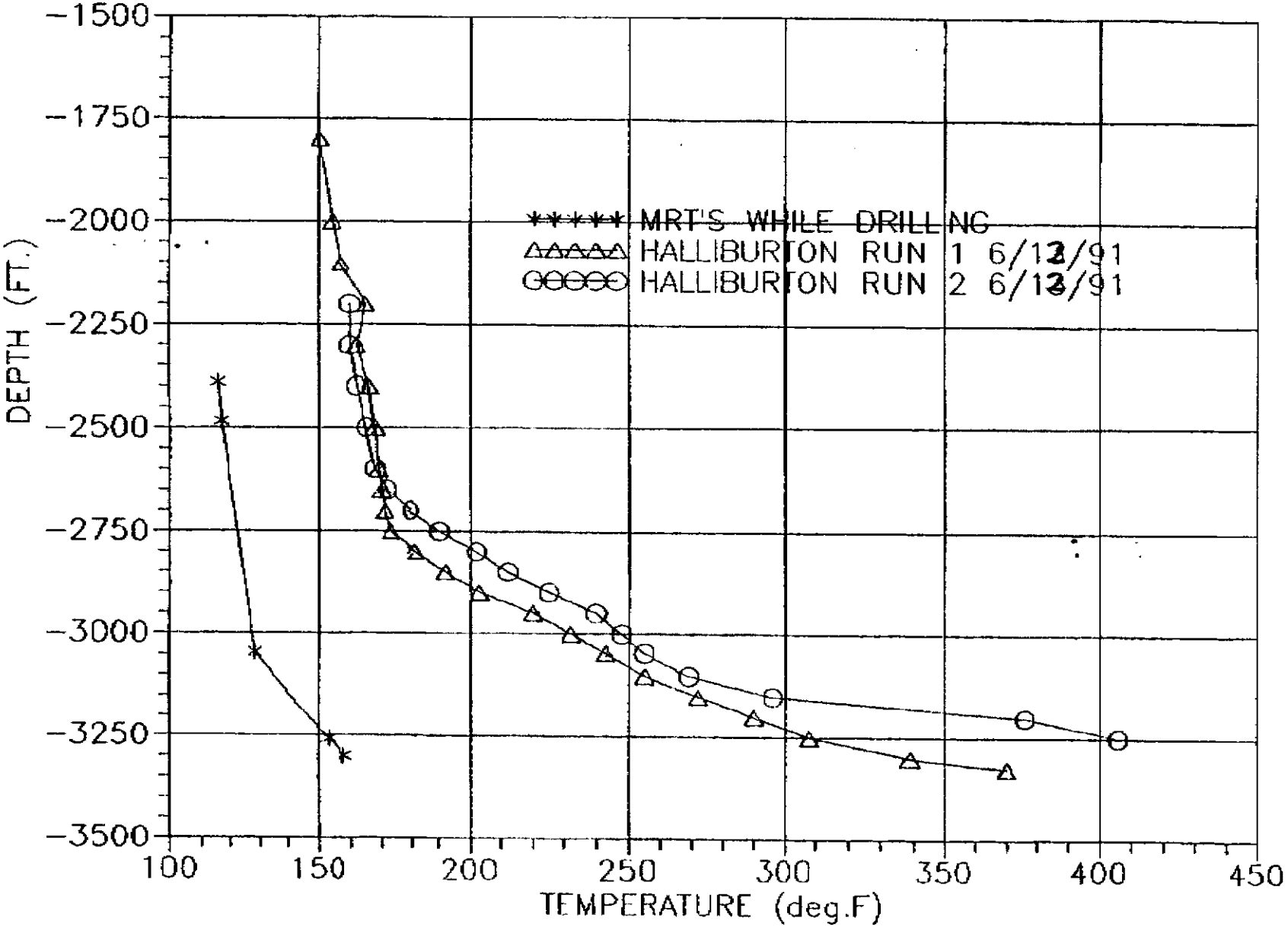
According to the 9th page of the Report on Uncontrolled Flow Event as per Conditions #13 and #26, in the Appendix section dated 6/12/91, paragraph two (2), the attached two graphs are part of the report.

cc: W. Paty, DLNR
M. Tagamori, DLNR
D. Nakano, DLNR
E. Tanaka, DLNR
N. Hayashi, HCPD
C. Hew, DOH
N. Hirai, DLNR
B. Clark, PGV
B. Teplow
File: 7.13.2, 14.3.13, 14.3.26

