Assessment of Geothermal Development Impact on Aboriginal Hawaiians

by
PUNA HUI OHANA

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Pahoa, Puna, Hawaii

Prepared for the U.S. Department of Energy
Under Contract No. DE-FC03-79ET 27133

ASSESSMENT OF GEOTHERMAL DEVELOPMENT IMPACT
ON TECHNICAL MANPOWER

Principal Investigator: Mr. Peter [illegible]

Project Director: Mr. Everett Hirney

Project Consultant: Dr. Jerry [illegible]

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PREFACE

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The Puna Hui Ohana is an organization of the Puna Hawaiian community, and is comprised of a Board of Directors representing the concerns of the youth, young adults, parents and elders of the community. The Hawaiian communities' concern about the possible effects of geothermal development on their culture and lifestyle was the stimulus for the project which is the subject of this report.

Environmental impact statements are normally researched and written by professional people, partly because the emphasis is most often on the physical impact of development, which requires considerable technical skill to understand. The social and cultural impacts of energy development projects are also typically assessed by professional people (social scientists); however, much of the work in this area cannot be done effectively without the full and honest cooperation of the members of the community. The assessment of social and cultural effects is a newer and less clearly defined process, and there is a need to develop and test new methodologies in this area. The model used by this project reversed the typical scientist/community relationship by being built around a representative community-based organization from the outset, and contracting for the necessary professional services. Thus the aboriginal Hawaiian community assessed the potential social and cultural impact of geothermal development on itself with relevant professional help; rather than social scientists doing the assessment with the assistance of the community. The results of this

effort and an evaluation of the model's advantages and disadvantages constitute the content of this final report.

One result of the Puna Hui Ohana experience was the feeling that the community "bit off more than it could chew." The complexities of assessing the effects of geothermal development on the social and cultural characteristics of the Aboriginal Hawaiian Community of Lower Puna call for much more investigation than the resources of the present project could provide. There is a clear need for additional baseline data collection as well as a continuing monitoring of the variables investigated by this project. It is hoped that, at the least, the present effort provides a solid set of baseline data about community attitudes and cultural characteristics against which the effects of future geothermal development in Puna can be compared and changes documented.

The final report was prepared by the program director and the project consultant. The program director, with the editorial assistance of Ms. Stephanie Mathews, wrote chapters 3, 5, 7, 8 and 9; and the project consultant wrote chapters 1, 2, 4, 6, 10 and 11.

ACKNOWLEDGMENTS

Acknowledgments are always difficult to write for fear of some omission. However we would like to thank, on behalf of the Puna Hui Ohana, the following people for their contributions to the Project. Most importantly, we are grateful to the members of the Puna Hawaiian Community for their cooperation with the research effort. Being the target of study by oneself is probably only slightly less intimidating than being the subject of someone else's study; and only the willingness of the community to engage in such extensive self-study made the Project possible. The office staff of the Hui (Maheala Naungayan, Sheila Bright, Pearl Kajiyama, Linda Enriquez, Kauamakani Elia) provided support well beyond their normal level of responsibility throughout the Project, and their willingness to extend themselves is appreciated very much. The Project Advisory Board (Ann Nathaniel, Brenda Lee, Edward Kanahele, Dr. Craig Severance, David Hess) was most helpful to the staff in maintaining a community perspective on the Project activities. Professors Bill Chen, Craig Severance and Mark Mathews provided valuable technical assistance and consultation; and Professor Lee Howard and Ms. Jan Ayabe were indispensible in their assistance in the computer analysis of the survey data. Ms. Stephanie Mathews did an exceptional job of providing editorial help with the final report under greater time pressure than anyone should be subjected to. Finally, Ms. Jan Ayabe, Ms. Pam Iwanaga, Ms. Stephanie Mathews and Ms. Kate Crosson were wonderfully understanding and flexible during their typing of the final report.

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Section one of the report discusses the need for an examination of the social and cultural impacts likely to occur with geothermal development in Puna and presents a historical summary of the Puna Hui Ohana's involvement in articulating this need to government agencies and geothermal developers. A summary of the major objectives of the Project and the methods used to reach them is also presented.

CHAPTER 1
INTRODUCTION

Geothermal development in the State of Hawaii offers the possibility of an alternate energy source which could markedly reduce the State's dependency on imported fuels for energy production. At the present time research into the technical feasibility of utilizing this energy and the potential for commercialization of it is being conducted in the Puna District of the Island of Hawaii. To date this research has focused on the technical problems the use of geothermal energy in Hawaii presents, rather than the social, cultural and economic consequences which possible development and utilization might bring. There is concern among the residents of Puna, particularly the longtime Aboriginal Hawaiian residents, about how such development might influence the lifestyle of their community, and how it would relate to their cultural values and beliefs. This report is the result of a research project designed to assess the impact of geothermal development on the social, cultural, and economic structure of the Puna Hawaiian Community.

The Hui's Entry into Geothermal Concerns

The Puna Hui Ohana's interest in geothermal development grew out of the public's confusion over recent discoveries of geothermal potential and the subsequent land-lease negotiations for geothermal rights. The activities of land speculators and pressure from agents representing several interested oil companies prompted 44 Native-Hawaiian land owners to appeal to the

Puna Hui Ohana for advice, guidance, and an investigation of the overall Hawaiian Community concerns.

Native Hawaiian rights groups were also expressing serious concern over establishing the ownership of the geothermal resource. In addition they were concerned about traditional Hawaiian beliefs regarding the uses of the geothermal steam. For example, it was suggested that Madame Pele, the Hawaiian fire goddess, would be offended by geothermal drilling, with potentially disasterous consequences for the Puna community.

The concerns described above were voiced by a number of Hawaiians, including representatives of the Puna Hui Ohana, at an international conference of the Geothermal Resources Council held in Hilo in July, 1978. The Department of Energy staff attending the conference indicated a willingness to consider funding a proposal from the Hawaiian Community to conduct a study to address the social and cultural implications of geothermal development for Aboriginal Hawaiians. A proposal submitted by the Puna Hui Ohana was funded by the Department of Energy, and this report summarizes the results of that study.

Objectives of the Project

The major objectives of the Project can be described as follows:

1. Description of the lifestyle and cultural characteristics of the Puna Hawaiian Community.
2. Collection of information about the probable effects of geothermal development in Puna.

3. Establishment of an effective communication system within the Hawaiian Community.
4. Survey of Hawaiian Community attitudes about geothermal development.
5. Communication of Hawaiian concerns and attitudes to appropriate government decision making bodies.
6. Evaluation of the Project's community-based model of social and cultural impact assessment.

The chapters to follow describe the methods and procedures used to accomplish these objectives, the outcomes of the study, and an evaluation of the Project.

CHAPTER 2

PROJECT METHODOLOGY

In order to establish a strong relationship between the Project activities and the broader Puna Hawaiian Community all Project staff members selected were Hawaiian residents of the community. The nature of the staff was expected to be an asset in building rapport with respondents during the structured surveys, and in facilitating communication within the community about Project activities. In addition, the learning experiences of the staff in gathering the data for the Project would make them better informed about the process and possible consequences of geothermal development and would thus serve an educational role.

A variety of procedures were used to gather information relevant to the project objectives. Existing information about geothermal development was collected and organized in the Hui library, and a number of conferences, workshops and meetings about geothermal development were attended by Project staff. Site visits by project staff and members of the Hui were made to existing geothermal fields in California and New Zealand in order to obtain firsthand exposure to developed geothermal fields. Both anecdotal observations and unstructured interviews provided initial descriptive information about the community. At the end of the Project a systematic survey of community attitudes toward geothermal development was conducted. The survey also provided

information about the lifestyle and cultural characteristics of the Hawaiian Community.

In most cases the Project objectives were addressed using a number of methodological approaches. The specific methods used to address each major Project objective are described below.

Baseline Description of Lifestyle and Culture

The description and documentation of the current lifestyle of the Puna Hawaiian Community began with the preparation of a wall map designating lower Puna as a Human Geographic Communication Unit which was organized into six sub-units (see Figure 2-1). A census of the Hawaiian population in the six units was conducted by the clerical staff and completed by early summer. Interviews with community members, leaders and elders as well as portions of the geothermal survey provided the basic information about lifestyle and culture.

Collection of Information About the Probable Effects of Geothermal Development

Existing information about geothermal development was obtained through mailing lists, contacts with other research agencies and projects, attendance at relevant conferences and workshops and membership in appropriate organizations and on government energy councils. Site visits to existing geothermal fields in California and New Zealand provided valuable firsthand observations.

Establishment of an Effective Communication System Within the Hawaiian Community

The Project Advisory Board included Hawaiian members from outside the Puna District, and the Hui Newsletter mailing list was

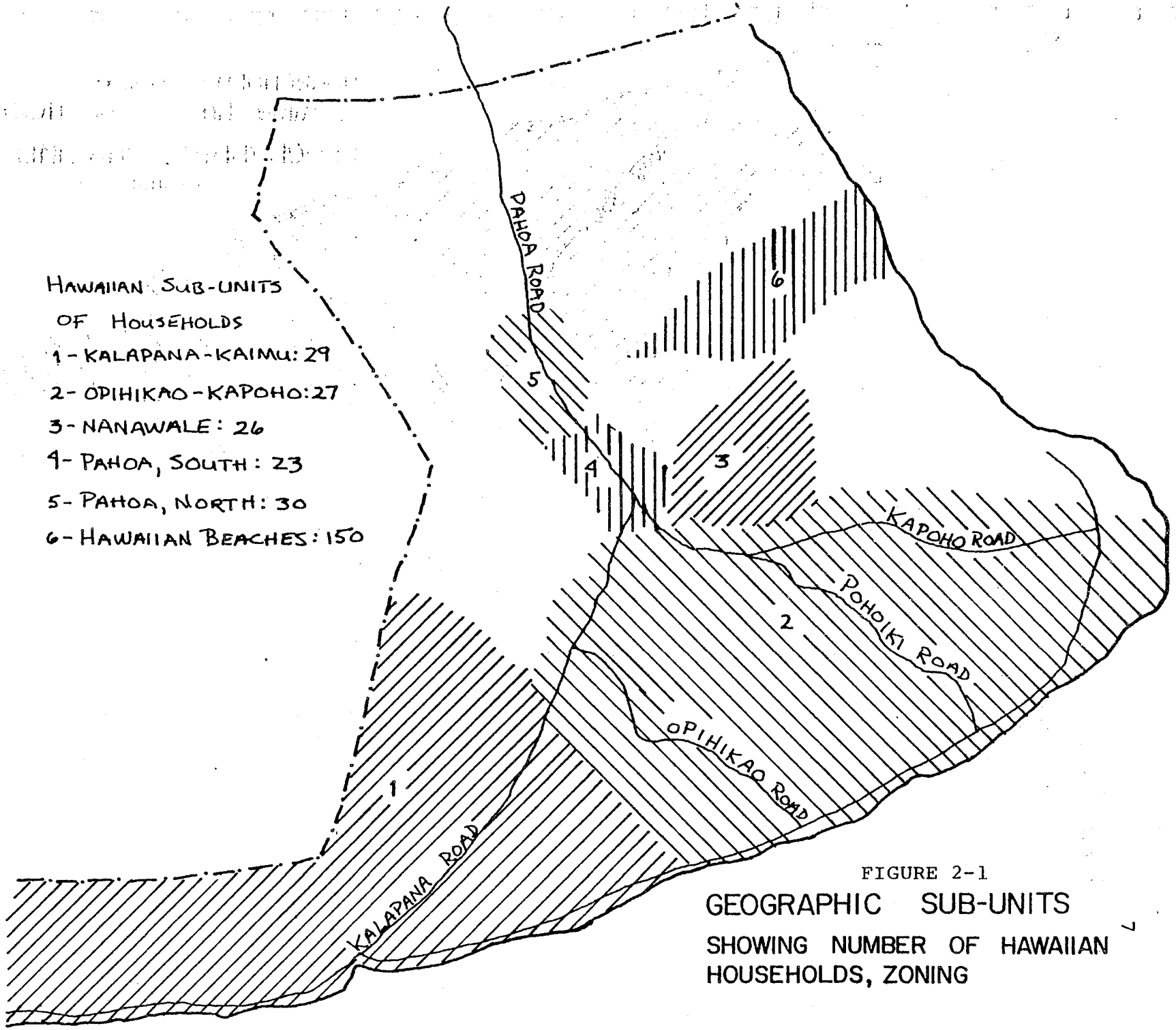


FIGURE 2-1

GEOGRAPHIC SUB-UNITS

SHOWING NUMBER OF HAWAIIAN HOUSEHOLDS, ZONING

expanded to include Hawaiian organizations throughout the State. Contact with the non-Hawaiian community was made through numerous presentations about geothermal development to community organizations on the Island. The Hui also sponsored a geothermal symposium in Pahoa.

