

JANUARY - MARCH 1991 QUARTERLY REPORT

Scientific Observation Hole (SOH) Program

Geothermal Resource Permit: GRP 89-1

Lilewa, Kapoho, and Halekamahina, Hawaii

TMK: 1-2-10:01; 1-4-01:02; and 1-4-02:32

Hawaii Natural Energy Institute

University of Hawaii

May 1991

I. SUMMARY

This document presents a quarterly report to the County of Hawaii Planning Department to support the Scientific Observation Hole (SOH) program in the Kilauea Middle and Lower East Rift Zones. The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. The information to be gained from the SOHs will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

This report addresses: description of work undertaken and planned; results of the environmental and noise monitoring activities; log of complaints; status of exploration activities; other information; and financial accounting.

II. INTRODUCTION

The County of Hawaii Planning Commission approved, on August 8, 1989, a geothermal resource permit application (GRP 89-1) to drill scientific observation Holes (SOHs) in the Kilauea Middle and Lower East Rift Zone. This document presents a quarterly report, as required in Condition 11:

"The petitioner shall submit five (5) copies of a status report to the Planning Department on a quarterly basis (by the first day of January, April, July, and October of each year), or, within 30 days of the completion of any SOH. The status report shall include, but not limited to:

- a. A detailed description of the work undertaken during the current reporting period including drilling activity report;
- b. A description of the work being proposed over the next reporting period;
- c. The results of the environmental/noise monitoring activities;
- d. A log of the complaints received and the responses thereto;
- e. The current status of exploration activities in the context of long-range program goals; and
- f. Any other information that the Planning Department may require which will address environmental and regulatory

concerns involving the requirements of the Geothermal Resources Permit.

- g. This condition shall remain in effect until all of the conditions of approval have been complied with, then after which these reports shall be every six (6) months for the duration of the project.
- h. These reports shall include a financial accounting of the resources expended by the project."

III. BACKGROUND

The SOHs are for scientific observation purposes only. The holes will not be flow-tested or produced. As designated, four holes are planned to be drilled along the Kilauea East Rift Zone on the Big Island of Hawaii. Three of the Big Island holes (SOHs 1, 2, and 4) are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH-3, is on conservation land. SOH activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell have been approved.

IV. SOH-1 SITE

Description of Current Work

Tonto Drilling Services resumed operations on January 4, 1991, following the Christmas break from December 23, 1990, through January 3, 1991. The hole was conditioned to a total depth of 5526 feet and temperature logs were run with the

assistance of representatives from the United States Geological Survey. A maximum temperature of 403° (F) was recorded at a depth of 5500 feet. Pressure, caliper and gamma ray surveys were planned, but were unable to be completed due to equipment failure. The Tonto U-5000 rig was released for work unrelated to the SOH program and moved off the site on January 14, 1991. The County of Hawaii, Department of Water Supply removed the water meter, which had monitored the water usage for the drilling operations at the SOH-1 site, on March 25, 1991. A fence was erected around the SOH-1 wellhead on March 29, 1991.

Description of Proposed Work

The mud and cuttings in the sump pit will be disposed in a manner recommended by the Department of Health. The sump material is being analyzed to determine if it is suitable for disposal at the County landfill or if it should be buried on site. The site will be reclaimed to its original state after testing and monitoring are completed.

Results of the Environmental/Noise Monitoring Activities

Passive hydrogen sulfide (H₂S) monitors were installed around the SOH-1 drill site. The Colortek sensors are replaced weekly as a matter of routine. The average H₂S level measured is about 1 ppb due to natural causes resulting from the decay of vegetation. No indication of H₂S emissions were detected from the well during this reporting period. On January 11, 1991, the

Colortec canisters were removed and refurbished in preparation for installation at the SOH-2 drill site.

The air quality monitoring station provides a continuous record of atmospheric H₂S concentrations when interfaced with a data logger or chart recorder. The unit was located in a utility container on-site with power provided by the drill rig system.

Continuous wind speed and direction measurements were made with a recording wind speed/direction sensor system. A data logger and back-up pressure-sensitive recorder collected the wind speed and direction data. The unit was located in a utility container on-site with power provided by the drill rig system.

One noise monitoring station was located at the SOH-1 site during drilling. A second noise station was located at the Laughlin residence, about a quarter mile west of the SOH-1 drill site. A third noise monitoring station was installed at the Pommerenk residence, about a mile east of the SOH-1 site. Due to the lack of AC power on-site, the monitor at the Pommerenk's was powered by solar charged batteries.

Complaint Log and Response

There were four noise complaints received during this reporting period, all from the Pommerenks. See Appendix B for complaint notice and response. The noise consultant analysis reports for these complaints are in Appendix C and show that SOH-1 drilling operations were within conditions set forth by the Geothermal Resource Permit (GRP 89-1).

V. SOH-2 SITE

Description of Current Work

A grading and grubbing permit was approved on December 4, 1990, and the site was cleared on January 25, 1991. A cement pad was poured and the site preparation completed January 29-31, 1991. Ambient noise monitoring equipment was installed on January 18, 1991, at the SOH-2 site and operated normally through this reporting period.

On January 22, 1991, the County of Hawaii Water Commission gave their approval for the SOH project to commence well clean-out/pump installation at the airstrip well, under DLNR permit 3081-01. Two water samples were taken from the airstrip well prior to use as a water supply for drilling operations. The first sample was taken with a bailer on January 27, 1991, and the second was a pumped sample taken on January 30, 1991. The results of the analyses are as follows:

Date	Cl	Na	K	Ca	Mg
01/27/91	418	315	20.6	29.8	25.3
01/30/91	378	285	19.7	32.7	27

Site preparations at SOH-2 continued February 1-3, 1991, including the rigging up of the Tonto U-5000 drill rig, the installation of the sump liner for the mud pit and the installation of a water line from the airstrip well to the water storage tank to provide water for the drilling operations. SOH-2

was spudded in a 11:30 am on February 4, 1991, with a 101mm core bit and drilled to a depth of 10 feet. The hole was then opened to 12-1/4 inches to a depth of 202 feet by rotary drilling and 9-5/8 inch casing set. On March 5, 1991, geophysical logs were run in the hole by personnel from the United States Geological Survey (USGS). These logs included: temperature (bottom hole temperature 85° F), gamma, caliper, spinner and televiewer.

Rotary drilling with an 8-1/2 inch bit continued from 1,871-1,901 feet in fairly competent formation until a number of drill collar failures occurred due to a sudden deviation ("dog leg") in the hole in the 1,870-1,900 foot interval. 7 inch casing was run to a depth of 1,896 feet and cemented.

Core drilling was attempted on March 17, 1991, and advanced from 1,909-1,924 feet in dense basaltic intrusive rock. Due to short core runs through poorly consolidated, fragmented rock, core drilling was abandoned and rotary drilling resumed on March 20, 1991, with a 5-7/8 inch rotary bit. Rotary drilling continued to a depth of 2,966 feet for this reporting period.

Description of Proposed Work

Rotary drilling will continue until a more competent formation is encountered. Casing will then be run in the hole and core drilling resumed.

Results of the Environmental/Noise Monitoring Activities

Passive hydrogen sulfide (H₂S) monitors were deployed around

the perimeter of the SOH-2 drill site on February 4, 1991. The Colortek sensors are replaced weekly as a matter of routine. The average H₂S level measured is about 1 ppb due to natural causes resulting from the decay of vegetation. No indication of H₂S emissions were detected from the well during this reporting period.

The air quality monitoring station provides a continuous record of atmospheric H₂S concentrations when interfaced with a data logger or chart recorder. The unit is located in a utility container on-site and power is provided by the drill rig system.

Continuous wind speed and direction measurements are made with a recording wind speed/direction sensor system. A data logger and back-up pressure-sensitive recorder collect the wind speed and direction data. The unit is located in a utility container on-site and power is provided by the drill rig system.

One noise monitoring station is located at the SOH-2 site during drilling. A second noise station is located at the Perry residence, about a third of a mile north of the SOH-2 drill site. A third noise monitoring station is located at the Hedtke residence, about 0.4 of a mile east of the SOH-2 site. The monitoring stations at both neighboring residence's were installed on February 1, 1991, and are powered by solar batteries. Minor adjustments were made during this reporting period, including the solar panel tilt, chart recorder speed and battery replacement. Chart jams, which are indicative of this type of monitoring equipment, continue to require adjustments.

Complaint Log and Response

A total of six noise complaints were received for the SOH-2 operations during this reporting period. Two complaints were from Jane Hedtke and two complaints came from Jennifer Perry and two from Delan Perry. See Appendix B for complaint notice and response. The noise consultant analysis reports for these complaints are in Appendix C and show that SOH-2 drilling operations were within conditions set forth by the Geothermal Resource Permit (GRP 89-1).

VI. SOH-3 SITE

Description of Current Work

Drilling activity has not been initiated. Access to the SOH-3 site has not been constructed, nor has the site been cleared or graded. SOH-3 is scheduled to be located at the True/Mid-Pacific alternate Drill Site 2 (approximately 3,000 feet north-north-west of the present drill site). All necessary reports have been submitted to DLNR for review and approval. An expanded Archaeological Survey on the Buffer Zone of the proposed site was submitted on March 20, 1991.

Description of Proposed Work

Grading and grubbing work for the access road and drill site will be done, prior to any drilling. Ambient noise surveys will be conducted prior to any drilling activity.

Results of the Environmental/Noise Monitoring Activities

No drilling activity has been initiated. Ambient noise will be recorded prior to the commencement of drilling. Ambient noise levels will be recorded at, or near the homes of cooperating residents which may experience similar sound reception conditions with respect to noise sources at the drilling site.

Complaint Log and Response

Drilling activity has not been initiated. No complaints were received during this reporting period.

VII. SOH-4 SITE

Drilling Activity

Tonto Drilling Services completed drilling work at SOH-4 on May 21, 1990. No drilling activity was performed during this period. The sump material at SOH-4 was buried on site on February 24, 1991. The Landowner, Campbell Estate, has seeded the site with experimental Mamaki, Kopiko and Ohia seeds collected from plants in the nearby area.

Description of Proposed Work

Various logs (i.e. temperature, pressure, and injection) will be conducted in the hole on a periodic basis.

Results of the Environmental/Noise Monitoring Activities

Air Quality, Meteorological, Noise and Emissions are not being monitored, since drilling has been completed at this site.

Complaint Log and Response

Drilling completed -- no activity.

VIII. STATUS OF CURRENT EXPLORATION ACTIVITIES

No activities are being pursued at this time, other than drilling at SOH-2 and permit activities at SOH-3.

IX. OTHER INFORMATION

No concerns need to be addressed at this time.

X. FINANCIAL REPORT

See Appendix D for Budget status.

APPENDIX A

DAILY DRILLING REPORTS

NOT INCLUDED SINCE THEY WERE
SENT TO YOU ON A DAILY BASIS

APPENDIX B

SOH-1 COMPLAINT LOGS AND RESPONSE

Public Contact Sheet

First Contact: answering service ☒ to mobile phone
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 1-5-91 Time 9:30 PM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Mrs. Pommerenk
address :
phone number :

Contacted by, R. Keckly Date 1-6 time 10 AM (Mr. Pommerenk)

Remarks:

answering service took call. Resident complained of
SOH noise.

Action taken:

Check with J. Deymonaz 0930 Am. Rig operation,
tripping pipe out of hole for USGS survey on Sunday.

For:

SOH

initiated by R. Keckly
date 1-7-91

Public Contact Sheet

First Contact: answering service ☐ ☒ direct.
mobile phone ☒
walk-in ☐
other ☐ Specify-

Date 1-6-91 Time 10 AM

Nature of contact: request for information ☐ ☒
complaint call

Residents name: MR. Pommervant
address :
phone number :

Contacted by, R. Kocit Date Same time Same.

Remarks:

Said Riq noise woke wife up at 3 AM. Hand held noise level meter (his) read 50 db+. between 3-3:30 AM

Action taken:

I explained operations were coming to a close.

For: SOH

initiated by R. Kocit
date 1-7-91

Public Contact Sheet

First Contact: answering service ☒ to office #
 mobile phone ☐
 walk-in ☐
 other ☐ Specify-

Date 1-7-91 Time 1115 Am

Nature of contact: request for information ☐
 complaint call ☒

Residents name: MRS. Pommerehne
 address :
 phone number :

Contacted by, R. Koehly Date same time 11

Remarks:

Resident Complained of night time SOH noise -
 Says she hasn't slept past 2 nights.
 Sat. night Res. claims 52db. on her meter.

Action taken:

Info. Relayed to J. Daymon

For: SOH

R. Koehly
 Initiated by 1-7-91
 date

Public Contact Sheet

First Contact: answering service ☒ to office machine
 mobile phone ☐
 walk-in ☐
 other ☐ Specify-

Date 1-7-91 Time 9:49 PM

Nature of contact: request for information ☐
 complaint call ☒

Residents name: Mrs Pommunk
 address :
 phone number :

Contacted by, R. Kochy Date 1-8-91 time 1120 AM (Greg Pommunk)

Remarks:

Answering service took call, resident says
 "SOH extremely noisy right now."

Action taken:

Spoke to J. Daymonar about nighttime operations—
 "deploying tubing."

For:

SOH

initiated by R. Kochy
 date 1-8-91

SOH-2 COMPLAINT LOGS AND RESPONSE

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ Direct call
walk-in ☐
other ☐ Specify

Date 2-29 Time 5pm

Nature of contact: request for information ☒
complaint call ☒

Residents name: Rusty Perry
address: Kapoho
phone number: 965-8699

Contacted by: R. Kochy Date 2-3-91 time 1145

Remarks:

Resident wanted to know what was making 3Am noise. (2-2-91) and when would drilling start.

Action taken:

Check with John Deymanaz - NO nighttime Sott noise
guard only on site.

Drilling to start today within 1 hr

For: Sott

Initiated by R. Kochy
date 2-3-91

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ Direct Call
walk-in ☐
other ☐ Specify-

Date 2-4-91 Time 10 Am (approx)

Nature of contact: request for information ☒
complaint call ☒

Residents name: Rusty Perry
address :
phone number : 965 8699

Contacted by, R. Kocky Date 2-4-91 time 1530

Remarks:

Resident wanted to know what "Klunking noise"
was coming from SOH drill rig.

Action taken:

Checked with J. Deymonaz - upper portion of
hole drilling, drill stem moves around more.

For: SOH-2

Initiated by R. Kocky
date 2-4-91

Public Contact Sheet

First Contact: answering service 0
mobile phone 0
walk-in 0
other 0 Specify-

Date 2-13-91 Time 0730

Nature of contact: request for information 0
complaint call 0

Residents name: Jennifer Perry
address :
phone number : Keopoh

Contacted by, R. Kochy Date 2-13 time 0830

Remarks:

Resident complained of night time noise from
SOH. Dogs Barking, cows mooing.