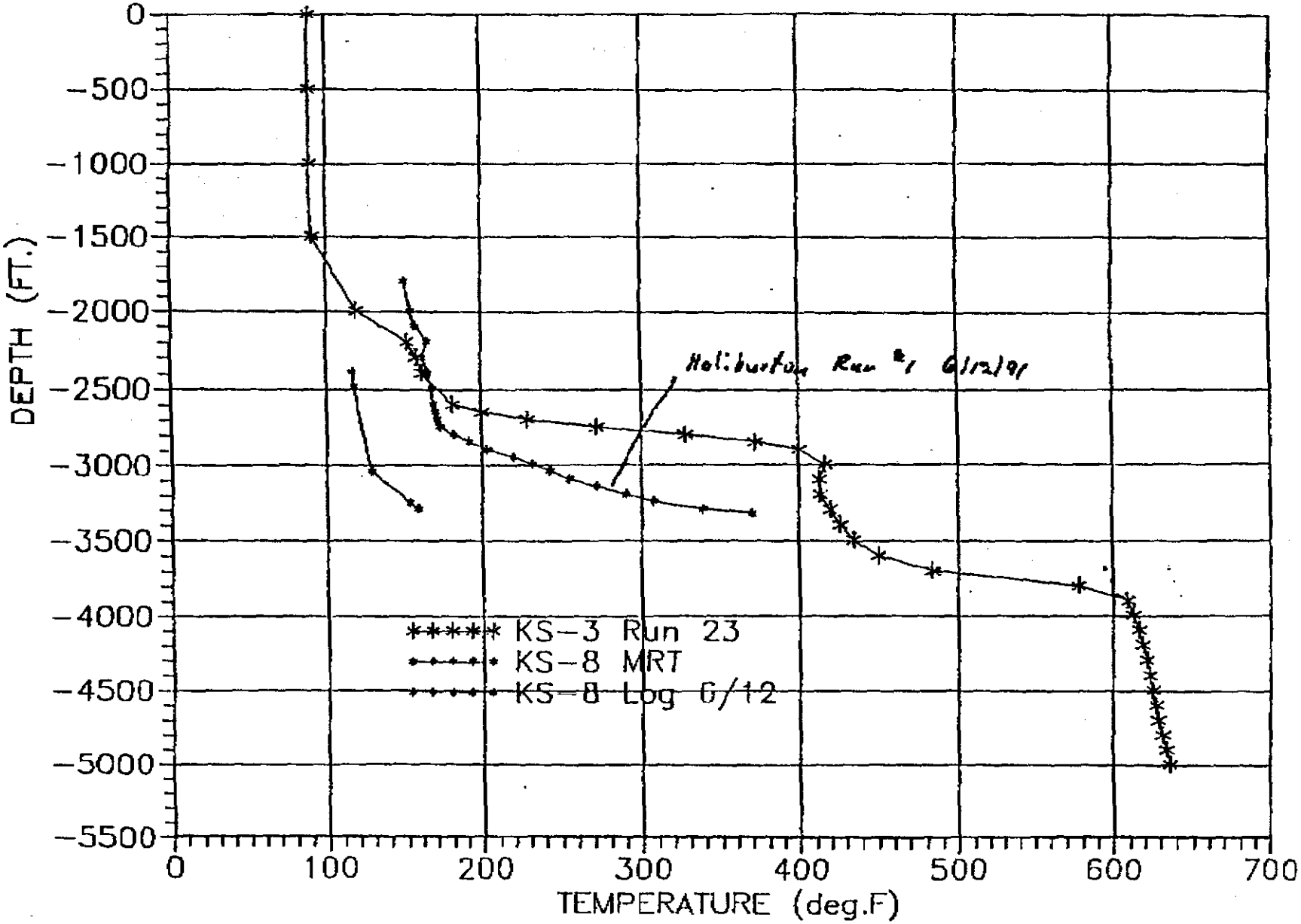
PUNA GEOTHERMAL VENTURE
KS-3: TEMPERATURE VS DEPTH
PRUETT RUN 23, 6/5/91



PUNA GEOTHERMAL VENTURE
KAPOHO STATE 8
SUBSURFACE TEMPERATURE DATA



PUNA GEOTHERMAL VENTURE
KS-3: TEMPERATURE VS DEPTH
PRUETT RUN 23, 6/5/91



PUNA GEOTHERMAL VENTURE
KAPOHO STATE 8
SUBSURFACE TEMPERATURE DATA