Survey of Community Attitudes About Geothermal Development

Information about community attitudes toward development was obtained through anecdotal observations and unstructured interviews as well as a systematic survey administered to the adult Hawaiian population of Lower Puna.

Communication of Hawaiian Concerns and Attitudes to Appropriate Government Decision Making Bodies

The project director identified, attended, and provided input into all relevant government planning and decision making meetings and hearings concerning geothermal development in Hawaii.

SECTION II

DATA COLLECTION

The sources of information about geothermal development included in the Puna Hui Ohana library and an annotated list of meetings and conferences attended for informational purposes are included in this section of the report. A synopsis of the status of geothermal development in Puna based on the information collected is presented. This section also includes a description and evaluation of the site visit to New Zealand which was undertaken to make firsthand observations of large-scale geothermal development in a Polynesian cultural setting.

CHAPTER 3

DATA COLLECTION
(Library Materials and Meetings)

The Puna Hui Ohana has collected a variety of written materials pertaining to geothermal development. These materials are kept in a library at the Pahoa Community Center and are available to interested people. Appendix 5 contains a list of materials currently in the library.

In addition to the collection of written materials, project staff members attended a variety of meetings and conferences to learn more about geothermal development. Appendix 1 contains a list of meetings attended and a brief description of the information obtained.

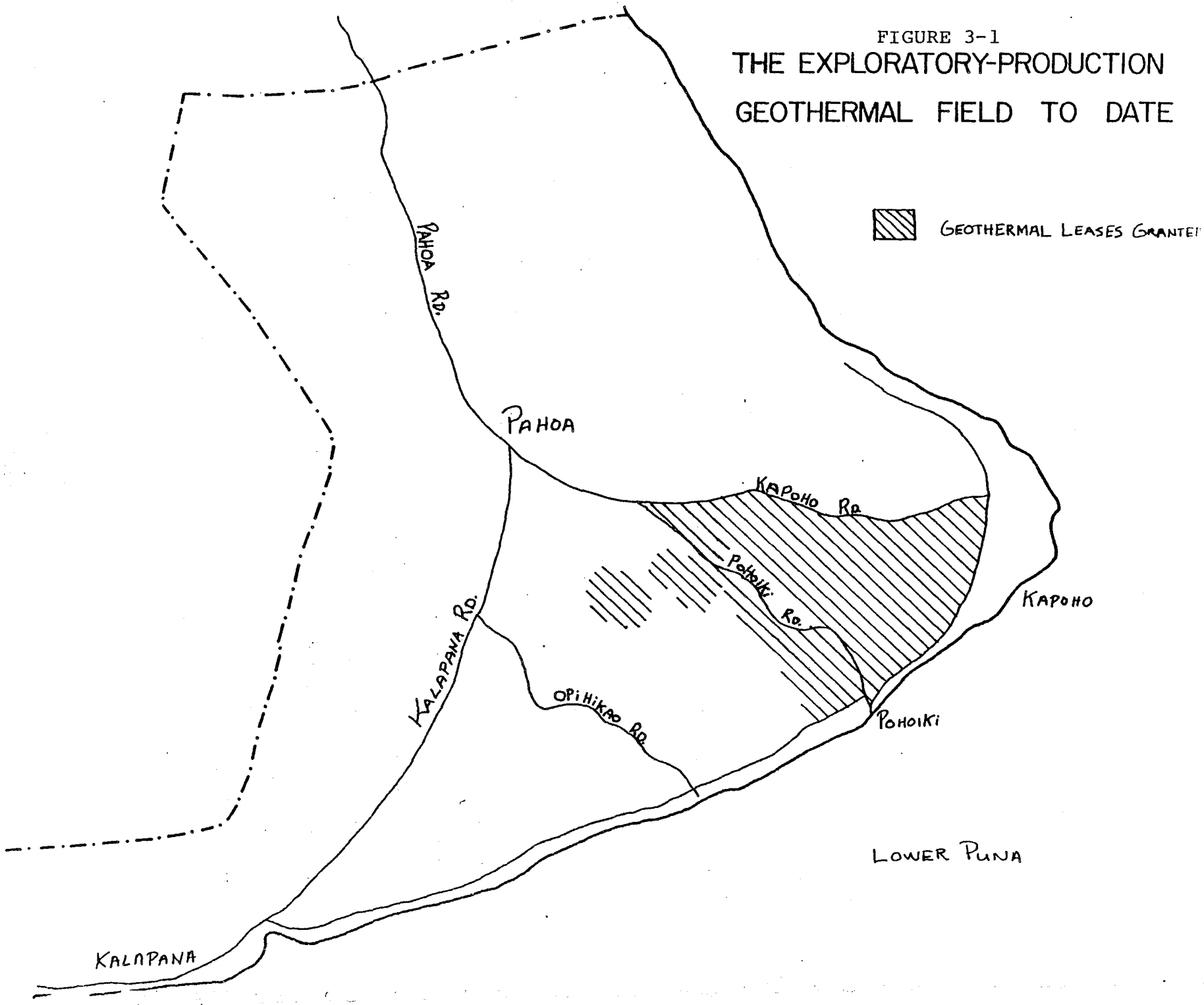
Below is a brief summary of the information collected about geothermal development in the Puna District.

Geothermal Energy Development in Puna

Early Hawaiians used the steam emanating from fissures along the rift zone for cooking and geothermally heated water ponds for bathing. Though exploratory drilling had begun in the 1960's in Puna, the first successful well wasn't discovered until 1976 (see figure 3-1). Designated HGP-A (Hawaii Geothermal Project-Abbott), the well was one of the hottest in the world (675°), high pressured (555 psi), and relatively chemically benign. The successful well represented a new era of alternative energy for the State of Hawaii. For the community of Puna, the geothermal success introduced a developmental element for which it had not been prepared.

FIGURE 3-1

THE EXPLORATORY-PRODUCTION GEOTHERMAL FIELD TO DATE



A wellhead generator has been installed on the geothermal site to measure the economic feasibility of producing electricity. The anticipated steam flow of approximately 75,000 pounds per hour from the well will be capable of producing an estimated 3 MW of electrical power. The electricity is being distributed into the Big Island grid system on or about July 17, 1981.

Exploratory drilling programs are underway to define the size of the reservoir and the characteristics of the resource. To date, 24 special use drilling permits have been approved. The Hui has requested a moratorium on permit issuance subject to the submission of a cooperative planning design by the planning department or the county administration.

While it is impossible to predict the total output of the geothermal field, current estimates suggest a potential output between 500 and 1000 MW in the Puna geothermal fields. Several possible uses of the geothermal energy have been suggested. These applications include the production of electricity for (1) the HELCO grid system, (2) processing local raw materials, (3) use in proposed industrial developments, and (4) use in Honolulu.

It is important to note that the HGP-A well is not remotely situated. It is located nearly in the middle of a geothermal field surrounded by residential and agricultural subdivisions in one of the fastest growing districts in Hawaii County. In many sections, geothermal wells are permitted less than 100 yards away

from roads and residential areas. There are also several papaya farms in the area. These papaya farms account for an estimated $6,000,000 in out-of-district export and provide jobs for the local population.

CHAPTER 4

AN ASSESSMENT OF THE EFFECTS ON PARTICIPANTS OF THE NEW ZEALAND SITE VISIT

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Project Consultant

In addition to the various secondary sources of information described earlier, the Puna Hui Ohana gained first-hand knowledge of geothermal development by sending a delegation to visit the geothermal fields of New Zealand. New Zealand was chosen for the site visit because of the similarity between the aboriginal cultures of the New Zealand and Hawaii. The Maori culture and language are the most like those of aboriginal Hawaiians of all Polynesian cultures. In addition, a large scale geothermal development currently exists in the central portion of the North Island of New Zealand, an area heavily populated by the Maori people. Further geothermal developments are also being planned for this area. While not identical to the situation in Puna, this work in New Zealand provides an excellent source of information about the potential effects of geothermal development on an aboriginal people very similar to those of Hawaii.

PROCEDURES

The Hui Study Group

The delegation sent to New Zealand included representatives of each of the four organizations which make up the Puna Hui Ohana. It was expected that having a broad-based delegation would maximize the communication about the findings of the study

trip throughout the Puna Hawaiian Community. Each delegate was assigned specific topics to research while in New Zealand. Each delegate also agreed to serve as a community resource person for the remainder of the Project period, and to assist in the data collection for the survey of attitudes conducted at the end of the project. Financial expenses for the trip were provided by the Hui, its member organizations, and the individual delegate.

Geothermal Sites Visited

The site visit included inspection of the geothermal fields at Wairakei and Broadlands, the power plants at Wairakei and Huntley, various non-electric applications of geothermal energy, and visits with Maori communities near the geothermal areas. The delegation from the Puna Hui Ohana was hosted in New Zealand by the Center for Maori Research and Studies, and by Maori communities in Hamilton, Taupo and Rotorua.

Senior staff at Wairakei were very helpful in providing guided inspections of the geothermal fields and power plant, and making available relevant information to the Hawaiian delegation. Much of this information is included in the Hui Geothermal Library and has been made available to interested individuals and organizations.

The geothermal field at Broadlands is entirely on Maori lands, and there is a great deal of planning and discussion underway between New Zealand government officials and the Maori community. Much of this planning involves the same cultural,

social and economic issues which are of concern to the Puna Hawaiian community. The opportunity to observe this planning process and talk with the principals involved provided information, uniquely available in New Zealand, about anticipated cultural impact. The modern environmental planning behind the Broadlands development also provided a valuable context for assessing the Wairakei development.

In the town of Huntley there has been a great deal of effort expended to resolve potential problems created by the siting of a large thermal power plant near the rural Maori community of Waahi. Extensive and thorough assessment of the impact of this facility is ongoing--particularly in the areas of cultural, social and economic impact. In addition to gathering the printed material about the Huntley project the delegation was able to meet with the members of the Maori commmunity who were the principals in the definition of the social, cultural and economic impact of the project; and who negotiated with the government on behalf of the Waahi people.

The non-electric uses of geothermal energy inspected included the processing of agricultural products and paper pulp, home use through heat exchangers, medicinal treatment, thermal baths, and tourism.

Assessment Design

The evaluation of the New Zealand site visit included both subjective assessments by the participants and the administration of a structured attitude survey. Participants kept daily journals of their impressions during the time in New Zealand,

and this written record provides an account of the issues which made the greatest impact on the group members. The structured attitude survey was administered to two groups before the trip and three groups after the trip according to the following design:

	BEFORE TRIP	AFTER TRIP
GROUP 1	14 PARTICIPANTS	14 PARTICIPANTS
GROUP 2	15 NON PARTICIPANTS	11 NON PARTICIPANTS
GROUP 3		13 NON PARTICIPANTS

The members of the site visit delegation completed the survey before and after the trip; a matched group of residents of the Puna Hawaiian Community also completed the survey at the same points in time before and after the trip; and a third matched community sample completed the survey only at the post-trip administration. The variables used in selecting the matched comparison groups included age, sex, area of residence in Puna and level of participation in community activities.

The comparison groups from the community were included in the assessment of the effects of the site visit in order to separate the effects on attitudes of retaking the survey instrument independently of the New Zealand experiences. The design provides information with which to validate the success of the matching procedures in forming groups with similar initial attitudes, information about any changes in attitudes resulting from the site visit, and information about the effects of simply retaking the survey.

The survey instrument included questions asking for descriptive information about the respondent; possible social, cultural, economic and physical impacts of geothermal development; possible uses for the geothermal resource, and finally a question about the perceived magnitude (on a 5 point scale) and perceived favorability (on a 7 point scale) of development. All questions were piloted with the Hui Board of Directors and with a University social psychology class. As a result of the pilot administrations changes in item wording and format were made before the pre-trip administration. A complete copy of the survey is presented in Attachment 4-1 which follows this chapter. The following item illustrates the question format.

SAMPLE SURVEY QUESTION

OVERALL, THE EFFECT OF GEOTHERMAL DEVELOPMENT IN PUNA WOULD BE . . . ?