Action taken:

Spoke to John D. 0800 - cementing and centrifugal
pump running. Called res. back at 0830 and she
claims 85 db spike (per B. Burkhardt's chart)

For:

SOH

initiated by R. Kochy
date 3-6-91

Public Contact Sheet

First Contact: answering service ☒
mobile phone ☐
walk-in ☐
other ☐ Specify-

Date 2-27-91 Time pm

Nature of contact: request for information ☐
complaint call ☒

Residents name: Jane Hedtke
address :
phone number : Kapoho

Contacted by, R. Kochy Date 2-27 time 4pm

Remarks:

Resident says SOH rig, noise kept her awake
10pm - 1Am 2-25-91. She described
a "whirring sound"

Action taken:

Answering service relayed call to my office number
(not my mobile phone) I called resident and explained
hydraulic winch noise, and complaint documentation
procedure.

For:

SOH

Initiated by R. Kochy
date 2-27-91

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☒ direct call
walk-in ☐
other ☐ Specify-

Date 2-23-91 Time 2:40 AM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Jennifer Perry
address:
phone number: Kapoho

Contacted by: R. Kocik Date 3-1-91 time 2800

Remarks:

Resident said Solt very loud.

Action taken:

I asked her if she wanted me to take additional noise level measurements - she declined.
Follow up call next morning.

For:

Solt

initiated by R. Kocik
date

Public Contact Sheet

First Contact: answering service ☐
mobile phone ☐
walk-in ☒
other ☐ Specify-

Date 3-4-91 Time 9 AM

Nature of contact: request for information ☐
complaint call ☒

Residents name: Jane Hedtke
address :
phone number : Kapoho

Contacted by, R. Kochy Date 3-4 time 9 AM

Remarks:

Resident said SOH very loud 10 pm - 1 AM 3-3, 3-4-91

Action taken:

Checked noise level chart at Rig and Hedtke Res. with Bill Burkhead. I encouraged her to call me for additional hand held inst. measurements.

For:

SOH

Initiated by R. Kochy
date 3-5-91

APPENDIX C
SOH-1 AND SOH-2
NOISE COMPLAINT ANALYSIS



RECEIVED

MAY 8 1991

MMTC - OBD

J89-10
May 7, 1991

Hawaii Natural Energy Institute
Look Laboratory
811 Olomehane Street
Honolulu, Hawaii 96813

Attention: Ms. Laura Glenn

Subject: Summary Of Noise Monitoring Efforts From
January 1, 1991 to March 31, 1991

Dear Ms. Glenn:

Our report dated January 29, 1991 provided a summary of noise level data recorded from October 1, 1990 to December 31, 1990. Following is a summary of noise monitoring efforts performed from January 1, 1991 to March 31, 1991.

1. OVERALL NOISE MONITORING

Table 1 is a summary of monitoring activities performed during the subject period. For the SOH-1 operation, a total of about 33 days on-line monitoring was performed during the month of January. A total of about 157 days on-line monitoring was performed for the SOH-2 operation, starting on January 19, 1991. There are three automated noise monitoring stations (described as "A," "B," and "C,") which are serviced by Alpha-Micro Systems of Hilo. In addition, Mr. Robert Kochy also performed a total of 17 short-term noise measurements during January 30 and 31, 1991, at the vicinity of the SOH-2 drill site. Mr. Kochy used Ambient Noise Survey Data Sheets and these are presented in Enclosure 1.

2. EVALUATION OF NOISE COMPLAINTS

Table 2 provides a summary of the evaluations made based on Public Contact Sheets provided to us for this quarter. The report dated July 30, 1990 explained the process used to evaluate noise complaints. From

the table, the sound propagation condition can be estimated by noting whether the complainant was downwind, upwind, or in a "transitional" condition (e.g., crosswind).

Figures 1 through 9 are noise level strip chart recordings obtained when complaints were received. In these figures, the noise data from the monitoring station next to the drilling rig is aligned in time with the noise data from the station at the complainants.

- 2.1 SOH-1 -- There were four noise complaints from January 5th through the 7th, all from the Pommerenk's, for the SOH-1 operation. Noise and meteorological data are not available until the afternoon period of January 7th, and therefore, Complaint Nos. 1, 2 and 3 cannot be evaluated. The drilling log indicates that during the Complaint Nos. 1 and 2, there were tripping activities, which may have generated audible signals at the complainant's residence.
- 2.2 SOH-2 -- A total of six noise complaints were received for the SOH-2 operation during this quarter. All the complaints were from either Perry's or Hedke's.

Complaint Nos. 8 and 10 are of special interest. They both included a similar complainant's (both from J. Hedke) comment, stating that the SOH noise was loud during the 10 pm and 1 am hours for both days (2/27 and 3/4). A review of the strip chart recordings revealed that a noisy event occurred between midnight and 1 am for both days. Both events lasted for about 15 to 20 minutes and the Lmax's were 55 and 63 dBA, which is about 20 to 30 dBA above the ambient. The SOH-2 noise data, however, do not show any events of similar type occurring during those periods. The rig levels were steady, ranging from about 70 to 73 dBA. The meteorological conditions were downwind at about 2 to 4 mph for both days, and there was no rain during Complaint No. 8 (no rain data are yet available for Complaint No. 10). After reviewing all the relevant data, we have concluded that the noisy events recorded at the Hedke monitoring station during Complaint Nos. 8 and 10 are not due to the SOH-2 operation. An increase in noise level due to thermal inversion, or focusing, normally causes about 10 dBA rise at most, and the phenomenon is intermittent, i.e., the sound level fluctuates. The recorded events do not show any of the thermal inversion characteristics.

The graphic chart recordings corresponding to the time of Complaint No. 9 show that a correlation exists between the data at the Perry's and the SOH-2 stations between midnight and 1:15 am on 2/28. The transients recorded at the Perry's are likely to be audible, but they were all below the 45 dBA geothermal noise guideline.

University of Hawaii
May 7, 1991

J89-10
Page 3

3. **BASLINE NOISE MEASUREMENTS FOR SOH-2**

In a response to the request from the Hawaii County Planning Director Norman K. Hayashi, we have submitted a report, dated February 12, 1991 to Dr. Harry Olson, on the baseline noise measurement results for the SOH-2 operation.

Sincerely,


Mike S. Lee

MSL/msl

Table 1 - Summary of Noise Monitoring Activities from 1/1/91 TO 3/31/91

Page 1 of 3

Location	Mon. Sta.	Data Set	Start Date	Stop Date	Days on Line	Remarks
Pommerenk	C	30c	1/1/91	1/2/91	1	
SOH #1	A	31a	1/7	1/9	2	Rig shut down until 1/7
Pommerenk	C	31b	1/2	1/18	14	No data, 1/9-11, equipment maintenance
Loughlin	B	31c	1/14	2/1	16	The station was down until 1/14; no data 1/21-23, pen dried
SOH #2	A	31d	1/19	2/1	13	
SOH #2	A	31e	2/1	2/6	2	No data, 2/1-4, no power
Hedke	B	31f	2/1	2/6	5	
Perry	C	31g	2/1	2/6	5	7-hours of data lost on 2/1
SOH #2	A	32a	2/6	2/15	9	Chart speed off by 12 hours, possibly due to a shorted battery cell
SOH #2	A	32b	2/15	3/1	13	No data, 2/22-23 no power
Hedke	B	32c	2/6	2/8	1	No data, 2/7-8, pen dried & paper ran out

Table 1 - Summary of Noise Monitoring Activities from 1/1/91 TO 3/31/91

Page 2 of 3

Location	Mon. Sta.	Data Set	Start Date	Stop Date	Days on Line	Remarks
Hedke	B	32d	2/8	3/1	11	4-hours of data collected during 2/9-13; 28-hours of data lost, 2/13-15; no data, 2/15-18; 12-hours of data lost, 2/18-20; no data 2/21-22; all due to paper jam
Perry	C	32e	2/6	2/11	4	No data, 2/10-11, paper ran out
Perry	C	32f	2/11	2/25	11	No data, 2/16-18, pen dried; no data 2/18-19, paper jam; 7-hours of data lost on 2/20
Perry	C	32g	2/25	3/1	4	7-hours of data lost on 3/1
SOH #2	A	33a	3/1	3/11	9	No data, 3/7-8, paper jam
SOH #2	A	33b	3/11	3/22	11	5-hours of data lost on 3/22, paper ran out
SOH #2	A	33c	3/22	3/31	9	6-hours of data lost during 3/22-25

Table 1 - Summary of Noise Monitoring Activities from 1/1/91 TO 3/31/91

Page 3 of 3

Location	Mon. Sta.	Data Set	Start Date	Stop Date	Days on Line	Remarks
Hedke	B	33d	3/1	3/11	6	No data, 3/7-11, no power
Hedke	B	33e	3/11	3/22	8	18-hours of data lost during 3/11- 13, weak battery; No data, 3/13-15, no power
Hedke	B	33f	3/22	3/27	5	
Hedke	B	33g	3/27	3/31	2	No data 3/27-29, paper jam
Perry	C	33h	3/1	3/11	9	15-hours of data lost, pen dried
Perry	C	33i	3/11	3/15	4	
Perry	C	33j	3/15	3/31	15	20-hours of data lost, paper jam

TABLE 2 - SUMMARY OF NOISE COMPLAINTS FROM SOH #1 & SOH #2 AND EVALUATIONS; JANUARY THROUGH MARCH, 1991

No.	Date (Time)	Complainant	Complainant's Comment	Rig Operation	Rig Noise Level	Met Condition	Comments & Evaluation
1	1/5/91 (2130)	D. Pommerenk	Resident complained of SOH noise	Tripping	No data available	No data available	Cannot evaluate due to lack of SOH-1 noise data.
2	1/6/91 (1000)	G. Pommerenk	Rig noise awoke wife up at 3 am. His sound level meter read 50 dB (dBA) plus between 3 - 3:30 am	Tripping	No data available	No data available	Cannot evaluate due to lack of SOH-1 noise data.
3	1/7/91 (1115)	D. Pommerenk	Resident complained of nighttime SOH noise; says she has not slept past 2 nights; Sat. night (1/5-6) resident claims 52 dB (dBA) on her meter	No drilling log available; SOH-1 final phase activities	No data available	No data available	Cannot evaluate due to lack of SOH-1 noise data.
4	1/7/91 (2149)	D. Pommerenk	"SOH noise extremely noisy right now."	No drilling log available; SOH-1 final phase activities	Many transients; up to about 70 dBA	Downwind 2-4 mph	Transients recorded @ Pommerenk during the time of complaint, max level of 47 dBA; predictably audible; no violation due to temporal aspect.
5	2/2/91 (1700)	R. Perry	Resident wanted to know what was making 3 am (2/2/91) noise, and when would drilling start	No nighttime activity	No data available	No data available	No nighttime activities at SOH-2 site. Only the guards are present.
6	2/4/91 (1000)	R. Perry	Resident wanted to know what "klunking" noise was, coming from SOH site	Drilling	Steady level of about 65 to 70 dBA with few transients of up to 79 dBA	Data available from 11 am; downwind, 5-7 mph	Many transients recorded @ Perry's; max level of about 60 dBA; predictably audible; no correlation with the SOH-2 data exists; probably no violation due to temporal aspect

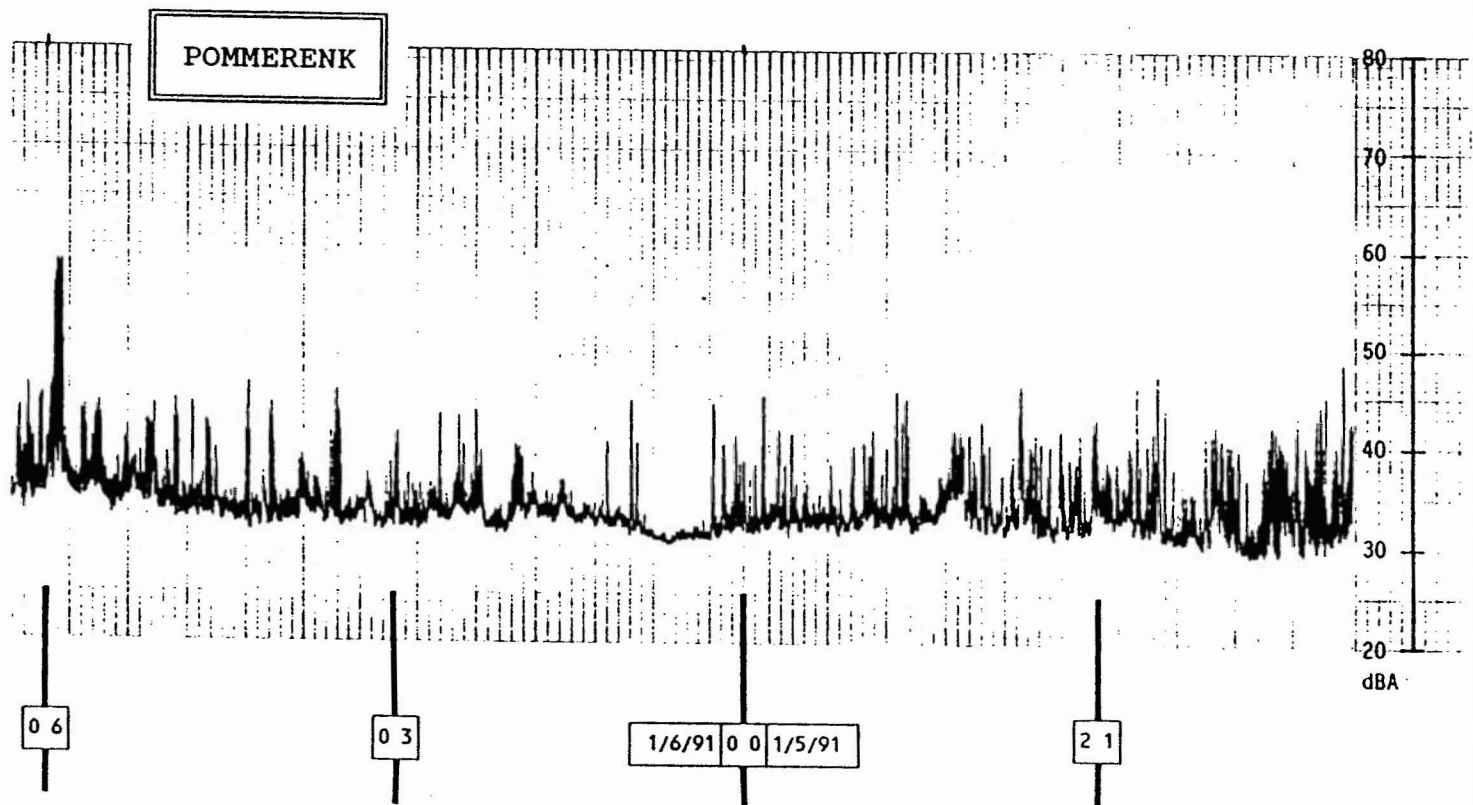
No.	Date (Time)	Complainant	Complainant's Comment	Rig Operation	Rig Noise Level	Met Condition	Comments & Evaluation
7	2/13/91 (0730)	J. Perry	Resident complained of nighttime noise from SOH; claims an 85 dBA spike recorded at the chart recorder	Drilling	Very little transients before midnight (2/12-13); transients up to 79 dBA recorded after midnight	Downwind 2-4 mph	Many transients recorded @ Perry's before midnight (2/12-13), few transients after 1 am; no correlation with SOH-2 data exists, including the '85 dBA spike', no 85 dBA spike exists, she's probably referring to 76 dBA spike; probably no violation
8	2/27/91 (pm)	J. Hedke	SOH rig noise kept her awake 10 pm - 1 am, 2/25; describes as a "whirring sound".	Drilling	Steady level of 71 dBA, few transients of up to 78 dBA at around 1 am	Downwind 2-3 mph	Probably no violation, see text
9.	2/28/91 (0240)	J. Perry	Resident said SOH very loud.	Tripping	Transients recorded between midnight (2/27-28) and 1:15 am and also at around 2 am	Transitional wind, 2 mph	Correlation exists between the data @ Perry's and SOH-2 for transients recorded between midnight and 1:15 am; transient levels at Perry's are about 5 to 7 dBA above the ambient but are all below the 45 dBA limit; audible but no violation; 3 to 4 transients recorded at Perry's around 2:15 am don't coincide with the SOH-2 data, probably from other noise source(s).
10.	3/4/91 (0900)	J. Hedke	Resident said SOH very loud 10 pm - 1 am, 3/3-4	Drilling,	Steady levels ranging from 73 to 75 dBA;	Downwind, 3-4 mph	Probably no violation, see text



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ACOUSTICAL CONSULTANTS

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dba

FIGURE 1.
GRAPHIC CHART RECORDING
COMPLAINT NOS. 1 & 2



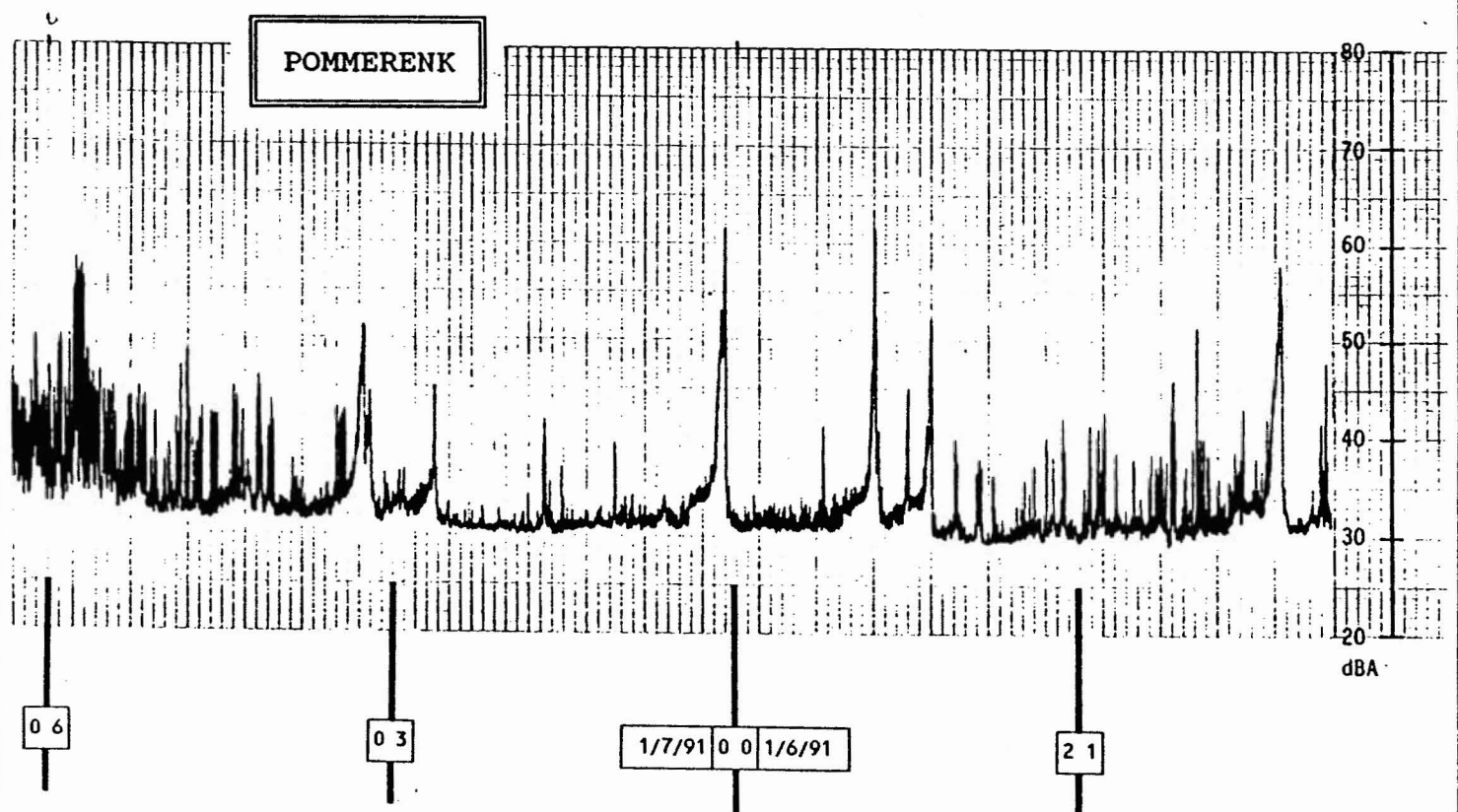
NO RIG NOISE
DATA AVAILABLE



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dba

FIGURE 2. GRAPHIC CHART RECORDING
COMPLAINT NO. 3



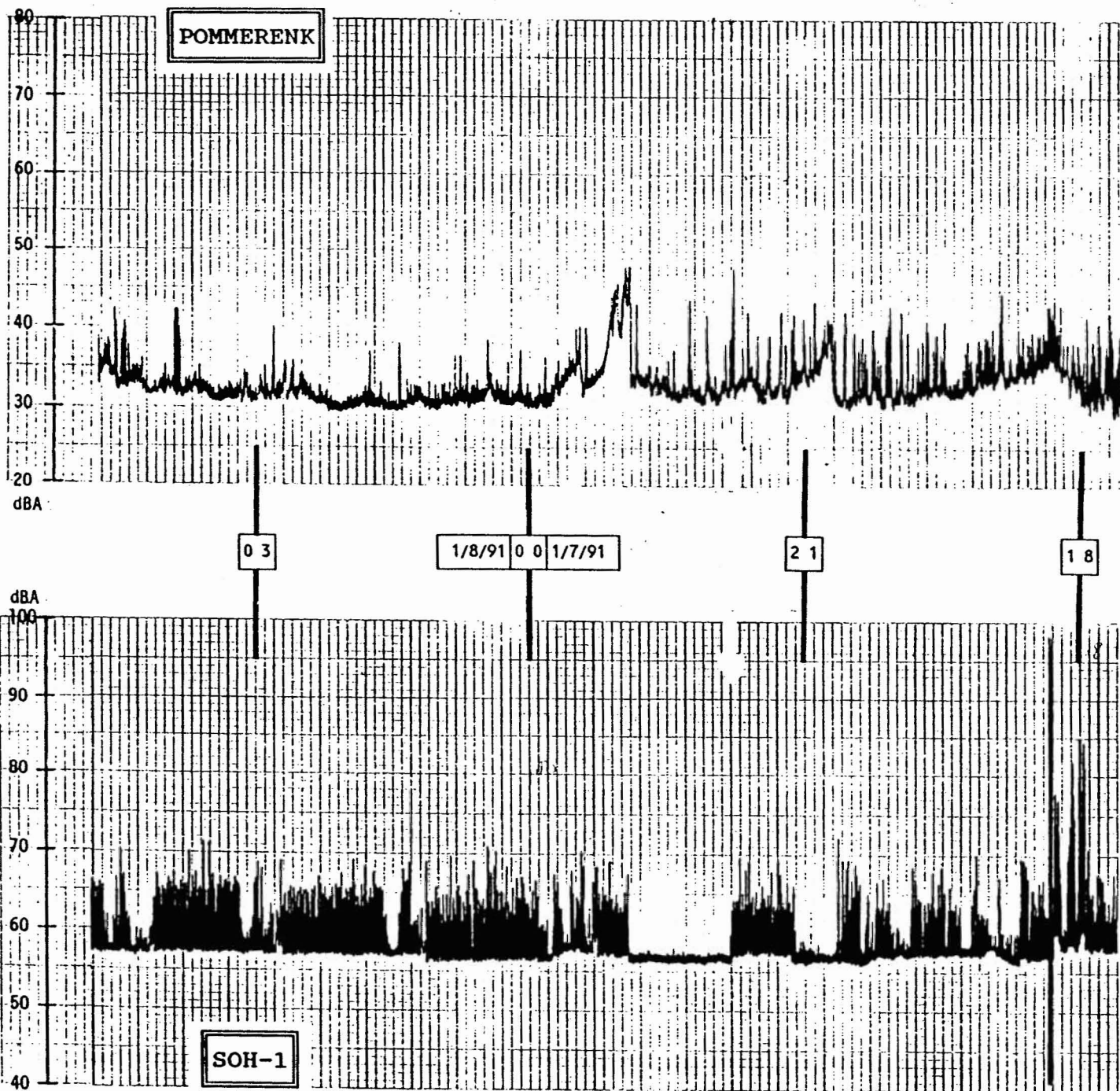
NO RIG NOISE
DATA AVAILABLE



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FIGURE 3.
GRAPHIC CHART RECORDINGS
COMPLAINT NO. 4

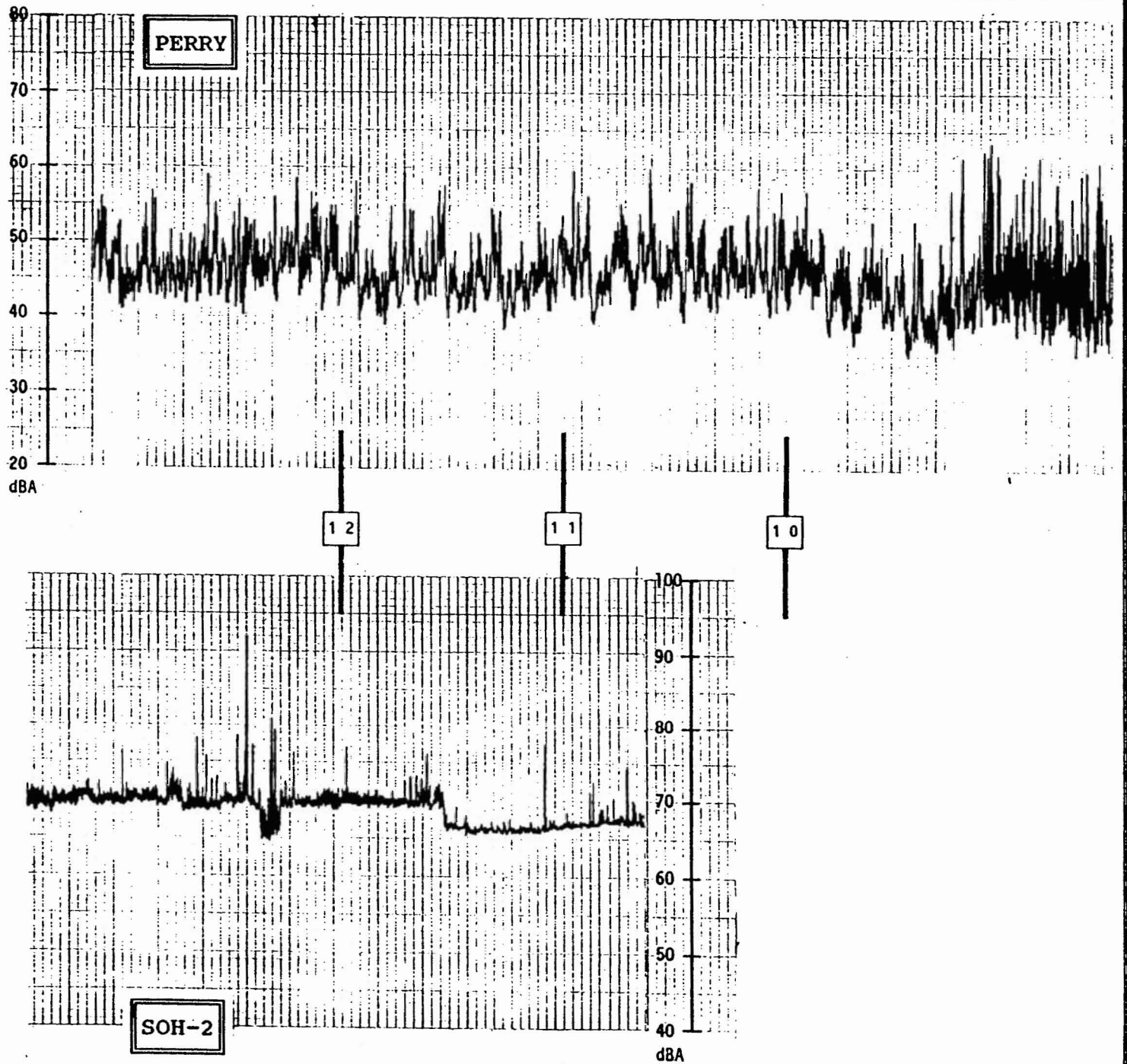




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FIGURE 4. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 6