A. (CHECK ONE)	B. (CHECK ONE)
____ VERY FAVORABLE	____ VERY LARGE
____ FAVORABLE	____ LARGE
____ SLIGHTLY FAVORABLE	____ SMALL
____ NEITHER FAVORABLE NOR UNFAVORABLE	____ VERY SMALL
____ SLIGHTLY UNFAVORABLE	____ NO CHANGE
____ UNFAVORABLE	
____ VERY UNFAVORABLE	

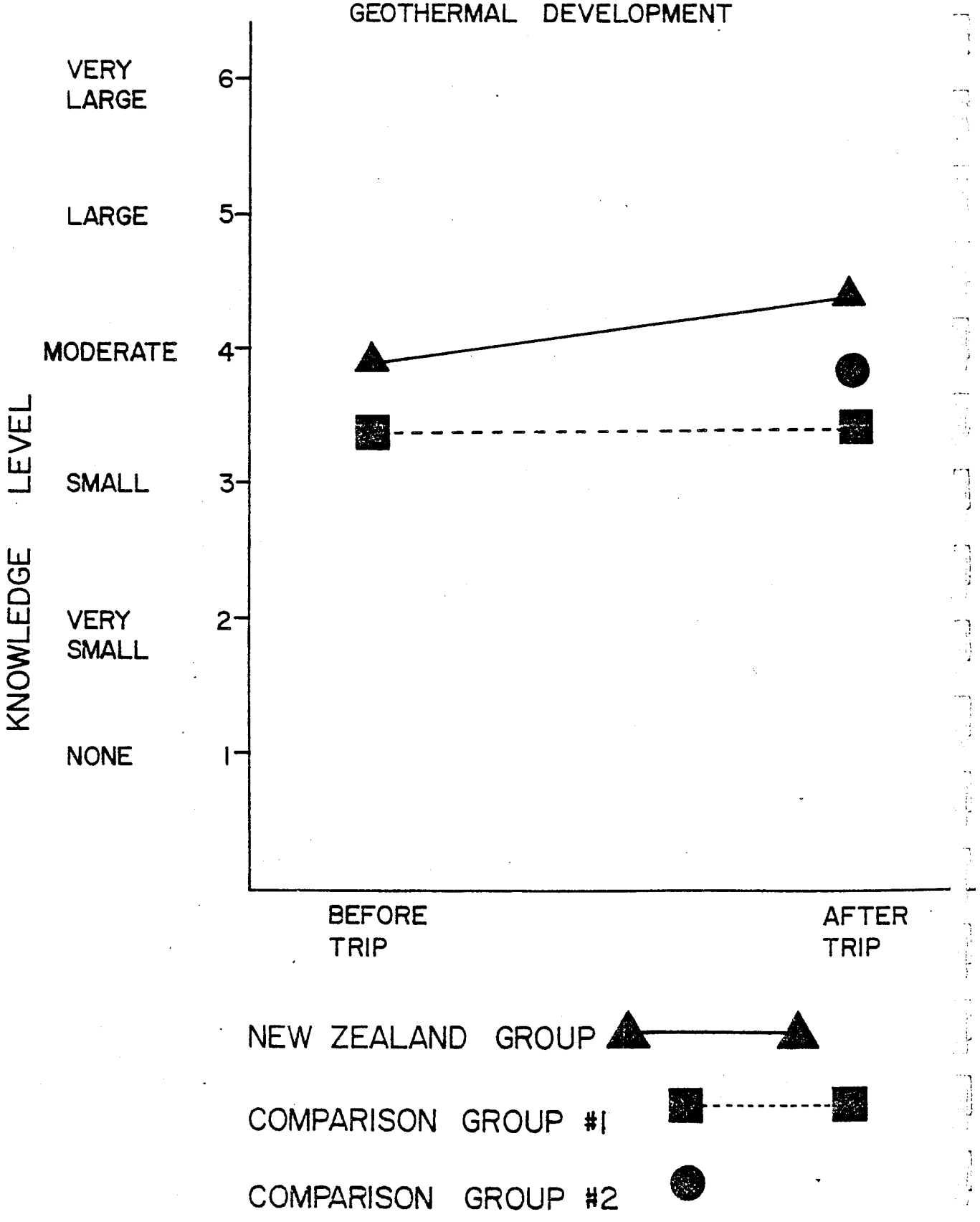
RESULTS OF THE SITE VISIT ASSESSMENT

The assessment design called for a total of 73 administrations of the attitude survey. All 29 of the respondents completed the survey for the pretest, and 38 of the 43 respondents completed it for the post-test. The majority of the refusals (4) were from the comparison group that completed the survey before the trip, but when approached for the post-trip administration they said that their attitudes had not changed so they didn't need to fill out the form again.

Most of the respondents lived in either Pahoa or Kalapana, and had lived in Puna for an average of 25 years. The average age of respondents was 36 years. All three groups reported a moderate to large level of knowledge about geothermal development. Figure 4-1 presents the level of knowledge reported for each of the five administrations of the survey. Inspection of the figure shows increase in the self-perceived level of knowledge with the New Zealand group after the site visit, but all other groups are similar.

The results of the assessment of attitudes toward geothermal development point to an impressive level of similarity among the three groups. Table 4-1 presents the means of the responses to the question about overall impact of geothermal development. The only statistically reliable difference among the groups is in the change to more negative atittudes for comparison group #1 on the post-trip administration. ($t=3.09$; $p<.02$). This finding however, could be reflecting the absence of the 4

FIGURE 4-1: AVERAGE SELF-REPORTED LEVEL OF KNOWLEDGE ABOUT GEOTHERMAL DEVELOPMENT



respondents who declined to complete the survey the second time.

TABLE 4-1

MEANS OF RESPONSES TO SURVEY QUESTION ABOUT OVERALL IMPACT

	NZ PRE TEST	NZ POST-TEST	COMPARISON GROUP 1 PRE-TEST	COMPARISON GROUP 1 POST-TEST	COMPARISON GROUP 2 POST-TEST
Favorability	4.79	4.50	5.07	3.60	5.38
Magnitude	4.14	4.00	4.38	4.30	4.33

The responses to this question are presented graphically in Figures 4-2 and 4-3. The impact is generally perceived to be large, however attitudes are not significantly different from the neutral point on the scale. This pattern of perceived large impact and relatively neutral attitudes about favorability is typical of responses to all of the survey questions for all three of the groups.

Figure 4-4 presents the responses to the questions about possible uses for the geothermal resource. Four of the five potential uses are viewed as slightly favorable, while the fifth, large industry, is perceived as neither favorable nor unfavorable.

The subjective assessments of the New Zealand site visit are generally consistent with the results of the attitude survey. Some of the members of the site visit group were impressed with the economic opportunities that geothermal development could bring to Puna. Others were frightened by the threat of massive development to the lifestyle and culture of Puna Hawaiians. Most reported that they