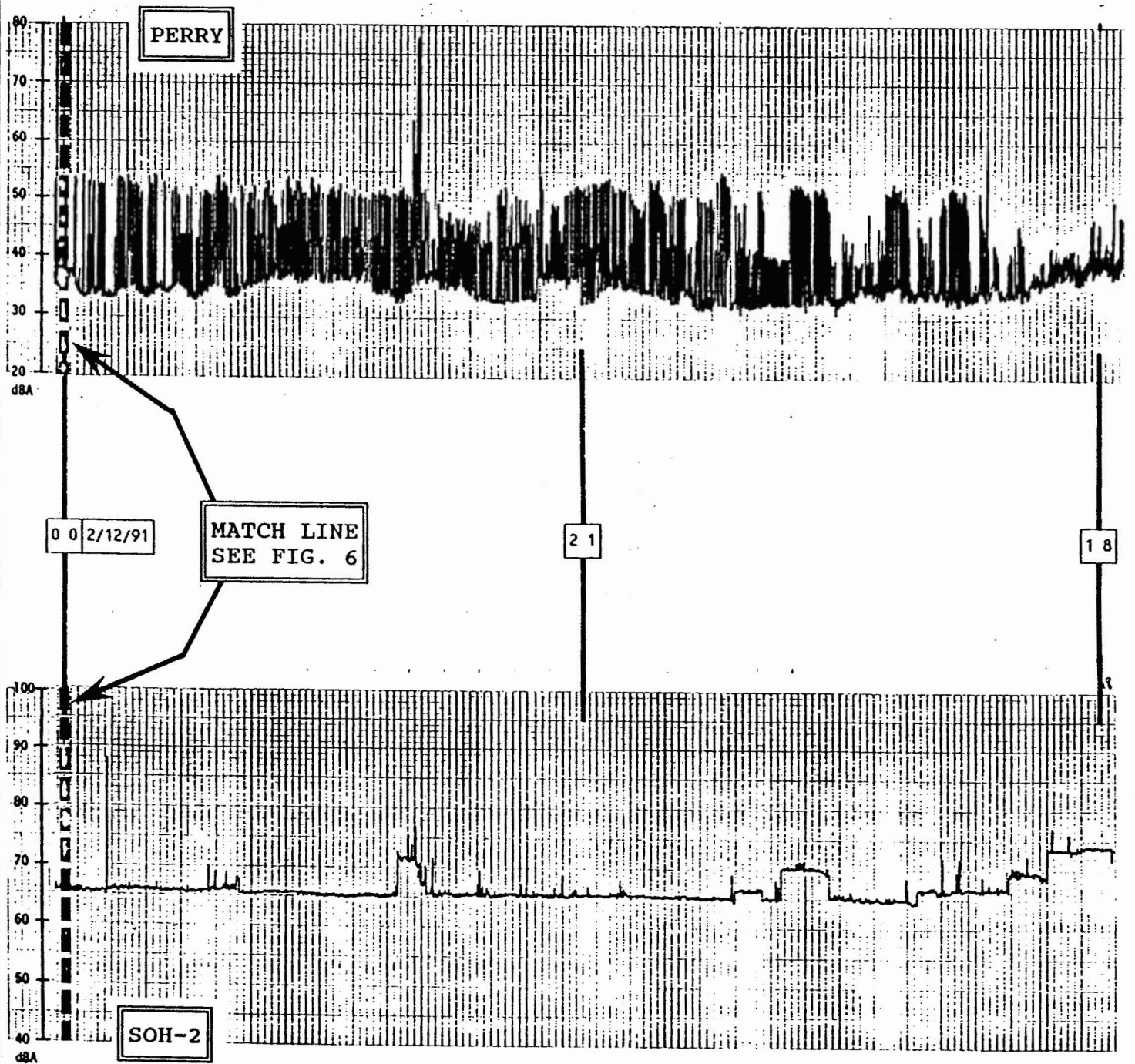




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dba

FIGURE 5. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 7 (PART)



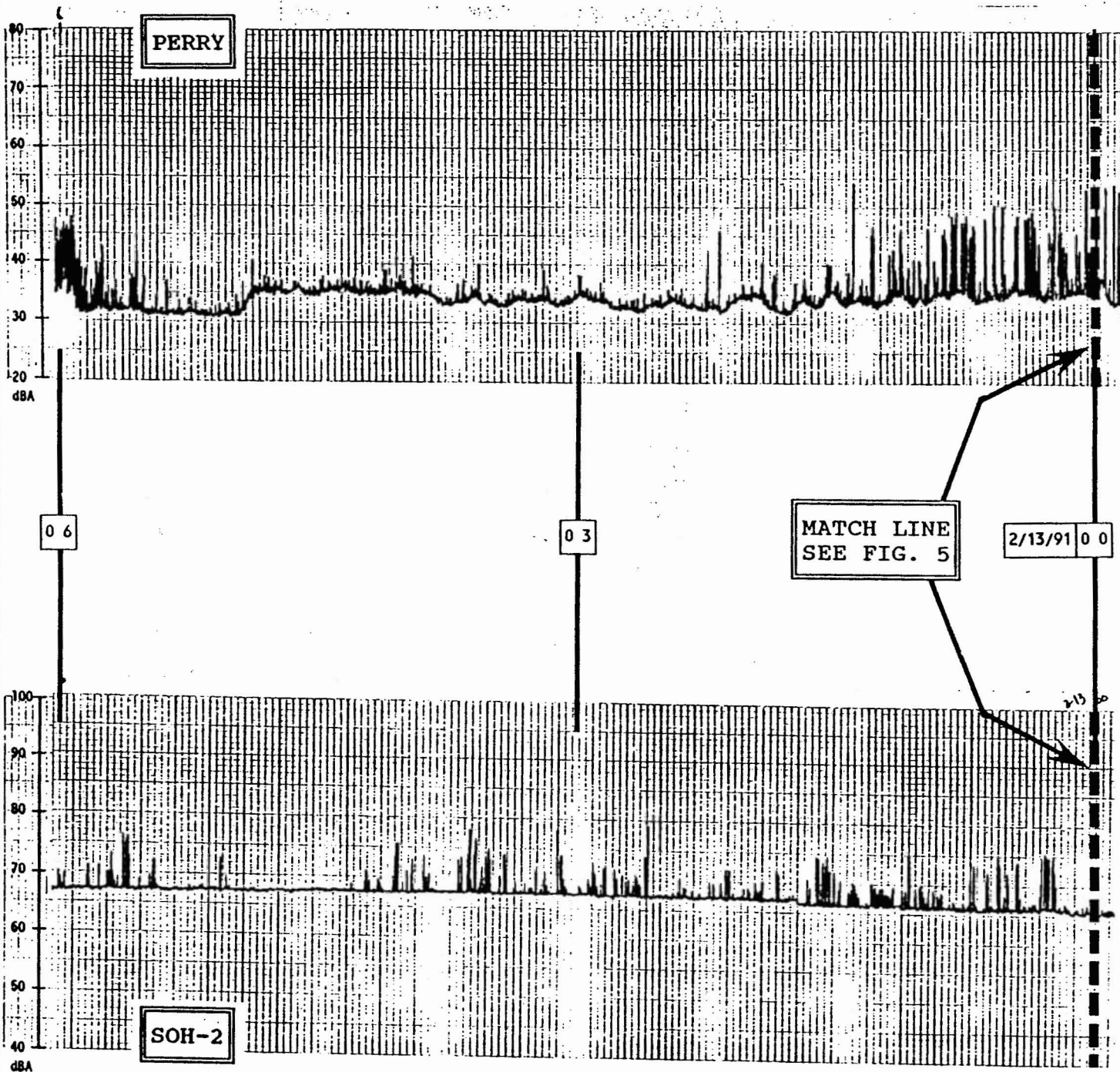


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FIGURE 6. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 7 (CONT.)

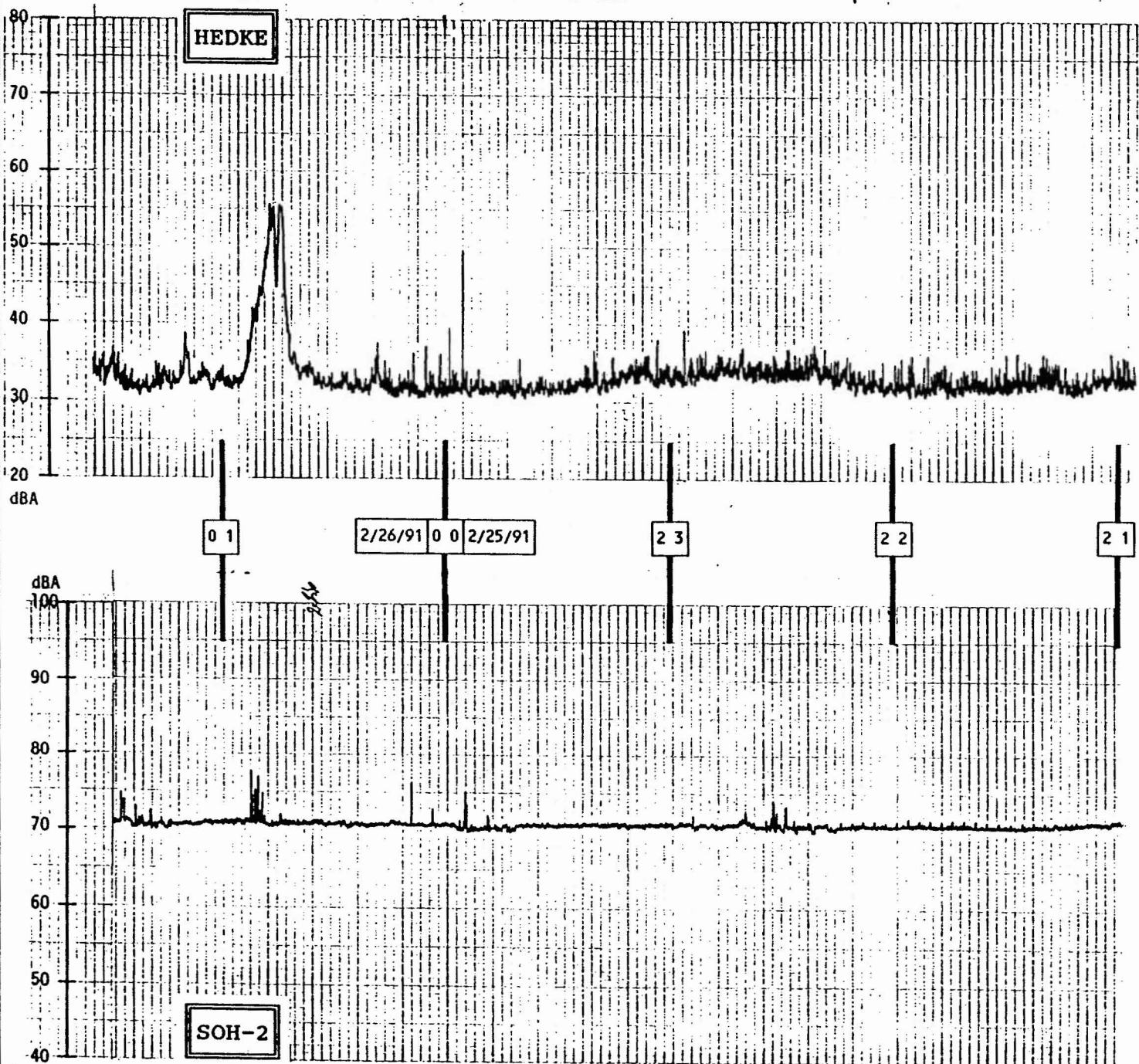




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FIGURE 7. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 8

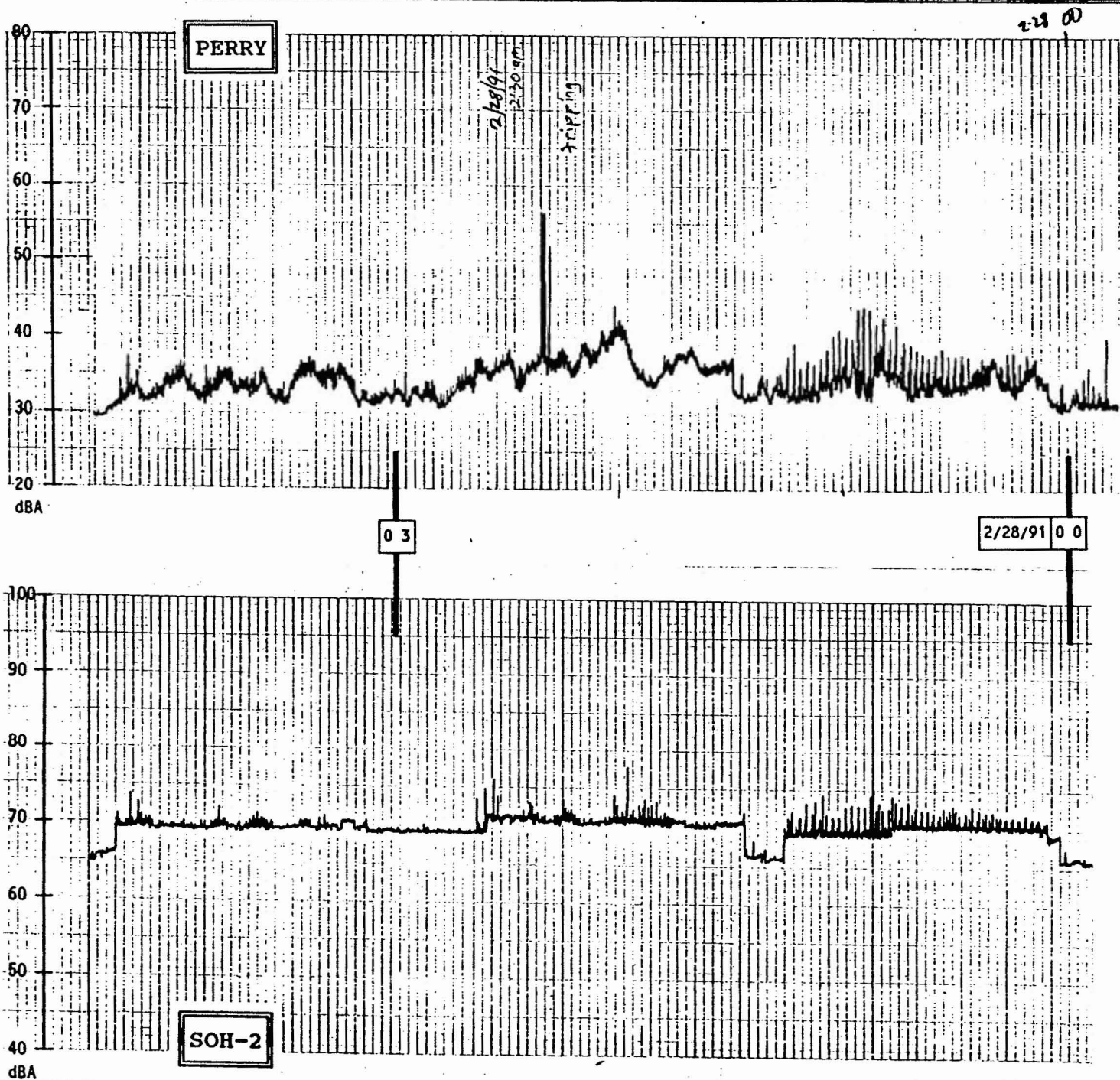




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& ASSOCIATES**
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FIGURE 8. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 9

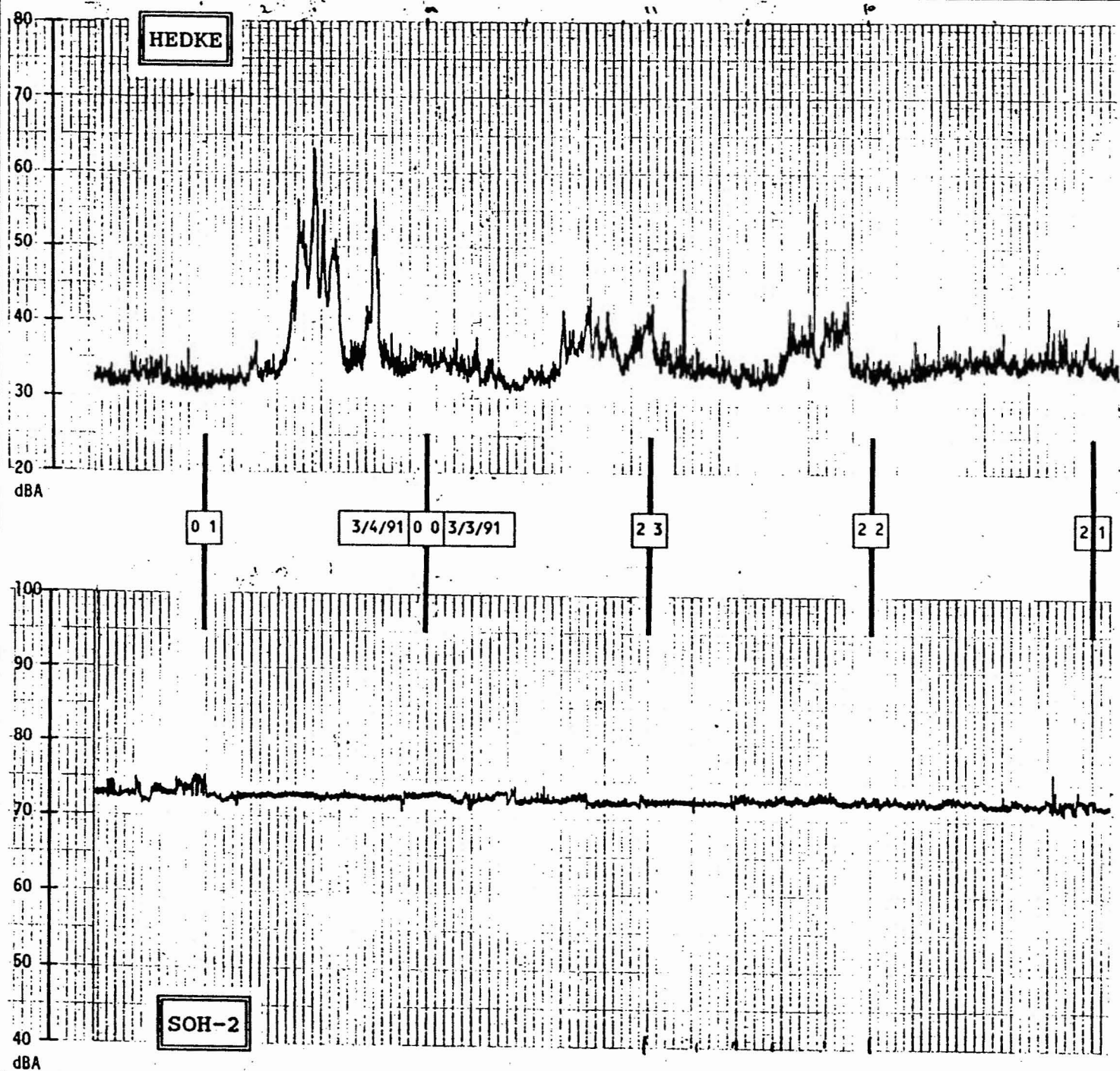




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& ASSOCIATES**
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dba

FIGURE 9. GRAPHIC CHART RECORDINGS
COMPLAINT NO. 10



ENCLOSURE 1

Short-Term Noise Level Measurement Results
Using Ambient Noise Survey Data Sheet

Performed by Mr. Robert Kochy
January 30-31, 1991
SOH-2

Page 1 -- Measurement Locations

Pages 2 through 18 -- Ambient Noise Survey
Data Sheets

2-1-91

R. Kochy

CONTINUED (1 of 2)

SOH-2 Noise level measurement Station Description

- Station 1. - intersection of old airstrip road (line of coconut trees 100 yd N. of drill rig) and upper entrance Rd - located approx. $\frac{1}{4}$ mile WNW of SOH-2
- Station 2. - at Airstrip well - 150 yds N. of SOH-2
- Station 3. - Pahoehoe slab on left side of road approx 100 yds from Perry property gate -
- Station 4 - Heading back to Hwy. on lower entrance Rd where access to SOH-2 intersects. approx $\frac{1}{4}$ mile E.
- Station-5 - Heading back to Hwy. on lower entrance Rd. where Papay Field (above Hedtke) starts approx. $\frac{1}{2}$ mile S. of SOH-2

AMBIENT NOISE SURVEY DATA SHEET

POSITION:

ENGINEER:

DAY OF WEEK: Wed

DATE: 1-30-9

TIME: BEGIN 1555

JOB NO.

FINISH: 1600

CAL: BEGIN

FINISH:

NOTES AND SKETCH:

SKY: Clear

WIND: S - 8-10 mph

dba L₁₀:

LIMITS, dbA:

Airport wall

SAH crew setting up

wind in coconut trees 40-50db

quats 52-54

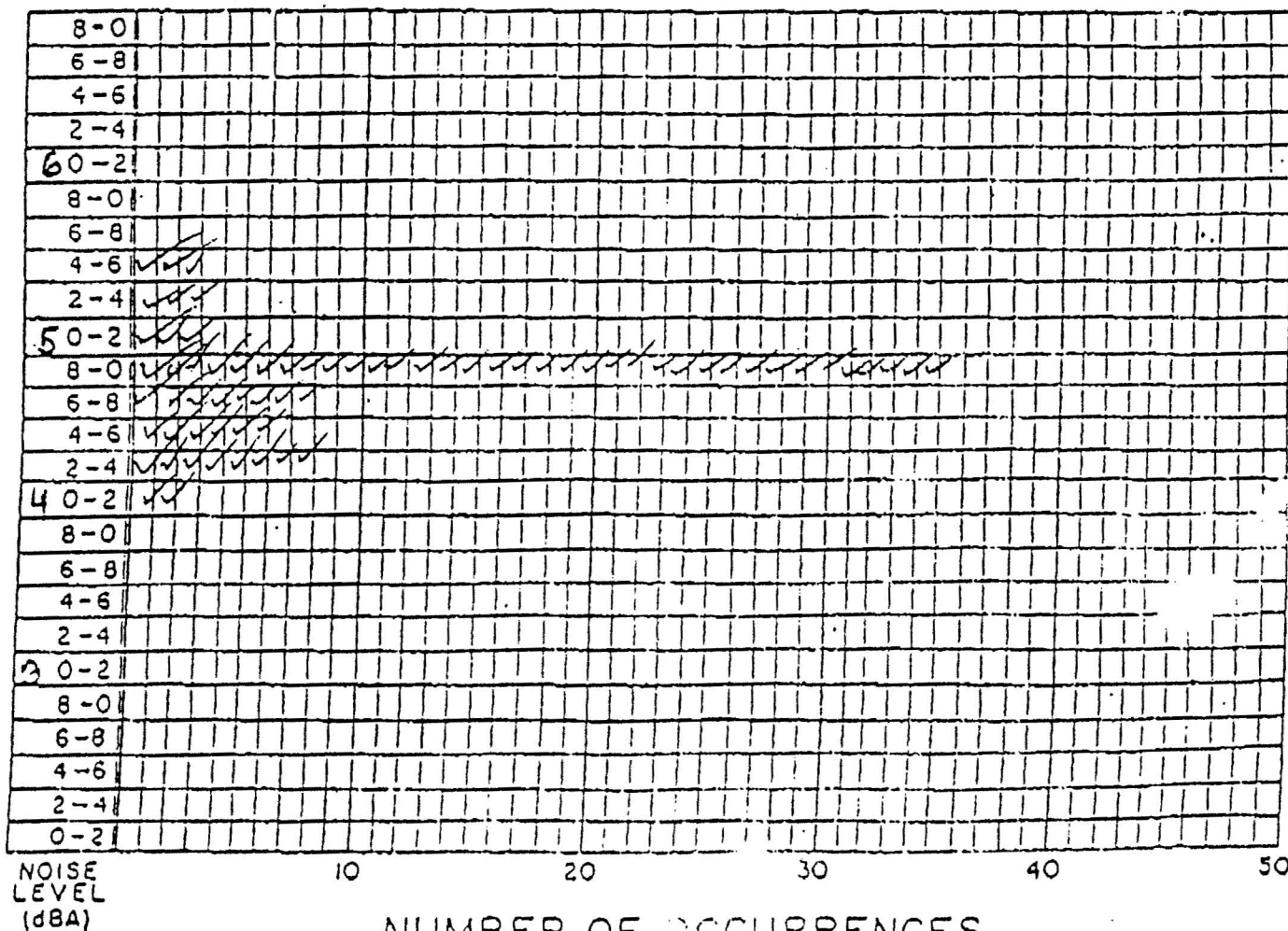
Deisel 51 peak (revving)

Audible equip 45

45db

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: .

ENGINEER: .

DAY OF WEEK: .

DATE: 1-30-90

TIME: BEGIN 1604

CAL: BEGIN .

JOB NO. .

FINISH: 1612

FINISH: .

SKY: clear

WIND: S-8-10 mph

dBA L₁₀: .

LIMITS, dBA: .

NOTES AND SKETCH:

Pahoehoe Slab - (Perry's driveway)

SOH Setting up

Deisel Running - 52 (truck)

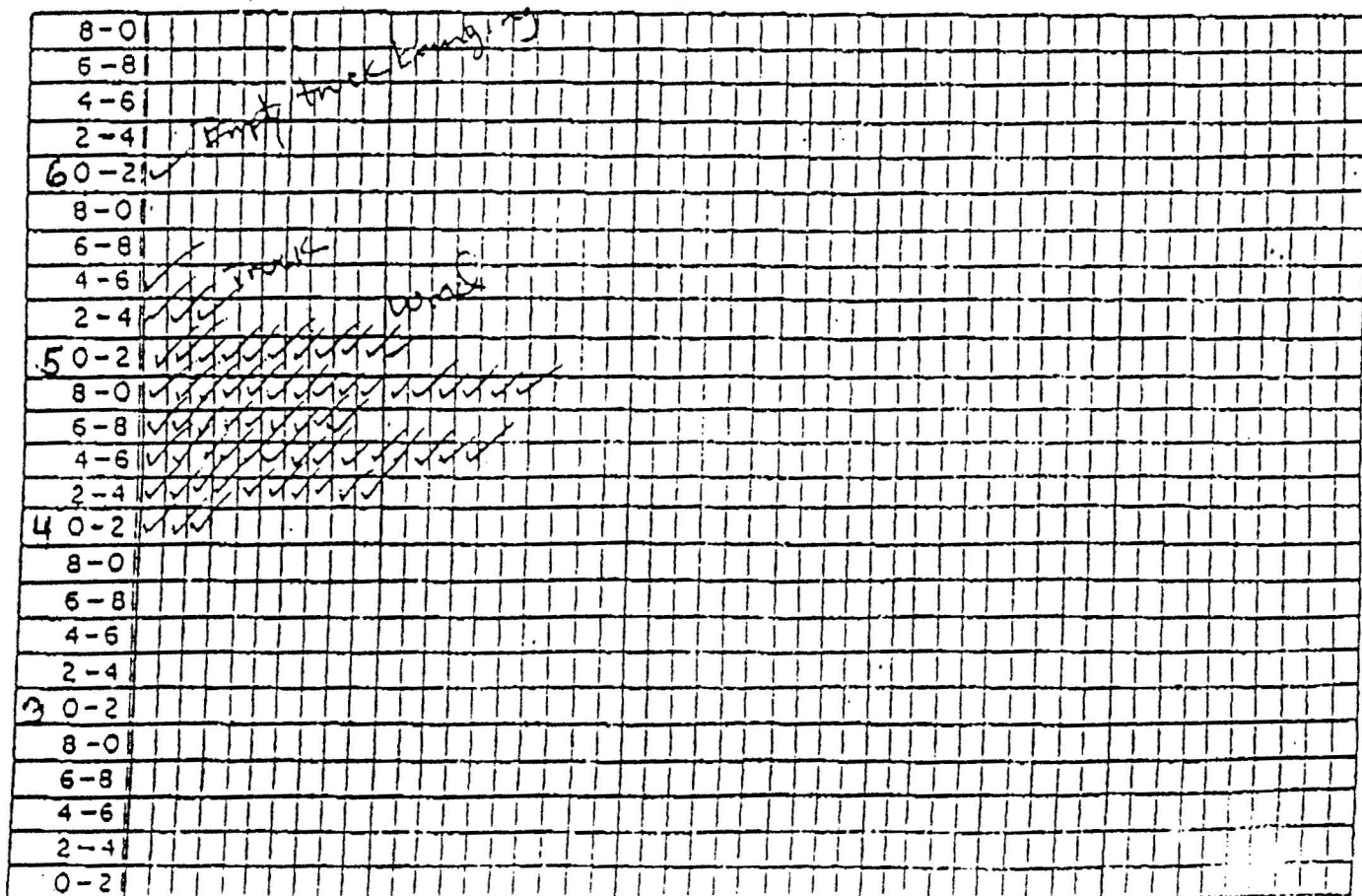
* wind in trees 50 db +
(louder than SOH)

Birds - 44 db

equip noise 46-48

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dBA)

NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: .

ENGINEER: .