FIGURE 4-2: PERCEIVED MAGNITUDE OF GEOTHERMAL DEVELOPMENT IMPACT

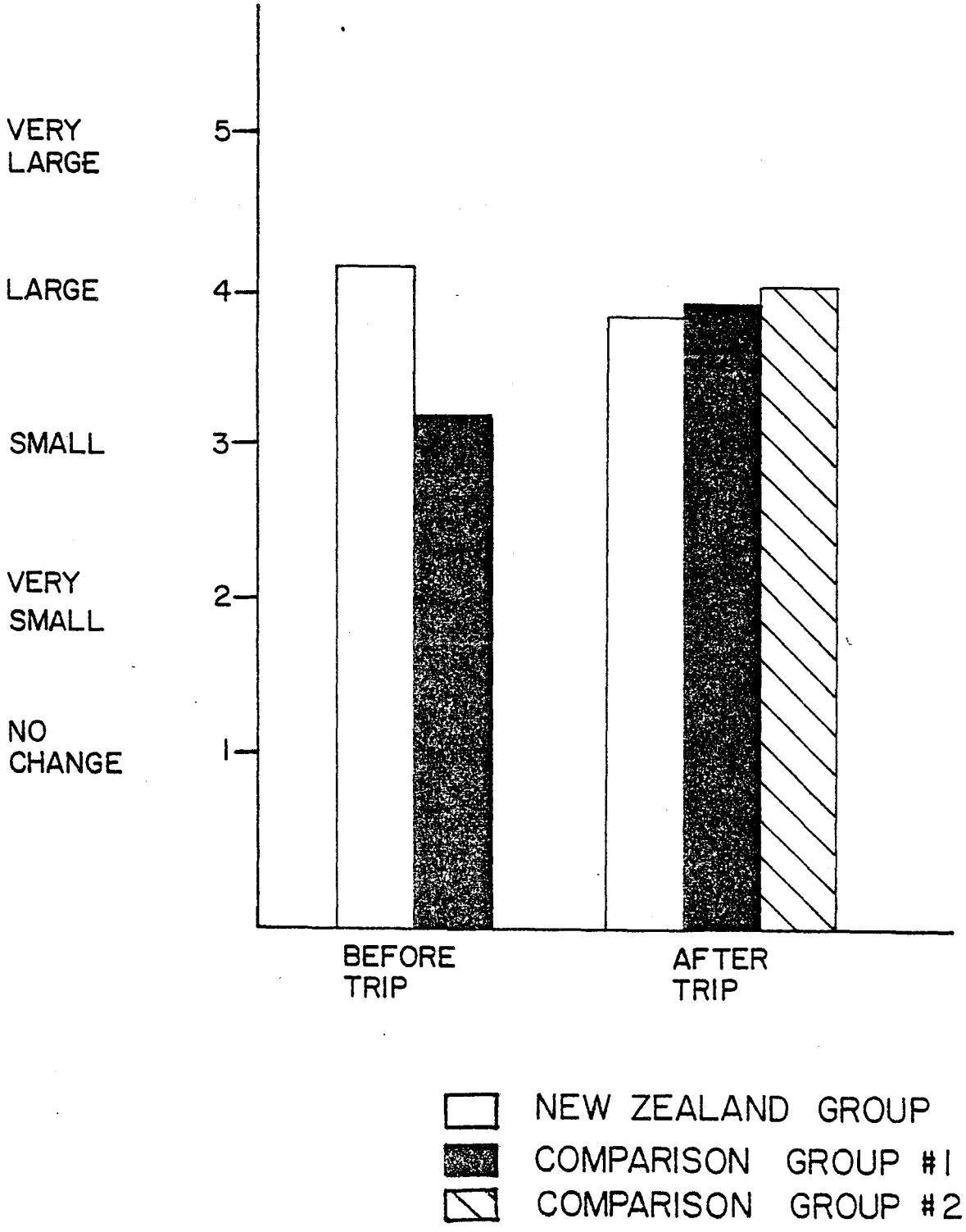


FIGURE 4-3: PERCEIVED FAVORABILITY OF GEOTHERMAL DEVELOPMENT

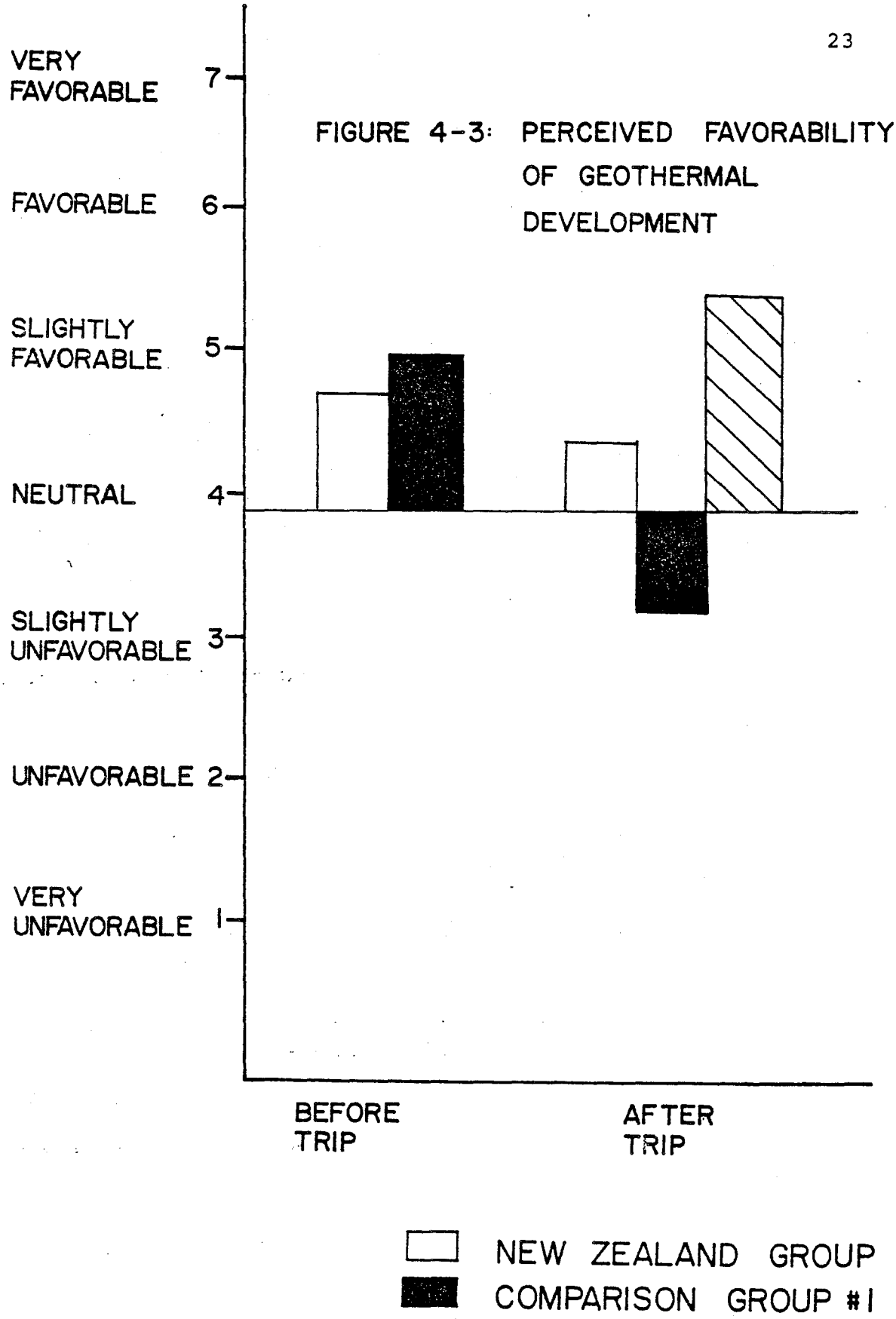
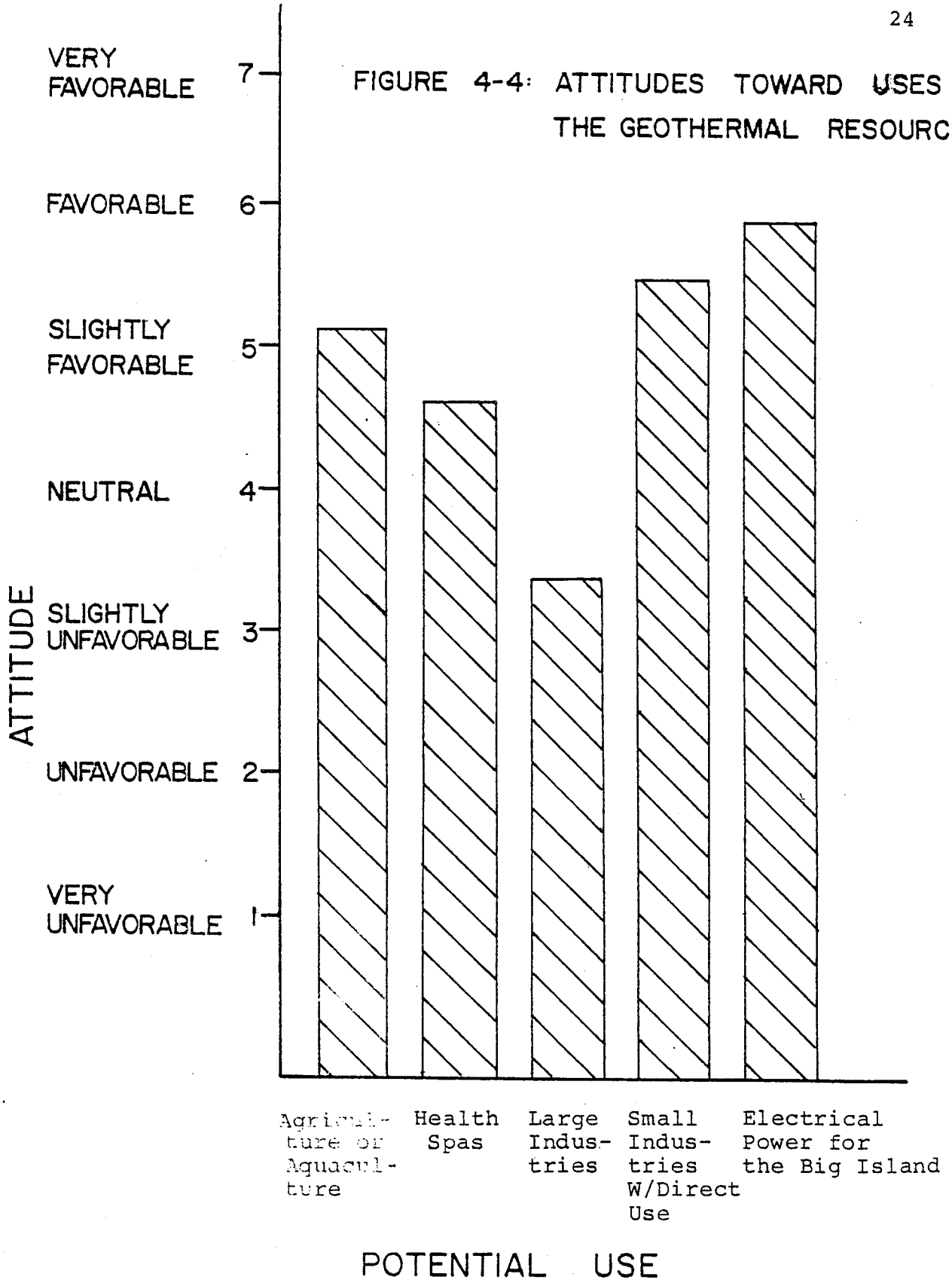


FIGURE 4-4: ATTITUDES TOWARD USES OF THE GEOTHERMAL RESOURCES



learned a great deal about both the benefits and costs of geothermal development, but then in weighing the overall effects they found it difficult to take a strong position either for or against it.

DISCUSSION

Both the attitude survey and the subjective reports of the participants in the New Zealand site visit suggest that the trip had little effect on either the direction or strength of attitudes toward geothermal development. The participants did, however, feel that they learned a great deal about geothermal development, its effects and uses. It seems clear that this gain in knowledge had little effect on attitudes since the attitudes of the participants both before and after the site visit did not differ from those of the comparison groups on two of the three survey administrations. It is not clear why the first comparison group viewed the overall impact of development as more negative on the second survey administration. There is some evidence that simply readministering a survey sensitizes the respondents to potential issues and problems of which they were not previously aware, and leads to an attitudinal shift in the negative direction. It should be noted that two weeks elapsed between the first and second survey administrations. It is possible that the first survey administation prompted participants to attend more closely to local news coverage and discuss the issues with their neighbors.

It could be argued that the educational experience of the site visit counteracted the tendency for such a negative shift

for the participants. However, it is also possible that the "change" in attitudes for the comparison group is an artifact of the missing data for the four respondents who declined to complete the survey the second time on the grounds that their attitudes had not changed.

Though not directly related to geothermal attitudes, there is an effect of the site visit that does seem to be particularly powerful. The journal reports and the conversation of the participants emphasize the importance of the cultural experiences the site visit provided. The opportunity to interact closely with the members of another Polynesian culture which retains more of the traditional culture than remains for the Hawaiians made a strong impression on the participants. The site visit has stimulated a continuing series of exchange visits between the Maori people of the central North Island of New Zealand and the Puna Hawaiian Community. The Puna Hui Ohana has initiated a number of programs designed to preserve and regain the traditional culture, and these programs were directly stimulated by the New Zealand experience. From the educational perspective which was the primary goal of the site visit, it must be judged a resounding success.

ATTACHMENT 4-1

PUNA HUI OHANA GEOTHERMAL SURVEY

GEOTHERMAL SURVEY
PUNA HUI OHANA

BACKGROUND INFORMATION

1. AGE ____

2. SEX (CHECK ONE) ___MALE ___FEMALE

3. IN WHAT PART OF PUNA DO YOU LIVE? (CHECK ONE)

___ORCHID LAND
___PARADISE PARK
___HAWAIIAN BEACHES
___AINAOLA
___PAHOA
___NANAWALE ESTATES
___LEILANI ESTATES
___KAPOHO
___OPIHIKAO
___KALAPANA

4. HOW MANY YEARS HAVE YOU LIVED IN PUNA? ___

5. HOW MUCH INFORMATION DO YOU FEEL YOU HAVE ABOUT GEOTHERMAL DEVELOPMENT? (CHECK ONE)

___VERY LARGE AMOUNT
___LARGE AMOUNT
___MODERATE AMOUNT
___SMALL AMOUNT
___VERY SMALL AMOUNT
___NONE

6. HOW HAVE YOU LEARNED ABOUT GEOTHERMAL DEVELOPMENT? (CHECK ALL WHICH APPLY)

___RADIO
___TELEVISION
___NEWSPAPER
___GEOTHERMAL WORKSHOP OR CONFERENCE
___PUNA HUI OHANA MEETINGS
___PUNA HUI OHANA NEWSLETTER
___FRIEND
___OTHER (PLEASE SPECIFY)_____

7. HAVE YOU VISITED THE GEOTHERMAL WELL IN OPIHIKAO (CHECK ALL WHICH APPLY)

___WHEN IT WAS BEING DRILLED
___WHEN IT WAS BEING TESTED
___WHEN IT WAS NOT BEING TESTED

INSTRUCTIONS

AS YOU KNOW, THERE IS ONE GEOTHERMAL WELL IN PUNA NOW, AND THERE ARE PLANS TO DRILL MORE WELLS. A NUMBER OF THINGS ABOUT THE PUNA AREA MIGHT CHANGE IF THE PROPOSED GEOTHERMAL DEVELOPMENT HAPPENS. THESE POSSIBLE CHANGES HAVE BEEN GROUPED INTO THE FOUR CATEGORIES BELOW:

A. HAWAIIAN CULTURE AND LIFESTYLE
B. SOCIAL IMPACT
C. ECONOMIC IMPACT
D. PHYSICAL ENVIRONMENT IMPACT

PLEASE INDICATE WHAT YOU FEEL WOULD BE THE EFFECT OF GEOTHERMAL DEVELOPMENT IN PUNA BY CHECKING 1) HOW FAVORABLE A CHANGE AND 2) HOW LARGE A CHANGE YOU THINK GEOTHERMAL DEVELOPMENT MIGHT BRING.

HAWAIIAN CULTURE AND LIFESTYLE

1. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HAWAIIAN CULTURAL VALUES AND BELIEFS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

2. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HISTORICAL SITES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

3. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE LIFESTYLE OF THE PUNA HAWAIIAN COMMUNITY.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

4. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON TRADITIONAL HAWAIIAN RELIGIOUS PRACTICES AND BELIEFS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

5. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON TRADITIONAL HAWAIIAN PLACES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

6. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HUNTING, FISHING AND FOOD GATHERING IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

7. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE TRADITIONAL OHANA IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

SOCIAL IMPACT

1. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON PUBLIC SERVICES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

2. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON COMMUNITY CLOSENESS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

3. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE POPULATION IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

4. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HOUSING IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

5. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON RECREATION IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

6. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE YOUTH OF PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

7. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE SCHOOLS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

8. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE QUALITY OF LIFE IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

9. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON TRAFFIC IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

ECONOMIC IMPACT

1. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE AVAILABILITY OF AGRICULTURAL LAND IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

2. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON EMPLOYMENT FOR HAWAIIANS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

3. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE ELECTRIC RATES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

4. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE LAND VALUES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

5. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON TAXES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

6. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON ECONOMIC GROWTH IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

7. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE INCOME OF PUNA HAWAIIANS.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

PHYSICAL ENVIRONMENT IMPACT

1. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE VISUAL ENVIRONMENT OF PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

2. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE LEVEL OF NOISE IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

3. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE SULFUR SMELL IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

4. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE AIR QUALITY IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

5. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON EARTHQUAKES IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

6. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON ERUPTIONS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

7. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE PLANTS AND ANIMALS IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

8. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HEALTH AND SAFETY IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

9. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE QUALITY AND AVAILABILITY OF WATER IN PUNA.

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

USES OF GEOTHERMAL ENERGY

WHAT ARE YOUR FEELINGS ABOUT THE USE OF GEOTHERMAL ENERGY IN PUNA FOR EACH OF THE FOLLOWING:

1. AGRICULTURE OR AQUACULTURE (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

2. HEALTH SPAS/HOTELS (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

3. LARGE INDUSTRIES (E.G. PROCESSING MANGANESE NODULES) (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

4. SMALL INDUSTRIES USING STEAM OR HOT-WATER DIRECTLY (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

5. ELECTRIC POWER FOR THE BIG ISLAND (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

OVERALL IMPACT

OVERALL, THE EFFECT OF GEOTHERMAL DEVELOPMENT IN PUNA WOULD BE ...?

A. (CHECK ONE)

___VERY FAVORABLE
___FAVORABLE
___SLIGHTLY FAVORABLE
___NEITHER FAVORABLE NOR UNFAVORABLE
___SLIGHTLY UNFAVORABLE
___UNFAVORABLE
___VERY UNFAVORABLE

B. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

SECTION III

THE LIFESTYLE AND CULTURAL CHARACTERISTICS OF THE LOWER PUNA HAWAIIAN COMMUNITY

In order to accurately assess the effects of geothermal development on the Hawaiian Community of Lower Puna, it is important to have a description of the characteristics of the Community before the development occurs. Collecting information for this baseline description is one of the major goals of the Puna Hui Ohana Project. The focus of this section of the final report is on the lifestyle of the Puna Hawaiian Community and on the elements of this lifestyle that reflect the Hawaiian Culture. It is hoped that this attitudinal, lifestyle, and cultural information will contribute to an understanding of the nature of the Community before the intrusion of geothermal development.

The information on the lifestyle and culture of the Hawaiian Community in Lower Puna is based on anecdotal observations and interviews with selected members of the Community (Chapter 5); and a survey conducted by the Puna Hui Ohana (Chapter 6).

CHAPTER 5

LIFESTYLE AND CULTURE: INTERVIEWS AND ANECTODAL INFORMATION

Historical Background

Because this research project represents an effort by an aboriginal Hawaiian organization to assess the impact of geothermal development on the aboriginal Hawaiians of Lower Puna, it might be appropriate to briefly describe the population. Hawaiians are Polynesians. Other Polynesian groups include the Maori, Samoans, Tongans, Tahitians, Cooks Islanders, and Marquesans.

Much information about the beginnings of Hawaiian history has been lost over time. However, through an oral history of ancient chants and vocal music (meles) that have been handed down through time, the Hawaiian people trace their origin to early ancestor seafarers who discovered and colonized the Hawaiian Islands. There is no clear consensus as to when the many voyages across the Pacific occurred. It is estimated that somewhere near 1000 A.D. the voyages stopped and a culture flourished in Hawaii. Radiocarbon dating of ancient campsites suggest that the Hawaiians may have settled in the island chain as early as 500 to 700 A.D.

For nearly 1000 years the Hawaiians were isolated and undisturbed by external influences. The societal structure was stratified in a feudal manner which consisted of rulers (ali'i), priests (kahuna), commoners (maka'ainana) and slaves (kauwa).

The society was highly regimented with strict separation of social classes. Social status was hereditary.

In 1778 the Hawaiian Islands were discovered by Captain Cook, and named the Sandwich Islands. The population then was estimated at approximately 300,000 with the largest population living on the island of Hawaii. Western influence produced immediate and devastating impacts on the Hawaiians. These impacts included:

1. Introduction of explosives and iron implements which effected the political structure and shifted the Hawaiian from a subsistence economy to a barter and money economy.
2. Introduction of new diseases to a people without hereditary immunity which reduced the pure Hawaiian population from 300,000 in 1778 to an estimated 40,000 in 1900.
3. Introduction of the Christian missionaries which displaced centuries-old religious beliefs.
4. The loss of the kapu system occurring at a time when the people had few resources with which to withstand the changes brought on with a substituted system radically different from a system of submission to God and nature.
5. The overthrow of the monarchy which gave power and leadership to western entrepreneurs. The Hawaiians were left leaderless and powerless against foreigners.

There are approximately 3,000 pure Hawaiians remaining today. Most Hawaiians today are offspring of intermarriages between the various ethnic groups.

There are two categories of aboriginal Hawaiians: the "Native Hawaiian" and the "Hawaiian." A "Native Hawaiian" is defined as one who is of more that 50% Hawaiian ancestry. Proof of ancestry may be confirmed by birth certificate, the family's genealogy, or

by affidavit of persons who can testify that they personally have knowledge of the claimant's alleged blood quantum. A "Native Hawaiian,"by Department of Hawaiian Homelands definition, shall be at least 50% of blood of the people living in Hawaii in 1778.

A "Hawaiian," according to the Office of Hawaiian Affairs, is any person having any amount of Hawaiian ancestry. The Puna Hui Ohana classifies its members as "aboriginal Hawaiians." That is, members must be able to claim ancestry to the aboriginal people of Hawaii as they were discovered in 1778.

The Hawaiian Homes Act of 1920 represented the United States government's effort to establish a land program of Hawaiian "rehabilitation" through homesteading. The act set aside a total of 203,500 acres within the state for homesteading by Native Hawaiians. Of this total, 107,300 acres is on the island of Hawaii. Two-thousand acres of Hawaiian Homes land are located in Lower Puna.

In anticipation of a growing Hawaiian population and potential economic opportunities resulting from geothermal development, the Puna Hui Ohana is utilizing the blood quantum report as a basic document for promoting Hawaiian homesteading in Lower Puna.

Section 2 of Act 32 of the First State Legislature established a public trust fund into which was appropriated all funds from the sale, lease of other disposition of public lands, which were ceded to the U.S.A. upon Annexation of Hawaii to the U.S.A. In 1961 these lands were transferred from Federal jurisdiction to the State of Hawaii. All proceeds from the use of such lands were to be used for five purposes, one of which is for the exclusive

benefit of Native Hawaiians. Section 5-f, with respect to geothermal lease rights or royalties paid to the State, is seen by the Puna Hui Ohana as a secondary vehicle obliquely satisfying aboriginal Hawaiian claims to subsurface geothermal resources for the benefit of Native Hawaiians. The Puna Hui Ohana believes that all Hawaiians are the primary owners of the geothermal resource.

Geographic and Population Background Information

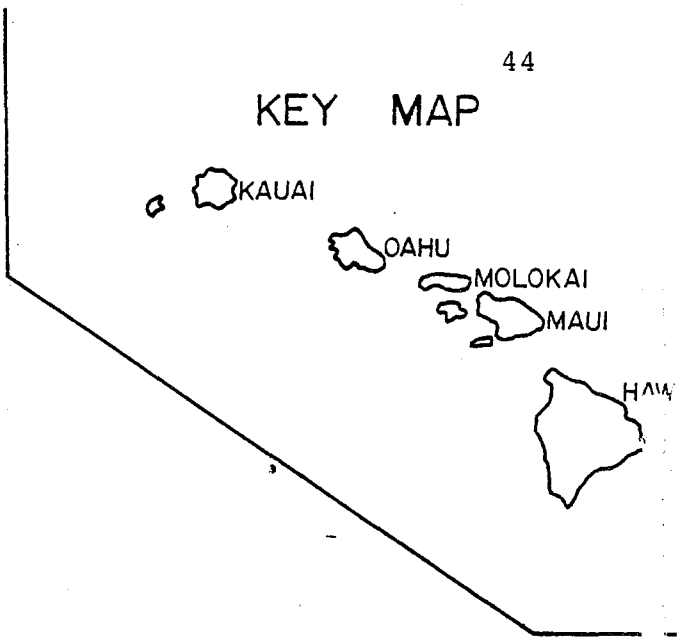
The island of Hawaii, measuring 4,038 square miles, is the largest land mass in the chain of eight inhabited islands which constitute the State of Hawaii. The island is divided into nine geographic districts. These include South Hilo, North Hilo, Hamakua, South Kohala, North Kohala, North Kona, South Kona, Ka'u, and Puna. As can be seen in Figure 5-1, the district of Puna is the island's second largest. The Puna district also has the second largest population on the island. The target area of this project was defined as the Lower Puna census tract (from the town of Pahoa to the town of Kalapana). This included the residents of the Hawaiian Beaches subdivision.

The district of Puna is currently undergoing very rapid growth. Overall, the population of the Puna district has increased over 128% between 1970 and 1980. Table 5-1 shows the percentage increases in population by ethnic classification. This comparison shows that the largest percentage increases in population are in the number of Caucasians and the number of Hawaiians living in Puna.

FIGURE 5-1

--- DISTRICT BOUNDARIES

ISLAND OF HAWAII



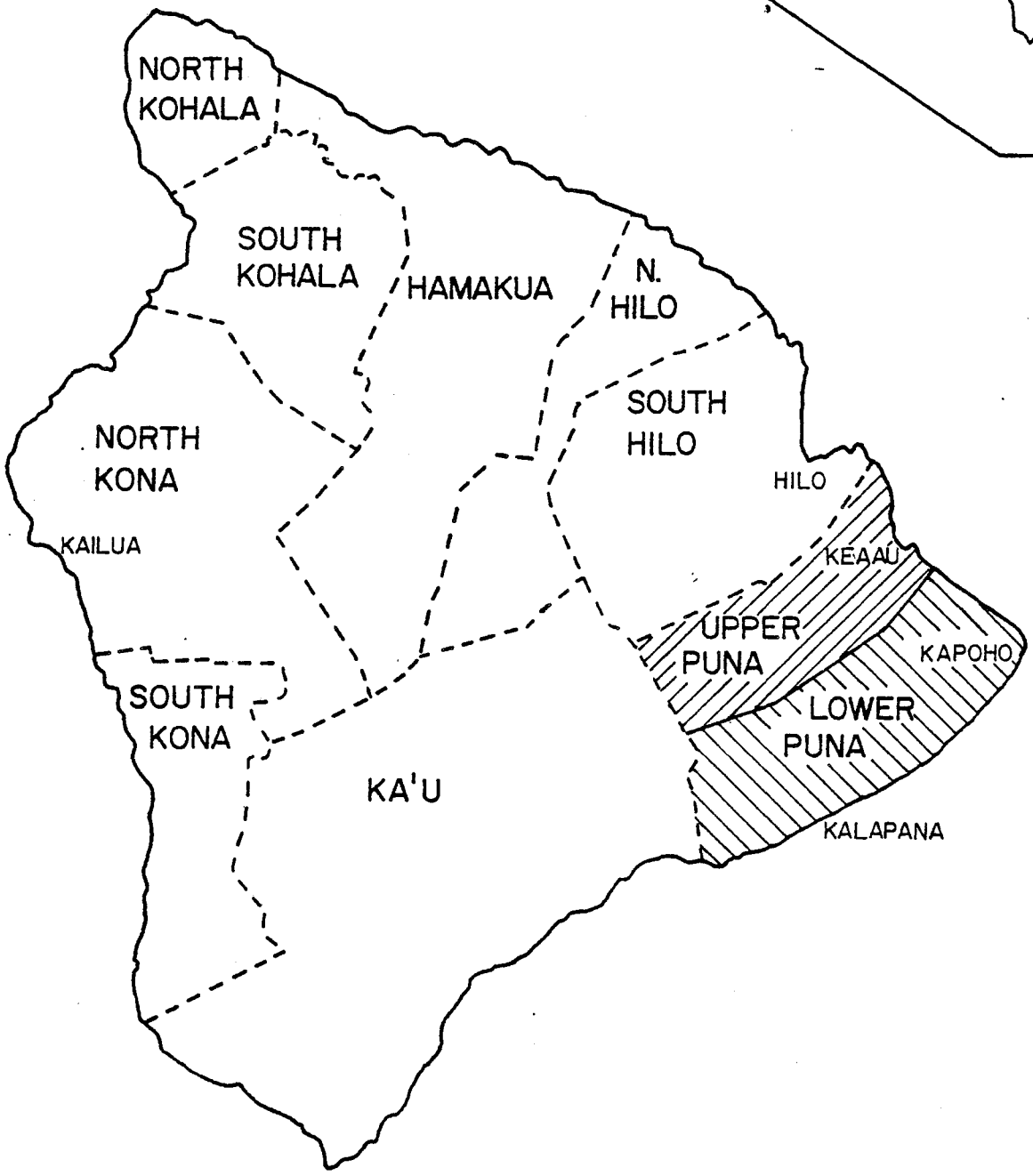


Table 5-1

1970 & 1980 ETHNIC GROUP POPULATIONS IN THE PUNA DISTRICT

Ethnic Group	1970 Census	1980 Census	Percentage Increase
Hawaiian; Part-Hawaiian	452	1,334	195%
Caucasian	1,237	5,078	311%
Other Non-Caucasian	3,465	5,339	54%
Total Population	5,154	11,751	128%

An even larger increase in population has occurred in Lower Puna. Table 5-2 shows the percentage increases in population by ethnic classification.

Table 5-2

1970 & 1980 ETHNIC GROUP POPULATIONS IN LOWER PUNA

Ethnic Group	1970 Census	1980 Census	Percentage Increase
Hawaiian; Part-Hawaiian	350	1,001	186%
Caucasian	234	1,924	722%
Other Non-Caucasian	768	1,618	110%
Total Population	1,352	4,543	236%

There are 1001 aboriginal Hawaiians residing in Lower Puna. This total includes 446 adults and 555 children under 18 years of age. They are almost evenly distributed throughout the sub-district communications units of Kalapana/Kaimu, Nanawale Estates, Pahoa South/Community Center and Pahoa North/Subdivision.

However, over 22% of the aboriginal Hawaiian population lives in the Hawaiian Beaches Subdivision. Most of the Hawaiians in this district are young newcomers originating from Hilo, Honolulu, and the outer islands as well as young married adults from several Lower Puna families.

Lower Puna has traditionally been rural and agricultural. Local farmers produce the bulk of the county's papaya, anthuriums, orchids, bananas, vegetables, maile, and marijuana. These crops are worth nearly $55,000.00 a year, excluding the value of the illegal marijuana crop. Marijuana figures prominently in the economy of Lower Puna and the County.

The research staff recently investigated the current employment of resident aboriginal Hawaiians. Ninety-one Hawaiian adults were employed locally (in Lower Puna). Table 5-3 shows the employment categories.