DAY OF WEEK: _____ DATE: 1-30

TIME: BEGIN 1015

JOB NO. _____

FINISH: 1619

CAL: BEGIN _____

FINISH: _____

NOTES AND SKETCH:

SKY: Clear

WIND: S - 8-10

dba L₁₀: _____

LIMITS, dbA: _____

wind in trees - ~~38-40~~ db

Birds ~~42~~

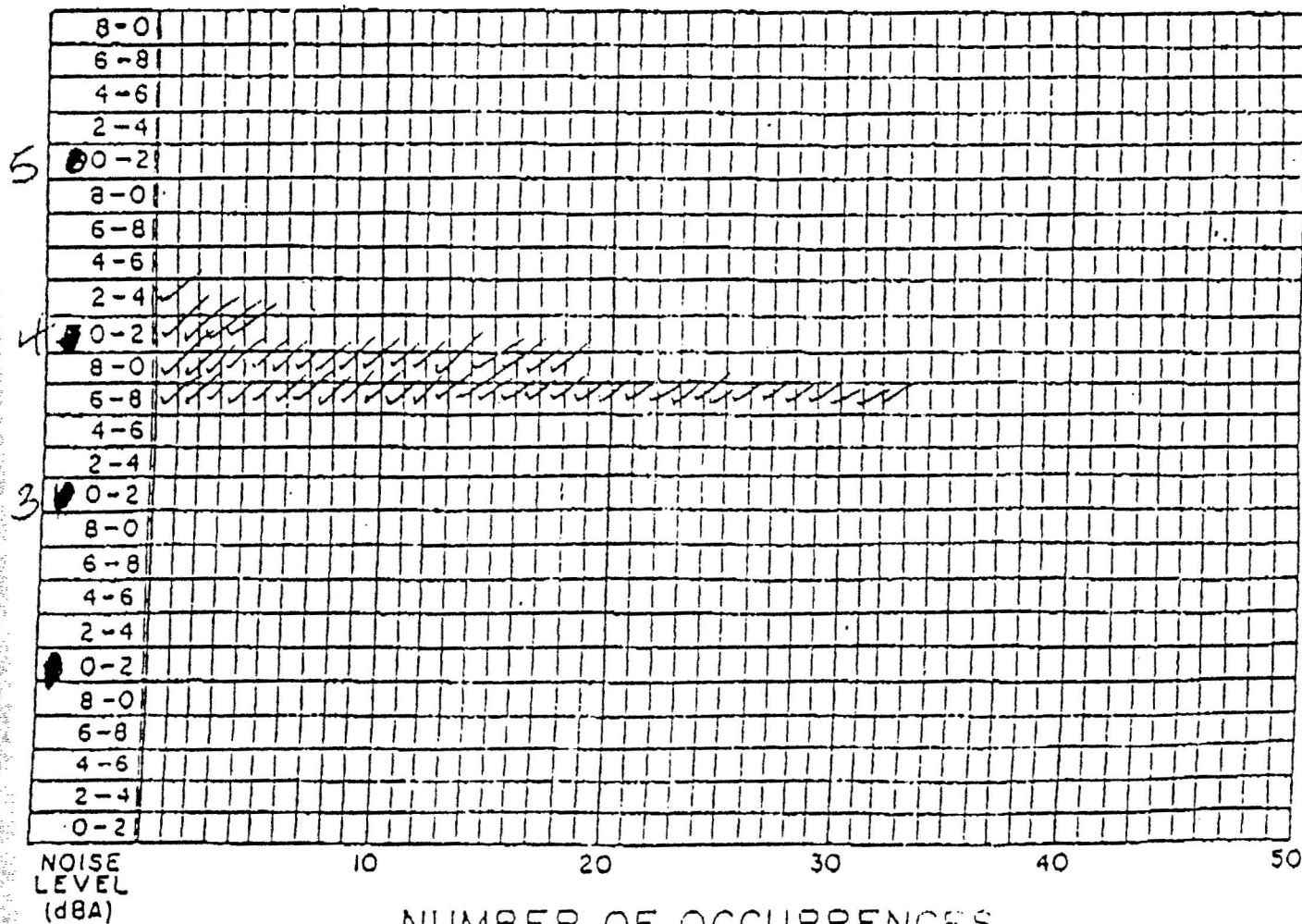
wind only

NO SON equip available

Cars on Hwy audible 44 db

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dba)

NUMBER OF OCCURRENCES

Sct 2

AMBIENT NOISE SURVEY DATA SHEET

POSITION: Sct 2
ENGINEER: Kathy
DAY OF WEEK: Wed DATE: 1-30-91 TIME: BEGIN 1959 FINISH: 2001
CAL: BEGIN _____ FINISH: _____
NOTES AND SKETCH: SKY: Cloudy
WIND: NONE
dBA L₁₀: _____
LIMITS, dBA: _____

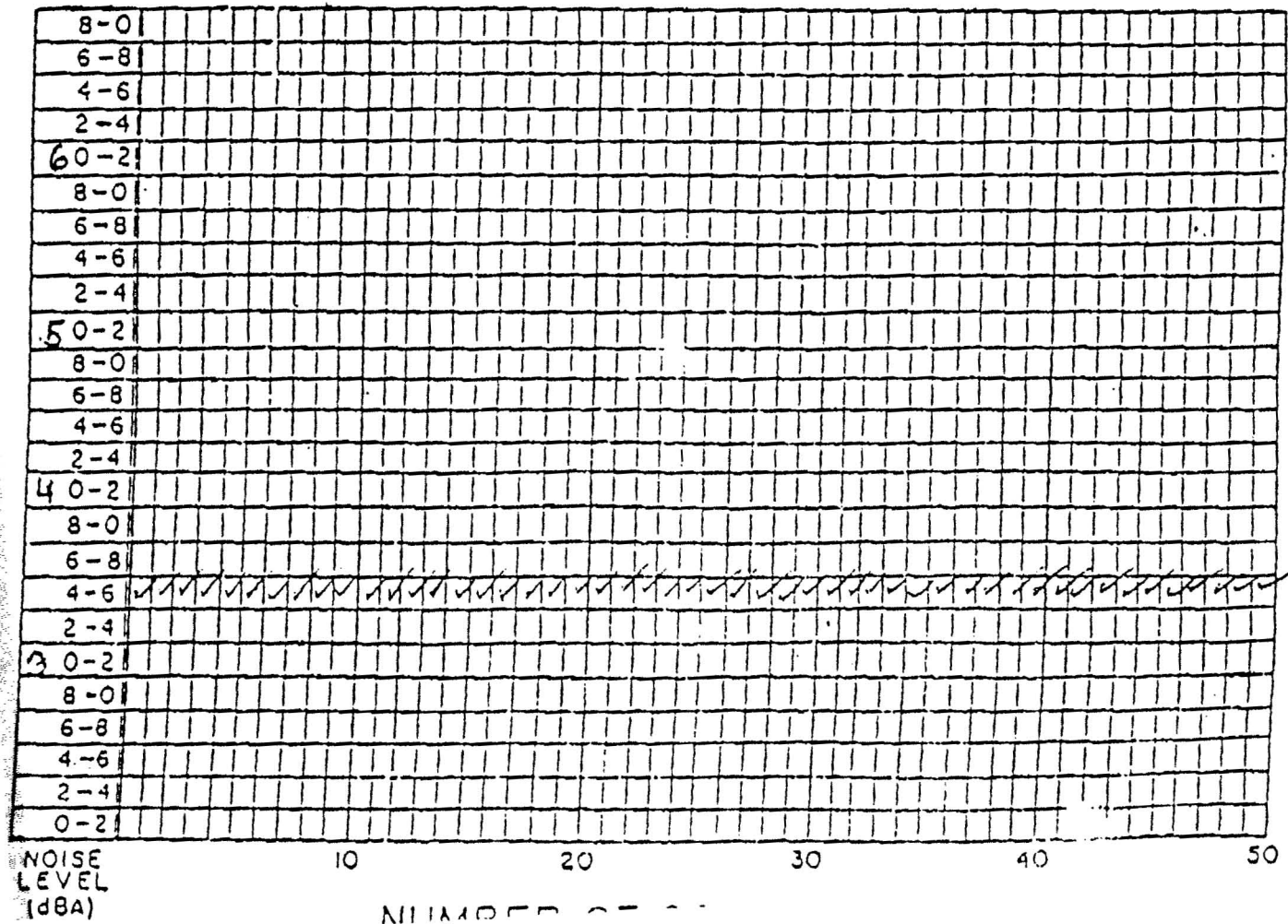
Airstrip int. - ①

Cricket chorus 35-36 db

NO SOH operations

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: Sat-2

ENGINEER: Kathy

DAY OF WEEK: Wed

DATE: 1-30-91

TIME: BEGIN 2009

CAL: BEGIN

JOB NO. _____

FINISH: 2012

FINISH: _____

SKY: Overcast

WIND: NONE

dB A L₁₀: _____

LIMITS, dBA: _____

NOTES AND SKETCH:

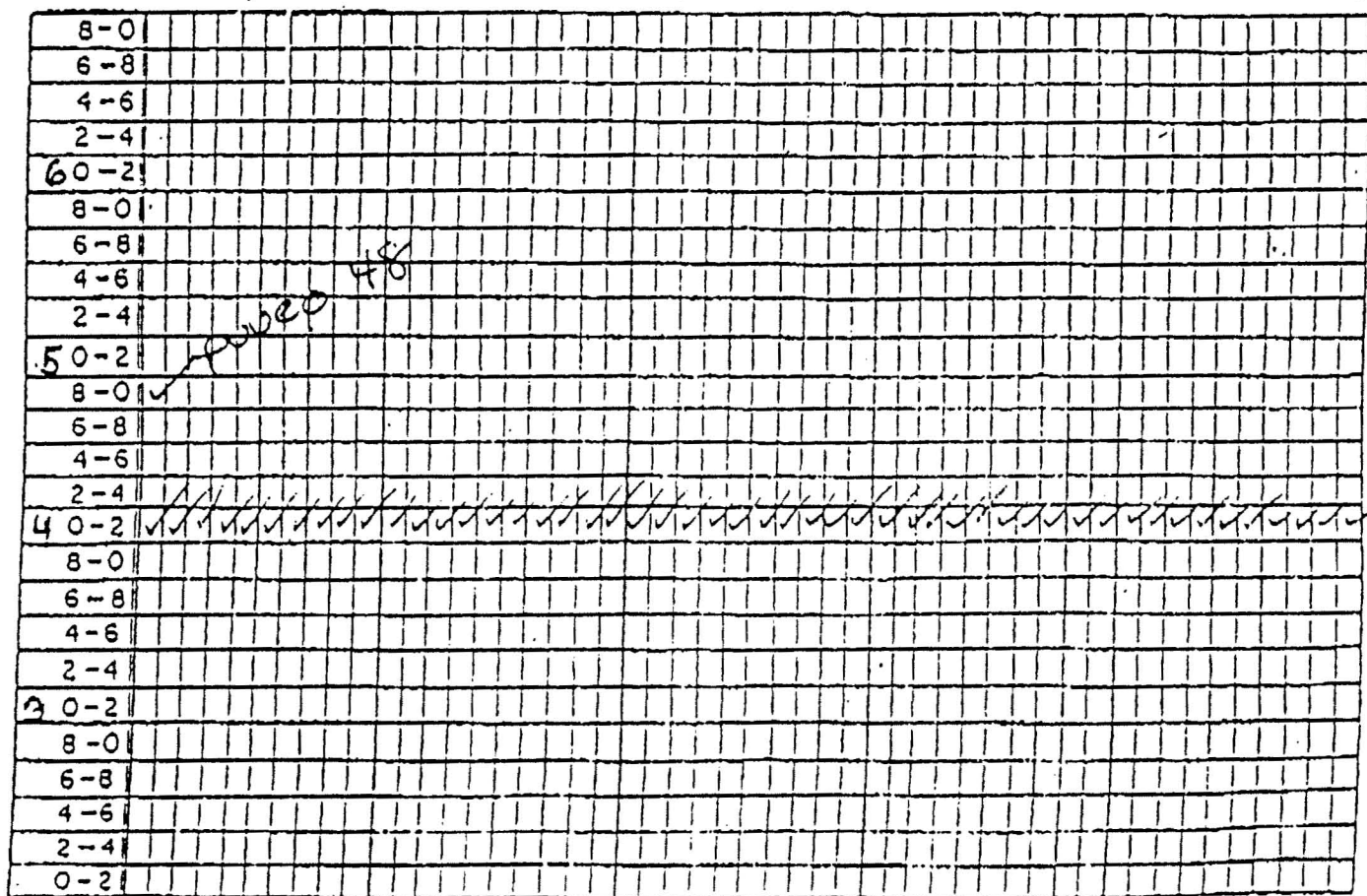
(3) Pumps pahoehoe

Crickets + cicadas only

No Sch operations

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dBA)

NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SCH 2

ENGINEER: Kochly

DAY OF WEEK: Wed

DATE: 1-30-9

TIME: BEGIN 2016

JOB NO. _____

FINISH: 2018

CAL: BEGIN _____

FINISH: _____

NOTES AND SKETCH:

SKY: overcast

WIND: None

dba L₁₀: _____

LIMITS, dbA: _____

④ Papaya field above Hedike

Cricket chorus -(Nocirculus)

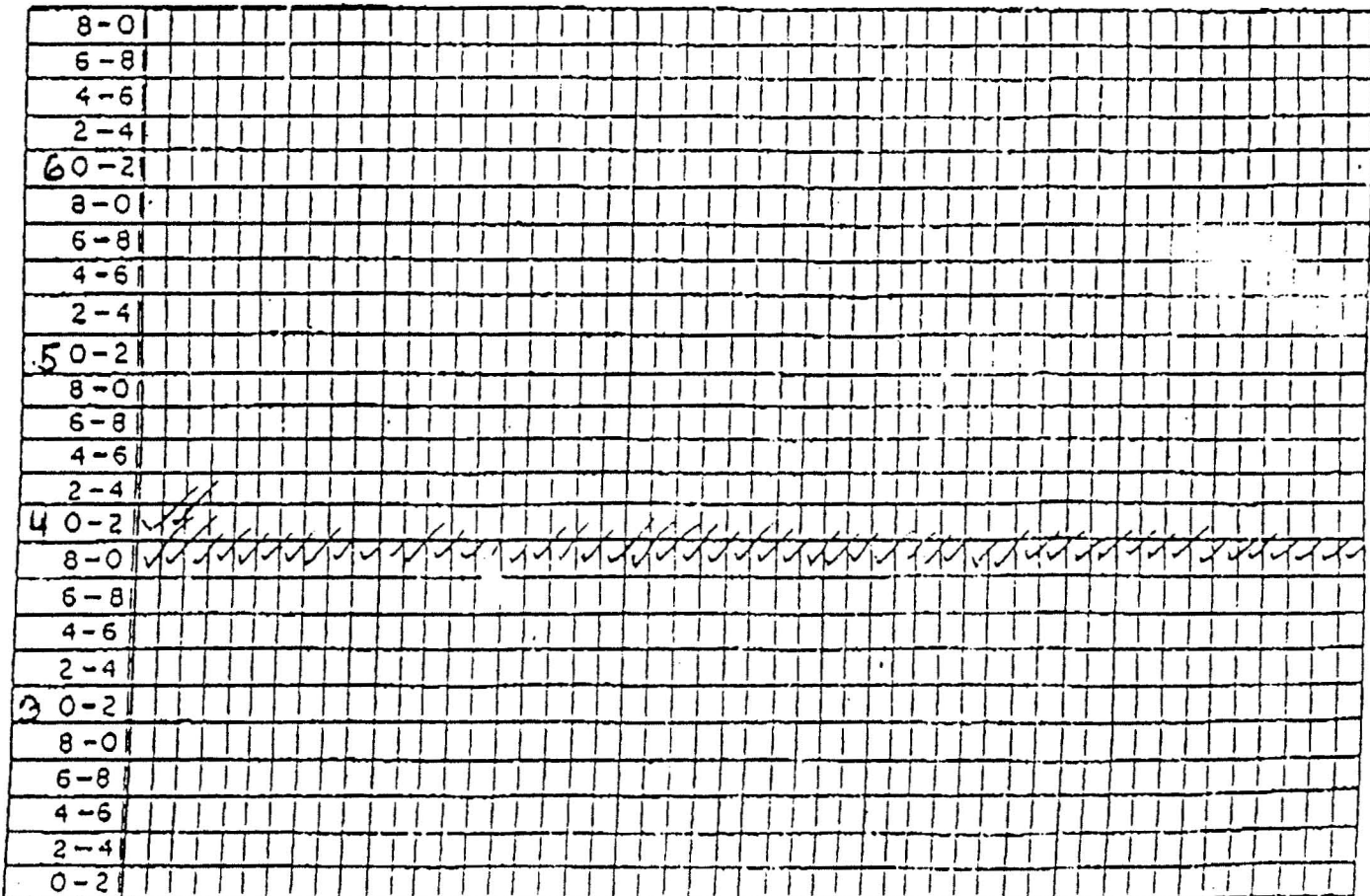
38-40 db. occasional 42

Very still...