Table 5-3

EMPLOYMENT OF PUNA HAWAIIANS, BY INDUSTRY EMPLOYED IN LOWER PUNA

Industry	Number	Percent
Public Service	28	30.8
Agriculture	18	19.8
Fishing	9	9.9
Retailing/Wholesale	9	9.9
Construction	7	7.7
Transportation	8	8.8
Finance/Real Estate, etc.	5	5.5
Students, U.H.-Hilo	5	5.5
Geothermal Drilling	2	2.2
TOTAL	91	100.0

All school age children in Lower Puna attend the Pahoa Elementary and High School unless they attend private schools or have out-of-district transfers. The school is located in Pahoa. Enrollment has increased from 411 in 1971 to 1190 in 1981. Table 5-4 depicts changes in enrollment between 1979-1980 and 1980-1981. The enrollment printouts obtained from the Pahoa School show that the "white" category enrollment has increased 37% between 1979-1980 and 1980-1981. The Hawaiian student population has increased approximately 12%.

Table 5-4

PAHOA SCHOOL ETHNIC CENSUS AS OF MAY 5, 1981

Ethnic Group	1979-1980 Enrollment	1980-1981 Enrollment
Hawaiian	353	394
Caucasian	257	351
All Others	508	597
Total	1,118	1,342

SOURCE: PAHOA SCHOOL, SCHOOL ROSTER 383

NOTE: Pahoa School has a very high transit/mobility rate of 600-700 students annually. Closing average student body will probably be closer to 1190.

Contemporary Hawaiian Culture and Lifestyle

Anthropologist Sutkus, in preparing documentation for a kinship analysis, called attention to six original root families: Kahilihiwa, Ka'awaloa, Koanui, Keliiho'omalu, Kaho'okaulana, and Kama. Members of these family groups have since intermarried extensively, contributing to a continuance of familial relationships among a comparatively large number of the Hawaiian population. As a result, cultural accountability within the Lower Puna

Hawaiian community has been considerably enhanced.

Hawaiians represent about 20% of the Lower Puna population and have a recognized common interest and lifestyle. Contemporary Hawaiians, including members of the Puna Hui Ohana, prefer to concentrate on "improving the conditions of the Hawaiian person providing him with the ability to control his own destiny," (PHO- By-laws). Emphasis on education, economic development, self-sufficiency, cultural preservation, and political development dominate organizational policy and planning.

In an attempt to better understand the contemporary Hawaiian culture, personal interviews were conducted with the Lower Puna community's Hawaiian leaders. The sample group was selected in recognition of their overall leadership experience. Twelve elders (kupuna) and other leaders of the Lower Puna Hawaiian group constituted the sample population.

The interview was structurally unstandardized. The respondents were not considered equal. On the whole, the people interviewed were considered to be better informed and more sensitive to the topic of the interview than other local residents. In the judgment of the interviewer (the Project Director), their responses were more likely to carry the burden of respect and authority. It was hoped that the unstandardized interview would provide interesting insights that would be unavailable from a standardized questionnaire interview format.

Of the 12, all represented two to three generational decendants of well-known ohana (family clan) in the Puna region. All respondents were Hawaiians and each was involved in one or more of the

umbrella organizations of the Puna Hui Ohana. Nine are presently members of the Board of Directors. Ten were either presidents or past presidents of the Puna Hawaiian Organization, the Hawaiian Parents Society, the Hui Opio, or the Young Hawaiians of Puna. Three are kupuna (elders) recognized by statewide Hawaiian kupuna organizations and are frequently called upon for validation of Hawaiian cultural artifacts. Nine are presently employed, the remainder are retired. Occupationally, two are successful farmers/business people, two are journeyman tradesmen, three are school aides at Pahoa School, one is a local secretary, one is a long-time agricultural worker. Of the three retired respondents, all speak the Hawaiian language well and have, from time to time, served as cultural specialists. One contributes his free time to various statewide Hawaiian organizations. Eight of the people interviewed are female and four are male. Their ages range from 25 to 75.

The interview questions required the respondent to be thoroughly familiar with the topic of the contemporary Hawaiian culture. The interviews required an establishment of friendly support, based on mutual respect and trust between the Project Director, who served as the interviewer, and the respondent. The Project Director also served as a participant-observer in the project and attempted to minimize interview biases. The interview results produced sensitive responses that might not have been divulged to a stranger or in a standardized questionnaire.

The respondents were encouraged to present not only their

perceptions of the situation, but also to define that situation in their own terms and to include whatever information they regarded as relevant. Inconsequential remarks can often reveal important information when considered in the context of the interview.

The respondents were eager to cooperate and each interview took from 90 to 120 minutes to complete. Each respondent was assured of: (1) anonymity, (2) confidentiality of data obtained, and (3) the security of information collected.

These experts were asked to: (1) discuss their perceptions regarding social and cultural changes and how they presently see these changes impacting the Hawaiian life-ways in lower Puna, (2) determine how they define the processes through which changes are occurring and how they tend to measure these changes, and (3) determine how the aboriginal Hawaiians in the Lower Puna community can best adapt to the new technology and innovation. The responses to these questions follow:

1. Do you believe Lower Puna is presently undergoing social and cultural changes? If so, how do you perceive the manner in which changes are taking place?

All respondents were in unanimous agreement that changes, mainly negative, are taking place and are very visible in the following ways:

> "Tremendous population growth, mostly Caucasian (haoles) moving into the region's residential subdivisions, are taking over the culture"
>
> "Large, young Caucasian (haoles) transient groups; roaming around, living off the land--help themselves to people's property"

"Can no longer see local people including the Hawaiians, Caucasian (haoles) taking over"

"A growing Filipino immigrant population working in agricultural places"

"People have turned inward, the openness is gone"

"Hawaiians are not getting together as they used to"

"Local people are less communicative, are uncertain of Caucasian (haoles) reaction"

"Business are vastly changed--commercial ownership shifting to Caucasians"

"People don't help and share with each other as they did in the past"

2. What do you believe are some of the factors causing changes in that period? Are similar factors still influencing change?

The study group agreed on several causal factors, mostly the result of political decisions, which have influenced change and which they believe are still influencing change. They include:

"Population expansion caused by explosive in-migration"

"People are looking for peace and tranquility but bring their western ways with them--they don't realize they are helping destroy what they are looking for"

"Politicians have caused much of the local changes. They are only concerned with issues that effect the state as a whole and not what damages can happen in a local community. Also, they have not taken the input of the community regarding change--we warned them, but they don't listen"

"Politicians are now sniffing around and selling out the community because of geothermal and business development interests"

"Hawaiians have been unable to hold onto their land--have been forced to sell because they could not pay the taxes"

"Cheap, fee simple land in the large subdivisions surrounding Pahoa"

"Land available for pakalolo farming"

"Changing conditions which cause many local people to move away"

3. In that same period, to what degree do you believe the Hawaiians may have changed in their cultural attitudes in connection with the overall community changes?

The respondents believed the Hawaiians were experiencing difficulty in accepting these changes. Many are angry, but realize they must learn to accept what is happening around them, especially that they are not being recognized for being Hawaiian. They are a stranger in their own land. Other ways they may change are seen by the respondents as follows:

"Loss of aloha"

"Feelings for the land and the language are shifting towards western ways"

"Attitudes to others: Feel Caucasian (haoles) can no longer be trusted; they will take what belongs to you with the extension of trust. They ask for more than what they give"

"Loss of the language, even in the old Hawaiian churches"

"Loss of closeness and sharing with each other"

"Culture will have difficult time surviving in this atmosphere"

"Don't know and are unable to compete against Caucasian (haoles) money"

"Retired haoles represent a group interested in the Hawaiian and his condition and are pressuring the Hawaiian to save his own culture"

"Young haoles are culturally unable to reach the Hawaiian"

"If people like the Hawaiian lifestyle they must help save the Hawaiians in order to benefit from the lifestyle"

"Unable to use old method must use western method"

"Caucasians are digging, taking out Hawaiian herbs and medicine to sell, none left for Hawaiians"

Hawaiians are awakening to the overall problem, are becoming more aware of the culture before change destroys it"

"It is like Captain Cook all over again! Only this time they're coming with money!"

4. List about three or four ways in which you have observed physical or social changes taking place.

All of the respondents focused on physical areas where they perceived a loss of history and the past such as:

"Loss of the old Akebono Theatre--was a gathering place for all nationalities. Now owned and managed by haoles"

"Criminal element moving in to deal with Caucasian pakalolo planters and processors"

"Heavy traffic through Pahoa, especially big trucks"

"New types of business like a natural food store, chop suey house, Italian restaurant, Magoo's Pizza, real estate offices, doctor's clinic, and fertilizer store (for pakaloio growers)"

"Crowded beaches, which were once lovely and isolated"

"Young Caucasian pakalolo planters buying farm and residential lands"

"See less Hawaiians using their subsistence skills (fishing, etc.)"

"More violence breaking out--involves all people but is mostly non-local with their own prejudices"

"Population of Waiakolea Pond" (a favorite children's swimming place)

"Competition with Caucasians (haoles) for local girls"

"Young Caucasian newcomers competing for welfare assistance locals believe they should have"

"More haoles in school enrollment, but teachers remain Japanese"

"Now is time for Hawaiian to improve education while they still have local teachers"

Many Hawaiians are actively attempting to discover and define their Hawaiian identity. An acceleration of this interest followed the exchange visits between the Maoris and Hawaiians during the project year. The Hawaiian study group returned from New Zealand deeply impressed with Maori efforts to ensure the learning, understanding, preservation, and perpetuation of their cultural heritage.

Many Puna Hawaiians believe they must secretly cling to aspects of their culture in order to participate and be accepted in the Western culture. Thus, for many Hawaiians in the district, the positive aspects of many beliefs are not accurately translated.

Today, some Hawaiians identify with a common Hawaiian cultural heritage. There is still much concern over the feelings and opinions of others while competition, assertive or aggressive behaviors are minimized. Kinship networks are intricate and extensive; many of the Hawaiian families are unaware of their relationship to each other and learn of it in unanticipated ways.

Most of the interview respondents still hoped for an improved understanding of "ohana" or family clan. For most Hawaiians in Puna, ohana is still deeply felt regardless of the distance of the relationships, though the "cousins" gap is closing (see interview comments). The core of the ohana is still the blood relatives. Another level of Ohana is "hanai" which refers to adopted children.

Hawaiian and non-Hawaiian attitudes toward ohana are often extended to include unrelated persons, community groups, or churches. It stretches the bounds of traditional definitions. The Puna Hui Ohana's family group itself is a case in point. In such cases the characteristics of ohana are made applicable to a non-blood related group.

The same issue might be associated with the ho'oponopono component and its related concepts; meaning to set things right with each other. Of the Puna families interviewed, all pointed to ho'oponopono as essentially a family matter which involved only the immediate members of the family with the kupuna or a healing kahuna providing the guidance through the intricate process of family therapy. Most did not wish to discuss their attitude toward ho'oponopono openly as they considered it a very private family matter. Most admitted, however, that they did not utilize every step in the seven-step process. As one of the kupuna stated, especially when someone in the family is sick, the pule mana is extremely difficult and questions whether there is anyone in Puna who could perform such a demanding rite. While some changes, innovations, and additions may be desirable, such as a community-wide application correcting huki huki (constant opposing emotional pull that two or more parties may exert on a third party), there is agreement that it is not ho'oponopono as seen in its original context. Several respondents concluded that the Hawaiian as a whole would probably have achieved greater social, economic, and political standing in the community if he had thoroughly understood the rigorous but beneficial demands

that make ho'oponopono a unique therapeutic tool.

There is a wide reciprocity network in which a great deal of sharing and trading of resources and services on a non-monetary basis occurs. This is generally the result of strong attachment to Hawaiian cultural values and attitudes within the rural characteristics of the Puna Community.

Not many of the people can speak fluent Hawaiian. Many understand the language though they are unable to speak it well. Young people as a whole are unable to speak or understand the language. Language programs are being planned by the Hui which will correct the problem.

Highly respected elders are generally held in esteem and must often lead by example and by subtle suggestions. The social network is characterized by face-to-face relationships making it necessary for any potential change agent to work through both the existing informal community leaders and the existing formal organizations.

Feasts (aha'aina) are still held to celebrate important traditional rituals (for example, first birthdays, marriage, first child, death). These feasts are less frequent because of the increasing cost and difficulty of gathering and preparing Hawaiian delicacies from the sea and the land.

Field visits and interviews indicate that most Hawaiian fishing on the Kalapana-Kapoho coastline is done to supplement food stocks. Presently, fishing in the Volcano National Park is restricted to Kalapana residents who are at least 50% Hawaiian or are escorted by a resident who meets this criterion. Kaimu

is the second most frequented fishing spot. Some Hawaiians fish the entire coastal area, the exact location depending on the season, the type of fish desired or the phases of the moon. Many Hawaiian fishermen still consider it bad luck to announce they are going fishing or to name the location. Several Hawaiians who had given up farming now fish commercially, mostly for ahi. Some feel that increasing weekend fishing activities are depleting the fish supply. It is difficult to determine the number who hunt on a regular basis. Pigs, sheep and goats are available for hunting which also contributes to the food supply.

Food prices are considerably higher in Lower Puna than in Hilo. Most Puna residents travel the 30 miles to Hilo once or more a week for food shopping. Lack of electricity in several outlying areas and the absence of a cold storage plant in Pahoa prevent frozen storage of large amounts of fresh fish or game. Estimates of the number of Hawaiians who regularly swim, surf, or participate in team or individual sports are difficult to note at this time because most of the field observations and interviews were with adults. Queens Bath, Harry K. Brown Park, Kaimu Beach and Pohoiki were visited. Within the past two years a large influx of newcomer residents on these beaches has forced the Hawaiians to relocate at less desirable recreational areas. Several Kalapana residents have expressed concern over pollution of Queens Bath, due to the larger number of people using it. Competition for recreational and food gathering space is expected to increase with geothermal development.

One cannot conclude a discussion on the aboriginal Hawaiian without reference to maha' oe and niele. Mary Pukui defines the first as brazen, outrageous behavior and the second as nosy inquisitiveness. In a deeper sense both concepts portray a cultural behavior more subtle in its application than it appears to be in western attitudes. Both can be affronted to an individual's deepest privacy which can be especially devastating in opinion development. When a Hawaiian is required to answer questions he does not like or which he may consider as imposing on his personality and his privacy, he will give you an answer he believes you want to hear.

Chapter 6

Lifestyle and Culture: Community Survey Data

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The previous chapter describes the culture and lifestyle of the Puna Hawaiian Community from the perspective of a selected sample of its members. The approach used for the present chapter was to present a standard set of questions about lifestyle and culture to as complete a sample of Lower Puna Hawaiians as possible. The primary source of information for the present chapter is the lifestyle and culture section of the geothermal survey conducted by the Puna Hui Ohana. A copy of the survey form is presented in Attachment 6-1. The large number of respondents to the survey provides a reliable set of baseline information about cultural practices and beliefs, and numerous aspects of the present lifestyle of Puna Hawaiians. With this pre-development baseline established it will be possible to document any changes in the variables assessed as geothermal development occurs.

METHOD

Sampling

The target area for the survey was defined by the Lower Puna census tract (Pahoa-Kalapana). This included residents from the Hawaiian Beaches subdivision to Kapoho and Kalapana. A house-to-house census of the area was completed by the members of the Hui to identify all Hawaiians living in Lower Puna. Questionnaires were administered to all adult (18 years of age or older) Hawaiian and Part-Hawaiian residents of the area who could be located and who were willing to complete the questionnaire.

Data Collection

For organizational purposes Lower Puna was divided into six geographic areas with a team leader coordinating the survey administration in each area. The survey teams for each area included from 1 to 11 people; and consisted of residents of the area being sampled. Thus the survey team members were familiar with the geographical area being covered; and, except in Hawaiian Beaches, knew most of the Community members they contacted. It was hoped that this familiarity would encourage a high questionnaire return-rate. During the earlier survey conducted to assess the effects of the New Zealand site visit, the questionnaires were personally delivered to and collected from each respondent by a member of the Hui staff. Since this procedure led to a high return rate (93%) on the earlier survey, it was followed for the larger survey as well.

Training for the members of the survey team consisted of three meetings in which questionnaire content, administration procedures, and potential problems were discussed. In addition to specific procedures, the importance of preserving the anonymity of the respondents and the confidentiality of the information obtained were stressed. An example of some of the issues covered in the training sessions is presented in Attachment 6-2.

Questionnaire Construction

The basic structure of the questionnaire was similar to that of the earlier survey of the effects of the New Zealand site visit. Individual items used a closed question format following a modification of the Consequence Analysis procedure (Sanford & Fawcett, in press) for community impact analysis. This procedure asks the respondent to indicate both the magnitude of the perceived effects of development (i.e., large or small), and the value of such effects (i.e., good or bad). Magnitude of impact is judged on a five-point scale and value of impact is judged on a seven-point scale. For questions about the potential uses of the geothermal resource only the seven-point value scale was used.

The final questionnaire was thus a refinement of the earlier instrument used to assess the impact of the New Zealand site visit. In addition the present survey instrument was piloted three times with the Hui Board and the Project Advisory Board to clarify wording and item structure, and to be sure that all relevant topics were included.

The first section of the questionnaire addressed attitudes toward geothermal development. The results of that section are described in Chapter 10 of this report. The second section of the questionnaire addressed lifestyle, cultural practices and values and these topics are addressed in the present chapter. The topics addressed by the questions about lifestyle and culture are probably more sensitive than those about geothermal development. Because of this potential sensitivity, an interview procedure which would allow time to build rapport with the respondent might have been a more appropriate data collection model than the use of a written questionnaire. However, the validity of the data collected through an interview procedure depends a great deal on the skill of the interviewer. The limited Project resources made it impossible to provide intensive training in interviewing techniques for the survey team members; consequently a written questionnaire format was chosen. All questionnaire items except those about age, sex and type of job used a closed format. Thus, for most items preselected categories were provided and the respondent was asked to check the appropriate categories. Although it was not explicitly requested, a number of respondents did write in comments on the questionnaire in response to some of the topics presented. Some of these comments will be included in the present report.

RESULTS

Demographic Information

The Hui conducted a door-to-door census of the Lower Puna area, and identified 413 adult Hawaiians as the survey population. The 351 respondents to the survey comprise 85% of the adult Hawaiians in the area, and represent 255 families with a total population of 928 people. Respondents ranged in age from 18 to 81 years, with a mean age of 38.7 years. The average age of all family members is 25.4 years. As the histogram in Attachment 6-3 indicates, the distribution of ages within the families shows a large proportion of the population to be in the younger age categories. The 1980 census for the State of Hawaii finds 32.5% of the State's population to be under 20 years of age, while the comparable figure for the Lower Puna Hawaiian Community is 47%. The difference is highlighted in the two youngest age groups in which 26% of the Puna Hawaiian Community but only 15.7% of the State population are reported to be less than 10 years of age.

The average length of residence in Puna for the respondents is 22.4 years, with a range of from less than one to 81 years. Table 6-1 presents the frequency distribution for this variable.

Table 6-1

FREQUENCY DISTRIBUTION FOR NUMBER OF YEARS IN PUNA

NUMBER OF YEARS	FREQUENCY	PERCENT
Less than 5	52	15.3
5 - 9	77	22.6
10 - 14	25	7.4
15 - 19	16	4.7
20 - 24	34	10.0
25 - 29	35	10.3
30 - 34	17	5.0
35 - 39	16	4.7
40 - 44	15	4.4
45 - 49	8	2.4
50 - 54	13	3.8
55 - 59	9	2.6
60 - 64	11	3.2
65+	12	3.5
No Response	11	

The 1980 census for the State reports a 247% increase in the population of the Lower Puna area in the last 10 years. Thirty-eight percent of those responding to the length of residence question on the Hui survey indicate that they have lived in Puna for less than 10 years. While this 61% growth is substantial, it does not approach the rate for the community at large.

The geographical pattern of residence for the Hawaiian population of the district is described in Table 6-2.

Table 6-2

AREA OF RESIDENCE FOR TOTAL SAMPLE

AREA	NUMBER	PERCENT
Hawaiian Beaches	149	42.45
Pahoa	77	21.94
Kalapana	66	18.80
Opihikao	29	8.26
Nanawale Estates	17	4.84
Kapoho	5	1.42
Leilani Estates	2	0.57
Ainaloa	1	0.28
Paradise Park	1	0.28
Orchid Land	0	0.00
No Response	4	1.14

Hawaiian Beaches, Pahoa and Kalapana are clearly the areas of residence for most of the Hawaiian Community, and include 83% of the population. It is particularly interesting that by far the largest number of Hawaiians living in any single area of Lower Puna reside in Hawaiian Beaches. This subdivision is relatively new and would be expected to contain more of the recent residents of the area.

The respondents reported a wide variety of occupations, and these are summarized in Table 6-3. Omitting the 16% who did not answer this question, the most common responses were housewife (18.5%), service jobs (10.5%), retired (10%), unemployed (8.5%) and agricultural jobs (7.7%). The remaining 28.7% of the sample report a variety of occupations, none of which included more than 3.5% of the respondents. The most frequently reported location of work is Puna (44.4%), with jobs in Hilo employing an additional 21.7%.

Table 6-3

OCCUPATIONS REPORTED BY LOWER PUNA HAWAIIAN COMMUNITY

OCCUPATION		FREQUENCY	PERCENT
Housewife		65	18.5
Service		37	10.5
Government	19		
Tourism	12		
Other	6		
Agriculture		27	7.7
Construction		12	3.4
Student		12	3.4
Transportation/ Communication/ Utilities		10	2.8
Office/Clerical		10	2.8
Truck Driver		9	2.6
Laborer		9	2.6
Fishing/Hunting		8	2.3
Retail/ Wholesale Trade		8	2.3
Mechanic		6	1.7
Manufacturing		5	1.4
Miscellaneous		12	3.4
Retired		35	10.0
Unemployed		30	8.5
No response		56	16.0

The remainder of the sample works at other Island locations or off-Island. These results are summarized in the histogram in Attachment 6-4.

The educational background of the members of the Community is presented in the histogram in Attachment 6-5. Only two of the 327 respondents answering this question have advanced degrees, with an additional 17 (5.2%) having bachelors degrees. The most common educational level is graduation from high school (41.3%), with somewhat fewer people having had some college (29%), or some high school beyond grade 8 (14.4%).

In response to the question asking if social services are received from either government or private agencies, 24.5% of the

sample indicated yes, with the largest number (21.4%) receiving services from government agencies.

Cultural Characteristics

Much of the information provided by the final section of the survey concerns the cultural characteristics of the Lower Puna Hawaiian Community. The Puna Hui Ohana is an umbrella organization formed to coordinate the activities of the four Hawaiian organizations in Lower Puna. Each of these organizations was created to address the interests and concerns of a segment of the Hawaiian Community. The Hui Opio is made up of the youth of the Community, and consequently its members were not included in the survey sample. The other organizations address the concerns of young adults (Young Hawaiians of Puna), parents of Hawaiian children (Hawaiian Parents' Society), those desiring to preserve the Hawaiian culture (Hawaiian Club), and those concerned with broader issues affecting the Puna Hawaiian Community (Puna Hui Ohana). One of the survey questions asked respondents to indicate if they belonged to any of these organizations. Ninety-seven people or 27.6% responded that they were members of one or more of the Puna Hawaiian organizations. The largest number indicated membership in the Hui (18.2%), with the Hawaiian Club receiving a similar response (15.1%). The Young Hawaiians of Puna and the Hawaiian Parents Society were checked on only 6.8% and 5.1% of the questionaires. These results are presented graphically in Attachment 6-6.

While it was beyond the scope of the present study to extensively examine the family structure and socialization practices of

the Hawaiian Community of Puna, there is some information in the household data that is relevant to cultural characteristics. The information on age of household members provided a means of estimating the frequency of extended family living arrangements within a household. In only 20 (8%) of the households are there reported to be three generations residing, while the majority (64%) of the households contain two generations, and the remaining 28% of households contain a single generation. The relatively low frequency of households containing three generations is consistent with the average household size of 3.64 people. Inspection of Table 6-4. finds that the modal household contains two people, but that there are between 12% and 16% of the households of each size between one and six.

Table 6-4

FREQUENCY DISTRIBUTION FOR HOUSEHOLD SIZE

SIZE OF HOUSEHOLD	FREQUENCY	PERCENT
one	33	12.9
two	53	20.8
three	41	16.1
four	42	16.5
five	40	15.7
six	32	12.5
seven	8	3.1
eight	4	1.6
nine	1	.4
ten	1	.4

Two additional pieces of information about the structure of Hawaiian households in Puna that might reflect the traditional culture are the frequency of traditional adoption practices (hanai), and the frequency of mixed marriages. The survey results indicate

that 6% of the 928 people are hanai, and that 10.2% of the household residents are non-Hawaiian. There would thus seem to be relatively low rates of both practices in the Puna Hawaiian Community.

It was hypothesized that the way a member of the Community spends his or her time outside of work would reflect elements of the traditional culture. Attachments 6-7, 6-8, and 6-9 describe respondents' reported use of leisure time; hunting, fishing and gathering activities; and practice of selected activities related to the traditional culture. These activities are relevant to the question of geothermal development impact to the extent that they imply conflicts in land use. The leisure time activities which involve use of the land and which were reported by more than half of the sample include picnicking (57%), gardening (56%) and fishing (56%).

Of particular interest in assessing the cultural impact of geothermal development is the extent to which the Community members engage in traditional subsistence activities which could be in conflict with geothermal use of the land. As Attachment 6-8 indicates, there is reported a high frequency of such activities with a majority of the sample fishing (66%), shoreline collecting (62%) and food gathering (59%). The [redacted] are also quite common. While these activities are common for family use, their frequency for commercial use drops substantially. Fishing (11%) is the most common of these activities practiced commercially, with shoreline collecting (7%), food gathering (5%) and gathering maile (5%) less frequent. Very little gathering of medicinal plants (2%) or hunting (1%) is engaged in commercially.