NO SCH operations

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dba)

NUMBER OF OCCURRENCES

Set 3

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SCH-2

ENGINEER: Kochy

DAY OF WEEK: Thurs DATE: 1-31-91 TIME: BEGIN 0842

JOB NO. _____

FINISH: 0846

CAL: BEGIN _____

FINISH: _____

NOTES AND SKETCH:

SKY: Clear-Sunny

WIND: SW-5-7

dba L₁₀: _____

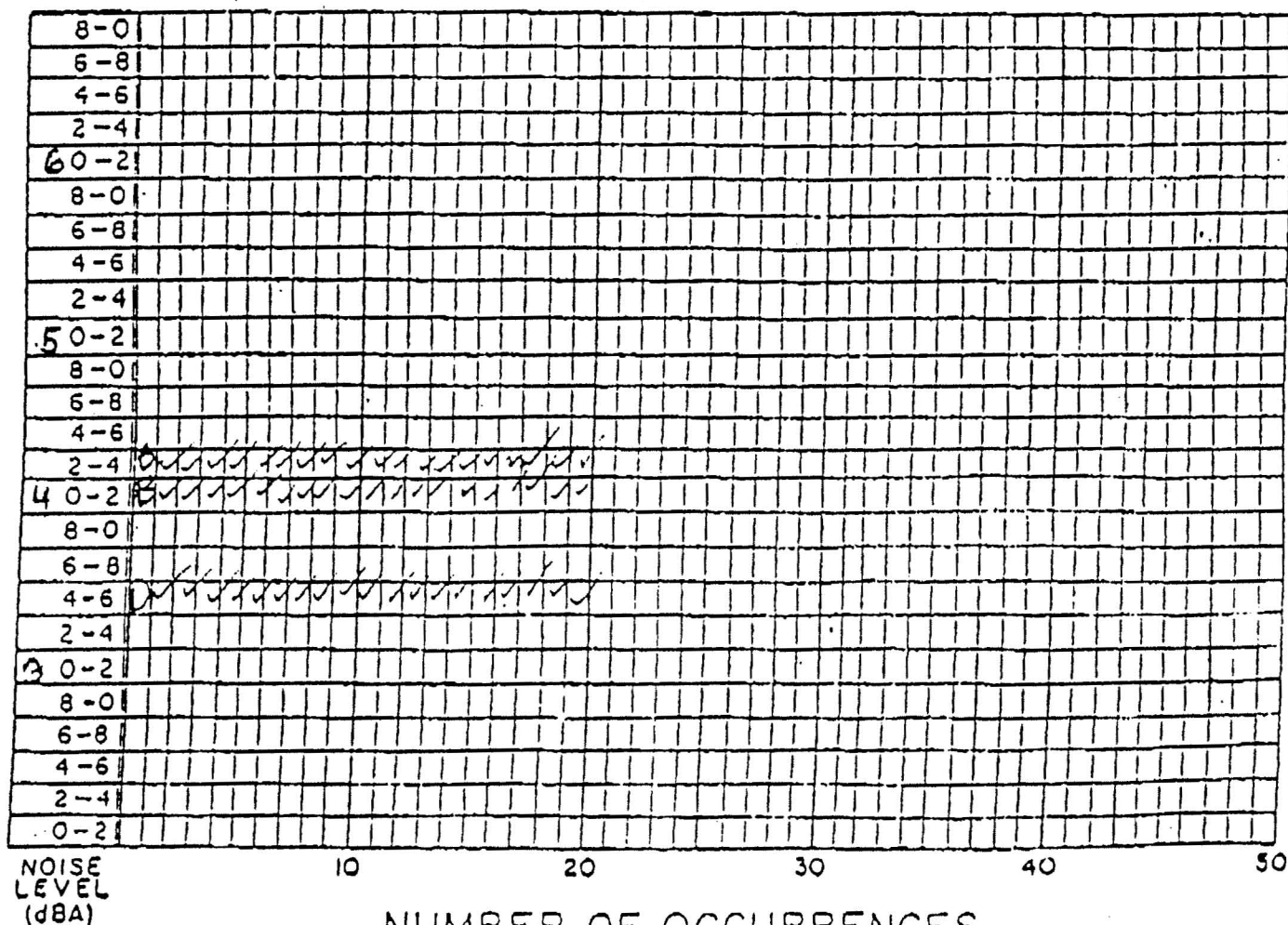
LIMITS, dba: _____

Airport-Tnt. No machinery sounds audible
① just Birds

B-Bird 42-44
D=Dove - 35

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2
ENGINEER: Kocit

DAY OF WEEK: Thurs DATE: 1-3-91 TIME: BEGIN 0852
CAL: BEGIN _____

JOB NO. _____
FINISH: 0857
FINISH: _____

NOTES AND SKETCH:

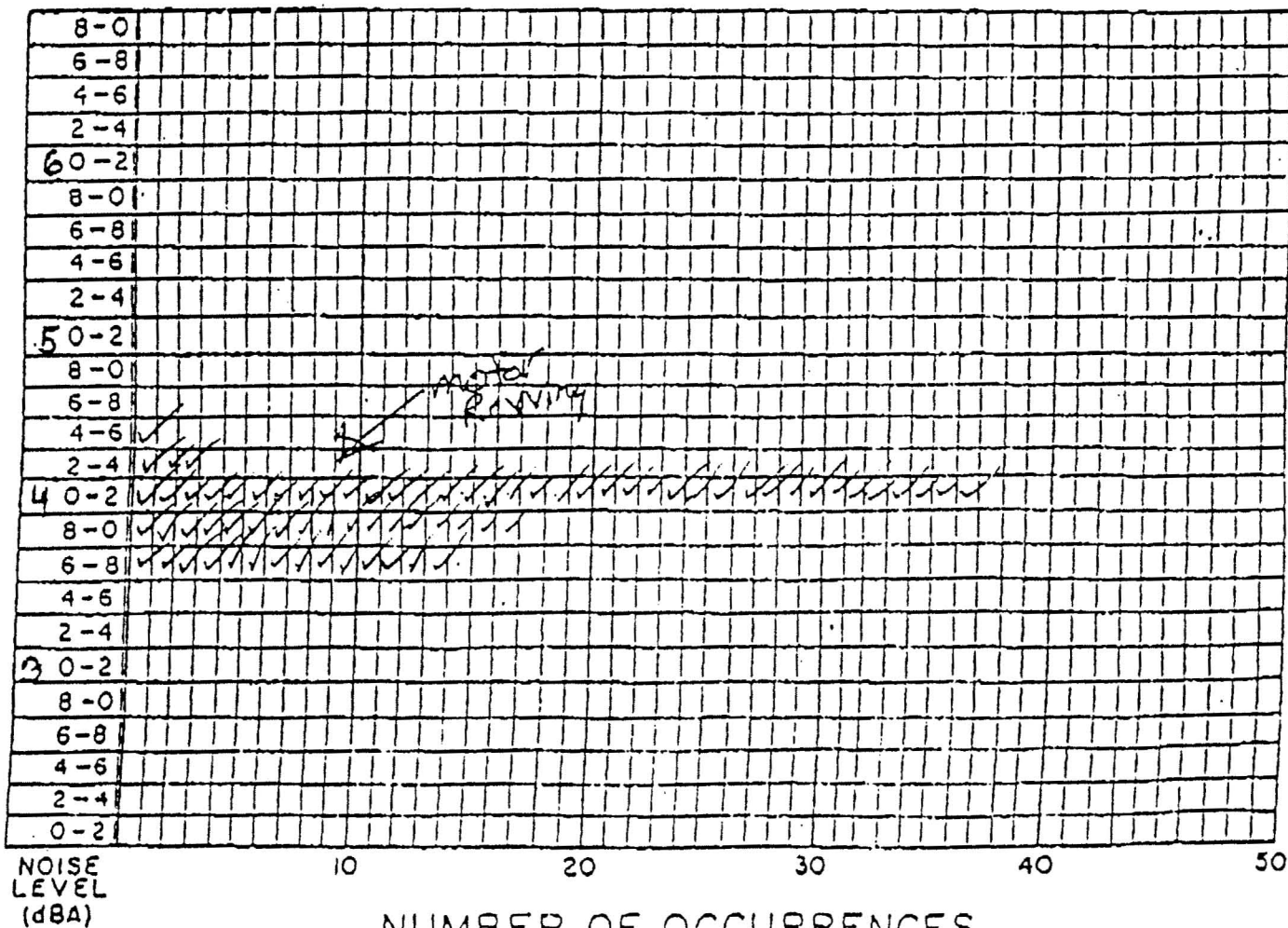
SKY: Clear-Sunny (Hazy)
WIND: 5-7 S-SW
dBA L₁₀: _____
LIMITS, dBA: _____

Pumps pahoehoe - more wind than
(3) 14st 3 sta.

SOH motor running 42
wind in trees 37-39 db

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2
ENGINEER: Koch

DAY OF WEEK: Thurs DATE: 1-31-91 TIME: BEGIN 0858
CAL: BEGIN _____

JOB NO. _____
FINISH: 0904
FINISH: _____

NOTES AND SKETCH:

SKY: Clear-Sun-Hazy
WIND: S-SW 5.7
dBA L₁₀: _____
LIMITS, dBA: _____

④. SOH Ent. RD (1/4 mi. E of hde)

42 db SOH equip running (generator)
Cardinal 46 db

Rusty pump in noisy truck
million missing-tim. over 80 db

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top

8-0	4	
6-8		
4-6		
2-4		
0-2	1	1
8-0	1	
6-8		
4-6		
2-4		
0-2	1	1
8-0		
6-8	1	1
4-6	1	1
2-4	1	1
0-2	1	1
8-0		
6-8	1	1
4-6		
2-4		
0-2	1	1
8-0		
6-8		
4-6		
2-4		
0-2	1	1

NOISE
LEVEL
(dBA)

10

20

30

40

50

NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: 2014-2.

ENGINEER: KOCHY

DAY OF WEEK: Thurs

DATE: 1-3-79

TIME: BEGIN

0908

JOB NO.

FINISH: 0912

CAL: BEGIN

FINISH:

NOTES AND SKETCH:

SKY: Clear - Hazy

WIND: S-SW - 4.5

dB A L₁₀: _____

LIMITS, dBA: _____

⑤ pupus above Hake - very little wind.
trees not moving.

No Soft audible

Distant Birds 3.2 ab.

Total # Samples	Upper Limit	L10	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top

[illegible]

NOISE
LEVEL
(dBA)

10

20

30

40

50

NUMBER OF OCCURRENCES

SA4

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2

ENGINEER: Kochy

DAY OF WEEK: Thurs DATE: 1-31-91 TIME: BEGIN 1830

CAL: BEGIN

JOB NO. _____

FINISH: 1834

FINISH: _____

NOTES AND SKETCH:

SKY: Partly Cld.

WIND: NONE

dBA L₁₀: _____

LIMITS, dBA: _____

Airport Int. (Sta. 1)

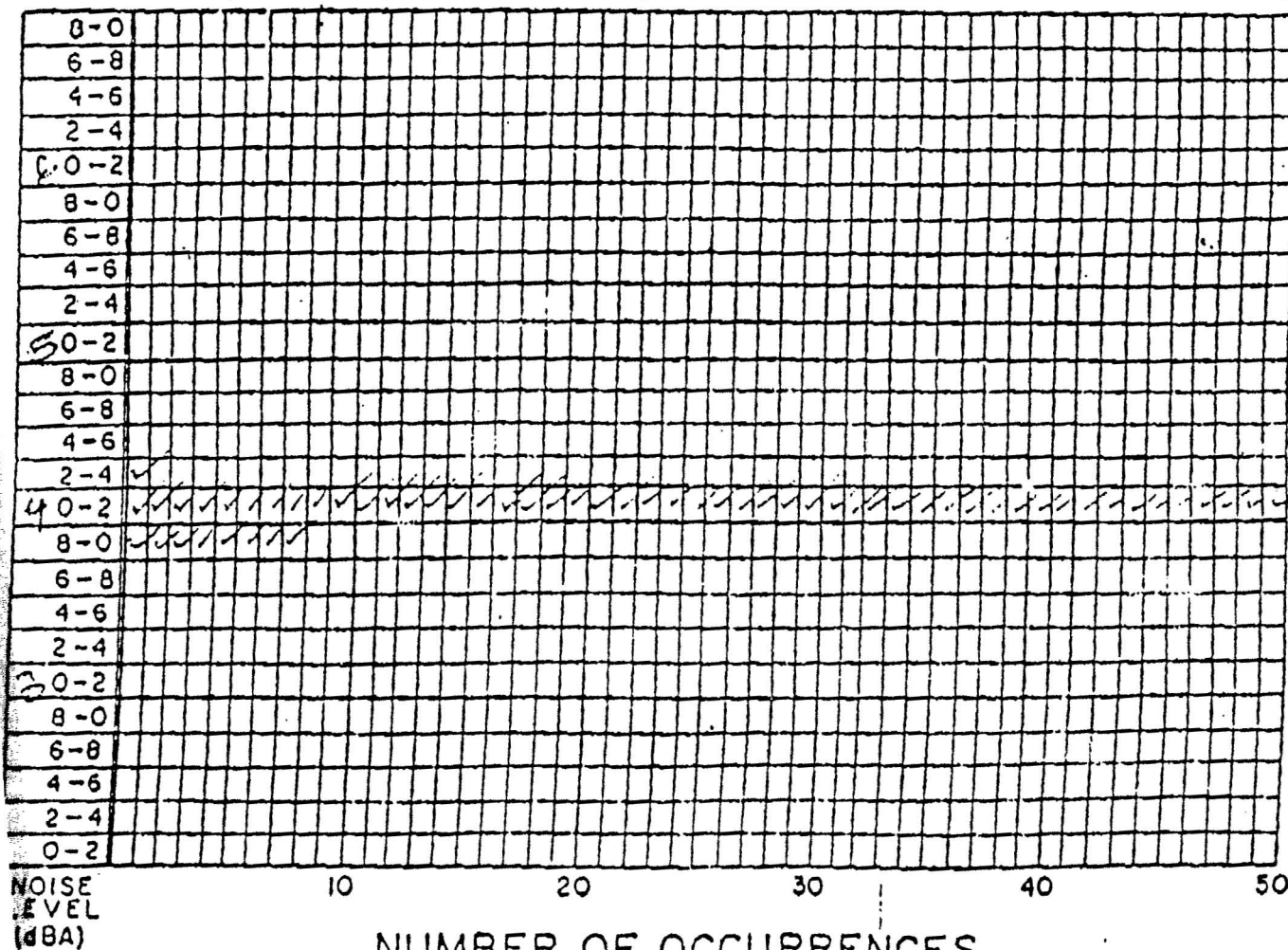
SOH generator running

lots of crickets nearby 40 db - 42

men talking clearly audible

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NUMBER OF OCCURRENCES

AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2

ENGINEER: Kathy

DAY OF WEEK: Thurs

DATE: 1-31-41

TIME: BEGIN 1835

CAL: BEGIN

JOB NO. _____

FINISH: 1840

FINISH: _____

SKY: clear

WIND: none

dba L₁₀: _____

LIMITS, dba: _____

NOTES AND SKETCH:

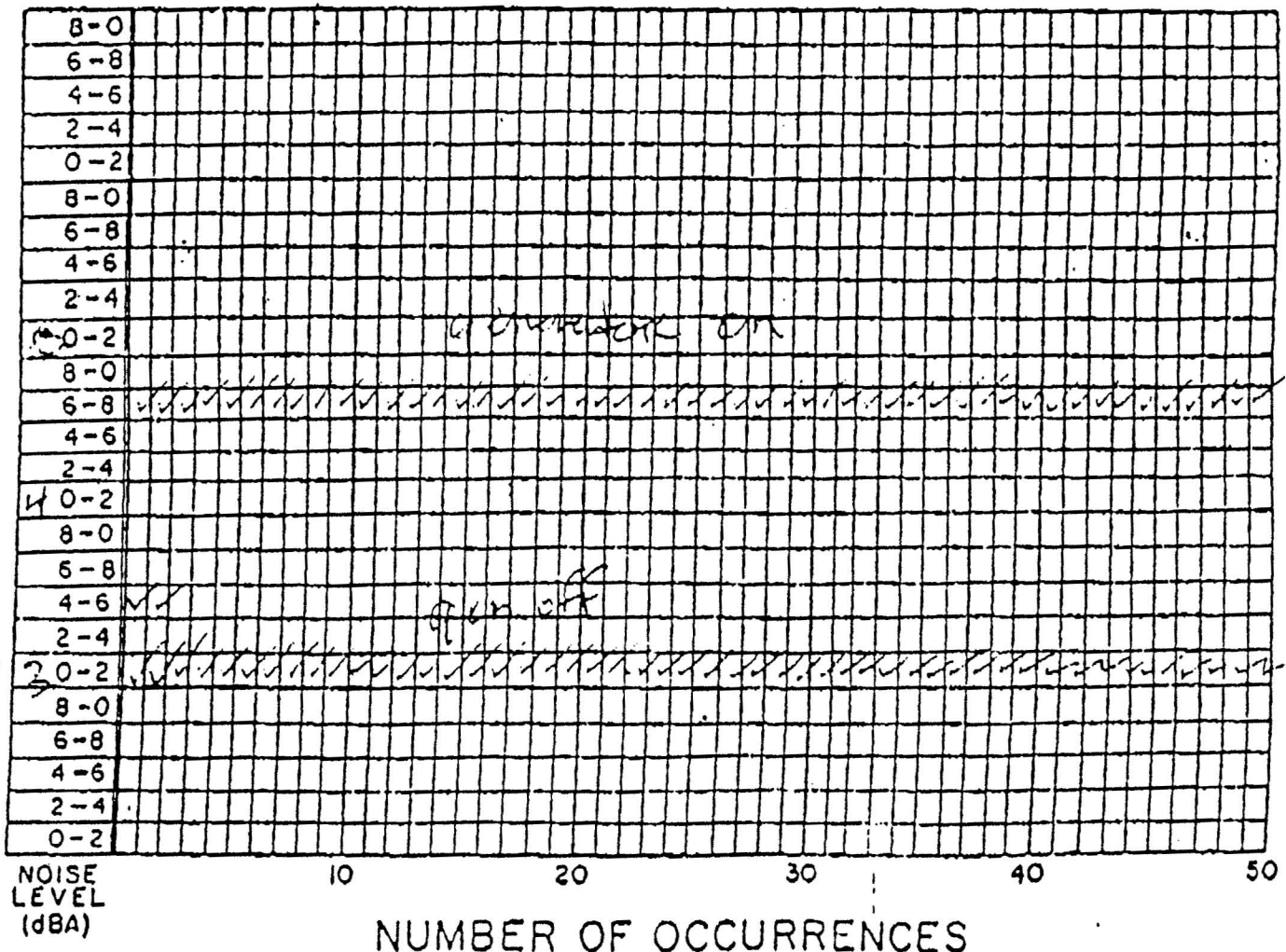
report well (Sta. 2)

Sat gen running 47-48 db
Guys talking

1836 gen off - 32-34
(Crickets)

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2ENGINEER: KennyDAY OF WEEK: Thurs DATE: 1-31-11 TIME: BEGIN 1840

JOB NO. _____

FINISH: 1843

CAL: BEGIN _____

FINISH: _____

NOTES AND SKETCH:

SKY: ptly cldyWIND: NONE - slightdBA L₁₀: _____

LIMITS, dBA: _____

Penny's Panchores (Sta. 3)

generator running to SE

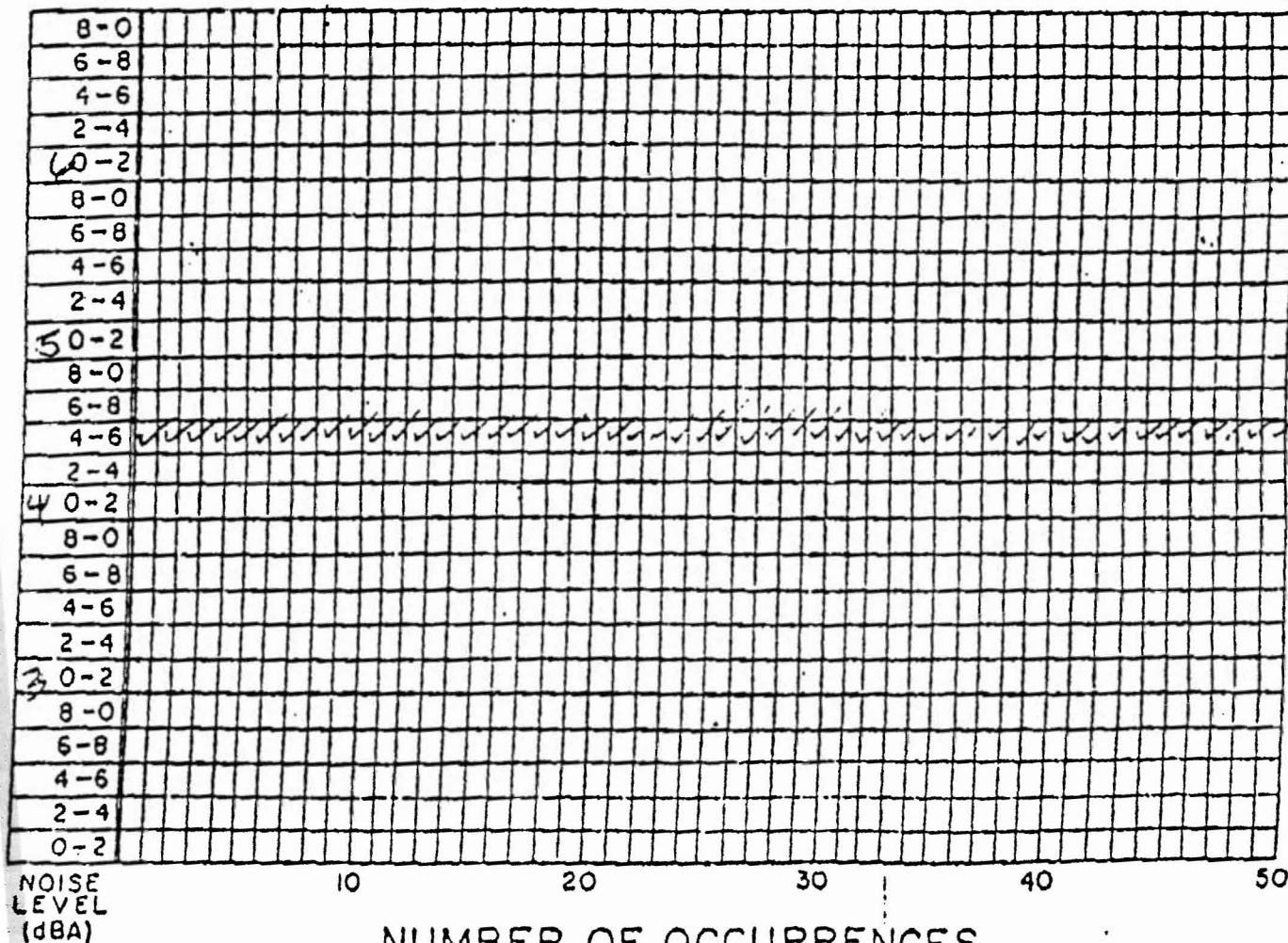
NO SOH audible (nothing running)

crickets only 45 db.

Spot ✓ ent. Rd. (32-34 crickets)
(Sta 4.)

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



AMBIENT NOISE SURVEY DATA SHEET

POSITION: SOH-2

ENGINEER: Kouty

DAY OF WEEK: Thurs

DATE: 1-31-91

TIME: BEGIN 1852

CAL: BEGIN _____

JOB NO. _____

FINISH: 1856

FINISH: _____

SKY: clear

WIND: WNE - (SLIGHT S)

dba L₁₀: _____

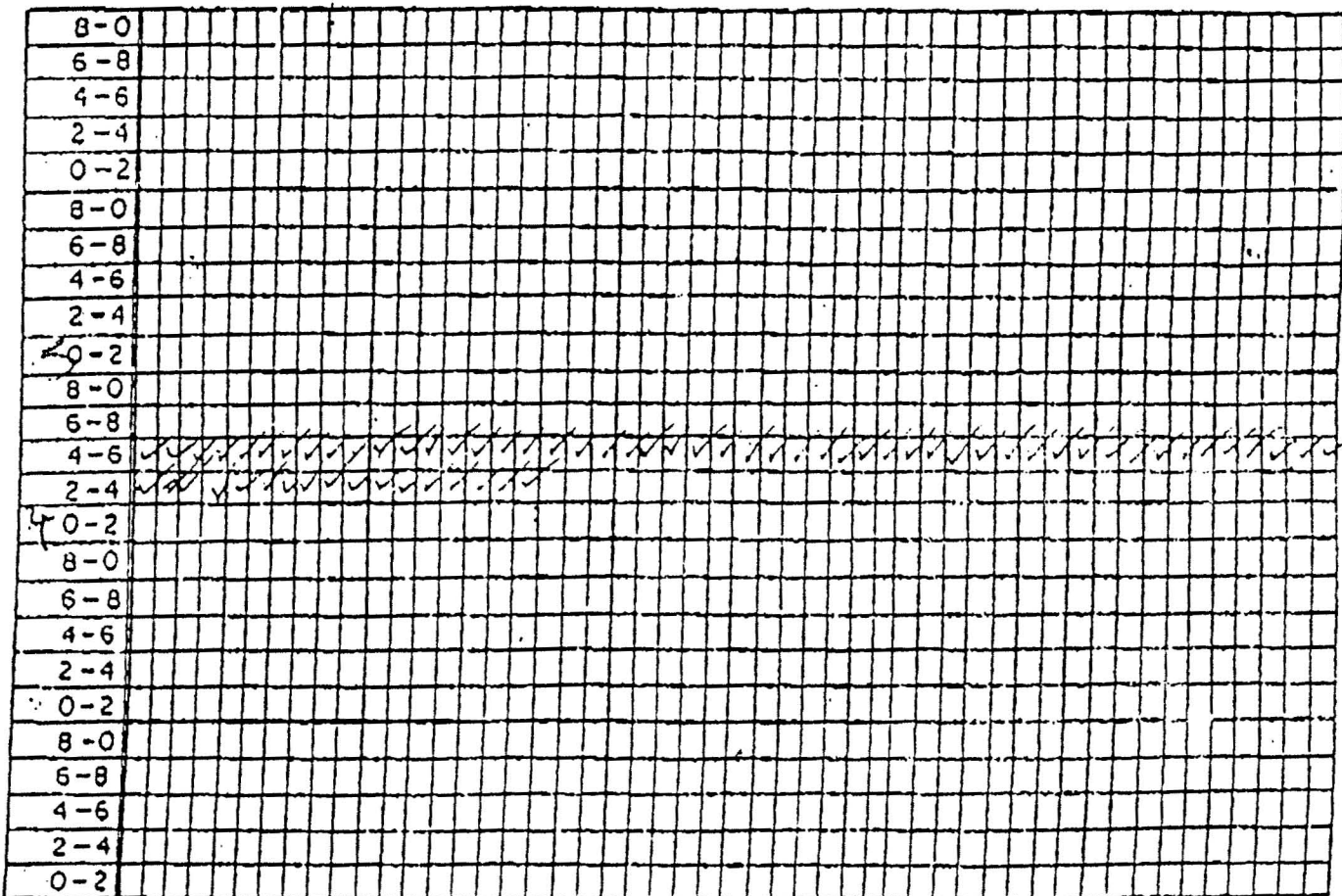
LIMITS, dbA: _____

NOTES AND SKETCH:

P.F.A.H. - (Stk. 5)
(Papaya field above Hedtke)
Dogs Barking - 46
Cars on Hwy audible
Plenty crickets - 44-45 db

Total # Samples	Upper Limit	L ₁₀	Lower Limit
50	1st	5th	10th
100	5th	10th	17th
150	8th	15th	23rd
200	12th	20th	29th
250	16th	25th	35th
300	20th	30th	41st
350	25th	35th	47th

sample from the top



NOISE
LEVEL
(dba)

NUMBER OF OCCURRENCES

APPENDIX D
FINANCIAL REPORT

DBED \$5,601,000

AGREEMENT FOR A GEOTHERMAL RESOURCE DEVELOPMENT, HAWAII (RCUH 3908-00)

BUDGET CATEGORY	AMOUNT AWARDED	AMOUNT EXPENDED AS OF 3/31/91	AMOUNT ENCUMBERED	AVAILABLE BALANCE
Salaries	\$175,100.00	\$90,872.43	\$0.00	\$84,227.57
Fringe	\$44,400.00	\$11,889.42	\$0.00	\$32,510.58
Equipment	\$165,000.00	\$109,518.90	\$11,766.24	\$43,714.86
Supplies	\$350,500.00	\$557,387.25	\$40,027.58	-\$246,914.83
Travel	\$45,000.00	\$36,380.54	\$2,552.30	\$6,067.16
Consultant	\$283,000.00	\$360,960.62	\$36,184.83	-\$114,145.45
Publications	\$0.00	\$0.00	\$0.00	\$0.00
Miscellaneous	\$162,000.00	\$289,907.04	\$96,747.26	-\$224,654.30
Indirect Costs	\$50,000.00	\$50,000.00	\$0.00	\$0.00
Drilling	\$4,326,000.00	\$2,450,559.83	\$39,489.84	\$1,835,950.33
TOTAL	\$5,601,000	\$3,957,476.03	\$226,768.05	\$1,416,755.92