The reported frequency of a number of traditional cultural activities is presented in Attachment 6-9. The most frequent of these practices are the sharing or exchange of food (72%), preparation of traditional Hawaiian foods (69%), singing of traditional songs (59%) and the use of traditional herbs and medicines (56%). While these activities are engaged in quite regularly by the Puna Hawaiian Community, the use of the Hawaiian language is much less common. Attachment 6-10 describes the extent to which the language is reported to be spoken and understood. The most common response was that a few words and phrases are spoken (51%) or understood (42%). Approximately 10% of the respondents report fluency in the Hawaiian language, while 5% say they do not speak it at all.

The final set of questions on the survey asked for respondents' views of a number of traditional Hawaiian cultural values. Attachment 6-11 presents the distributions of responses to four cultural values in terms of both their importance and the frequency with which they appear in modern Hawaiian culture. "Aloha," "love of the land," "ohana" and "respect for Kupunas" were all considered very important and common or very common among modern Puna Hawaiians. The agreement in the responses to these four values was larger than for any other cultural characteristic assessed by the survey, and reflects a virtual consensus among the adult members of the Hawaiian Community of Lower Puna. Of particular relevance to the issue of geothermal development is the question about "love of the land," which 97% of the sample felt important or very important and 87% felt to be common or very common.

One of the survey questions discussed in the Chapter 10 on Community attitudes toward geothermal development asked respondents how they felt about the quality of life in Puna at the present time. Attachment 6-12 presents the distribution of responses to this item. On a seven point scale from happy to unhappy the large majority responded that they were happy with the present quality of life in Puna, while only 9.5% were unhappy and 8.6% were neither happy nor unhappy.

A cultural variable which is likely to be directly affected by geothermal development in Puna is the identification, interpretation and preservation of historic sites. A brief review of historical preservation concerns is presented in Attachment 6-13. The review was prepared by Dr. Craig Severance of the UH-Hilo Anthropology Department, and it points out potential problems given the limited amount of archeological work in the prospective geothermal zone. The reader is referred to Dr. Severance's review for a summary of the problems in this area.

DISCUSSION

The picture of the Lower Puna Hawaiian Community which emerges from the information provided above is one of a Community with many young families, and one which has grown substantially during the last 10 years. Occupational status varies considerably, formal education is typically completed with high school graduation, and approximately one fourth of the adult Community receives social services from government or private agencies. What is the relationship of these characteristics to the possible effects of geothermal development in Puna?

The large percentage of young families and the general growth rate of both the Hawaiian and the non-Hawaiian community point to an increasing demand on the infrastructure necessary to support the population. The effect of this growth is likely to be large even without additional stimulation by the geothermal industry. Should geothermal development encourage a large increase in population, services such as schools, fire and police protection, road and park maintenance, etc. would be severely strained. Continued large population increases will certainly affect the opportunity to practice many of the traditional cultural activities described earlier. There is also an increasing potential for social conflict as newcomers with relatively high-paying jobs and values different from the current residents of this rural Community compete for the use of physical resources and social status.

One of the findings from the survey of attitudes toward geothermal development was that the economic impact of development was seen as generally positive. Fifty five percent of those responding perceived positive effects, 21% perceived neither good nor bad effects, and 24% perceived negative effects. This positive economic outlook was balanced against a long list of perceived negative cultural, social and physical effects of development. It is not clear from the survey exactly what the respondents see the economic gains to be, especially since they were fairly evenly divided on the impact of development on jobs for Hawaiians (43% positive, 22% neutral, 34% negative). While only 8.5% of those answering the question about employment indicated that they were unemployed, 16% did not answer the question and fully 48% of those responding

were not engaged in income-generating work. There may be a sizeable need for employment opportunities among the members of the Hawaiian Community, but there is considerable disagreement about whether geothermal development.would meet this need. It is interesting that this issue generated one of the highest frequencies of write-in comments. Most of these comments can be summarized by one respondent's statement that the jobs would be "not for Hawaiians" but "For Haole and Japanese only." It would seem that the high-school educated residents of this rural Community do not necessarily see the highly technological geothermal industry as an answer to their employment needs.

The impact of geothermal development on the traditional culture of the Puna Hawaiian Community is likely to focus on conflict over the use of the land in culturally congruent ways, and the potential interference with the application of certain Hawaiian cultural values. Some aspects of household and family structure, and Hawaiian language usage do not present a picture of a strong and viable Hawaiian culture in Puna. However there are clearly a number of strongly held traditional values, and [redacted] and the practice of numerous traditional cultural activities point to considerable [redacted]. The importance of the land to the modern Hawaiian resident of Puna comes through very clearly both in the questionaire responses and in the numerous write-in comments about the use and meaning of the land for the Hawaiian. It is perhaps in the ways in which the Lower Puna Hawaiian Community actually uses the land presently that the greatest potential for conflict

between the aboriginal culture of Hawaii and the land-intensive geothermal industry exists. Many of these traditional cultural activities require access to fairly large areas of land that are "undeveloped" in the Western sense, but highly productive of things necessary for the practice of traditional Hawaiian culture. That the land of Puna is presently meeting these cultural needs is apparent not only from the things that Puna Hawaiians do with their time, but also their strong satisfaction with the present quality of life in Puna.

SUBSTANTIAL CONTRIBUTIONS TO THE PREPARATION OF THE REPORT WERE MADE BY PROFESSOR LEE HOWARD, COMPUTER PROGRAMMER AND MS. JAN AYABE, RESEARCH ASSISTANT. THEIR ASSISTANCE IN COMPLETING THE DATA SUMMARY AND ANALYSIS IS GRATEFULLY ACKNOWLEDGED.

ATTACHMENTS

ATTACHMENT 6-1: PUNA HUI OHANA GEOTHERMAL SURVEY

HAWAIIAN LIFESTYLE

THE NEXT SET OF QUESTIONS WILL ASK YOU FOR INFORMATION THAT WILL HELP US KNOW WHAT OUR PUNA HAWAIIAN COMMUNITY IS LIKE. IF GEOTHERMAL DEVELOPMENT COMES TO PUNA, AND CHANGES OUR LIVES, WE WILL ONLY KNOW WHAT KIND OF CHANGES ARE HAPPENING IF WE KNOW WHAT OUR COMMUNITY WAS LIKE BEFORE DEVELOPMENT. ONCE AGAIN, YOU CAN BE SURE THAT YOUR INDIVIDUAL QUESTIONAIRE WILL NOT BE IDENTIFIED, AND ONLY COMMUNITY SUMMARIES WILL BE REPORTED.

1. WHAT IS YOUR JOB?_____
   WHERE DO YOU WORK? (CHECK ALL WHICH APPLY)

   ___PUNA
   ___HILO
   ___OTHER BIG ISLAND LOCATION
   ___OTHER

2. EDUCATION: CHECK THE HIGHEST LEVEL REACHED:

   ___ADVANCED DEGREE--M.A., M.D., PH.D.
   ___COLLEGE DEGREE--B.A.
   ___SOME COLLEGE
   ___HIGH SCHOOL GRADUATE
   ___SOME HIGH SCHOOL BEYOND GRADE 8
   ___GRADE 8 COMPLETED
   ___BELOW GRADE 8

3. HOW DO YOU SPEND YOUR LEISURE TIME OR RECREATIONAL TIME? (CHECK ALL WHICH APPLY)

   ___RELAXING AT HOME
   ___GARDENING
   ___WATCHING T.V.
   ___VISITING WITH FRIENDS OR RELATIVES
   ___PICNICKING AT BEACH OR PARKS
   ___CAMPING
   ___HUNTING
   ___FISHING
   ___WATER SPORTS (FOR EXAMPLE, SURFING, DIVING, SWIMMING, BOATING)
   ___OTHER SPORTS (FOR EXAMPLE, VOLLEYBALL, BASKETBALL, ETC.)

4. DO YOU RECEIVE SOCIAL SERVICES FROM EITHER OF THE FOLLOWING? (CHECK ALL WHICH APPLY)

   ___GOVERNMENT AGENCIES(FOR EXAMPLE, WELFARE, FOOD STAMPS, MEDICAL TREATMENT, AID TO FAMILIES WITH DEPENDENT CHILDREN)
   ___PRIVATE AGENCIES (FOR EXAMPLE, OLCC, CHURCH, ETC.)

5. DO YOU DO ANY OF THE FOLLOWING ACTIVITIES COMMERCIALLY, OR FOR FAMILY USE? (CHECK ALL WHICH APPLY.)

	FAMILY USE	COMMERCIALLY
HUNTING	____	____
FISHING	____	____
FOODGATHERING (FOR EXAMPLE, GUAVA, LILIKOI, MANGO, ULU)	____	____
SHORELINE COLLECTING (FOR EXAMPLE, OPIHI,LIMU,A'AMA CRAB)	____	____
GATHERING MAILE	____	____
GATHERING MEDICINAL PLANTS	____	____

6. DO YOU BELONG TO ANY OF THE FOLLOWING PUNA HAWAIIAN ORGANIZATIONS? (CHECK ALL TO WHICH YOU BELONG)

   ___PUNA HUI OHANA
   ___HAWAIIAN CLUB
   ___HAWAIIAN PARENTS SOCIETY
   ___YOUNG HAWAIIANS OF PUNA

7. HOW WELL DO YOU KNOW THE HAWAIIAN LANGUAGE? (PUT ONE CHECK MARK IN EACH COLUMN)

	SPOKEN	UNDERSTOOD
FLUENTLY	____	____
GOOD, BUT NOT FLUENTLY	____	____
FAIR	____	____
A FEW WORDS AND PHRASES	____	____
NOT AT ALL	____	____

8. DO YOU ENGAGE IN ANY OF THE FOLLOWING ACTIVITIES? (CHECK ALL WHICH APPLY)

___USE TRADITIONAL HERBS AND MEDICINES
___PLAY TRADITIONAL HAWAIIAN SPORTS OR GAMES
___PREPARE TRADITIONAL HAWAIIAN FOODS
___DANCE TRADITIONAL HAWAIIAN DANCES
___SING TRADITIONAL HAWAIIAN SONGS
___SHARE OR EXCHANGE FOOD (FOR EXAMPLE, FISH CATCHES, GARDEN VEGETABLES OR FRUITS, ETC.) WITH OHANA OR FRIENDS
___USE HO'OPONOPONO

HOW IMPORTANT DO YOU FEEL EACH OF THE FOLLOWING IS TO MODERN HAWAIIAN CULTURE, AND HOW COMMON ARE THESE THINGS?

9. RESPECT FOR KUPUNAS

A. (CHECK ONE)	B. (CHECK ONE)
___VERY IMPORTANT	___VERY COMMON
___IMPORTANT	___COMMON
___SLIGHTLY IMPORTANT	___UNCOMMON
___NEITHER IMPORTANT NOR UNIMPORTANT	___VERY UNCOMMON
___SLIGHTLY UNIMPORTANT	___NOT PRESENT
___UNIMPORTANT	
___VERY UNIMPORTANT	

10. LOVE OF THE LAND

A. (CHECK ONE)	B. (CHECK ONE)
___VERY IMPORTANT	___VERY COMMON
___IMPORTANT	___COMMON
___SLIGHTLY IMPORTANT	___UNCOMMON
___NEITHER IMPORTANT NOR UNIMPORTANT	___VERY UNCOMMON
___SLIGHTLY UNIMPORTANT	___NOT PRESENT
___UNIMPORTANT	
___VERY UNIMPORTANT	

11. OHANA

A. (CHECK ONE)	B. (CHECK ONE)
___VERY IMPORTANT	___VERY COMMON
___IMPORTANT	___COMMON
___SLIGHTLY IMPORTANT	___UNCOMMON
___NEITHER IMPORTANT NOR UNIMPORTANT	___VERY UNCOMMON
___SLIGHTLY UNIMPORTANT	___NOT PRESENT
___UNIMPORTANT	
___VERY UNIMPORTANT	

12. ALOHA

A. (CHECK ONE)	B. (CHECK ONE)
___VERY IMPORTANT	___VERY COMMON
___IMPORTANT	___COMMON
___SLIGHTLY IMPORTANT	___UNCOMMON
___NEITHER IMPORTANT NOR UNIMPORTANT	___VERY UNCOMMON
___SLIGHTLY UNIMPORTANT	___NOT PRESENT
___UNIMPORTANT	
___VERY UNIMPORTANT	

MAHALO I KOU MANA'O
(THANK YOU FOR YOUR THOUGHTS)

PLEASE LIST THE AGE AND SEX OF EACH MEMBER OF THE HOUSEHOLD, AND CHECK IF THE PERSON IS HANAI, OR NON-HAWAIIAN.

	AGE	SEX	HANAI	NON-HAWAIIAN
1.	___	___	___	___
2.	___	___	___	___
3.	___	___	___	___
4.	___	___	___	___
5.	___	___	___	___
6.	___	___	___	___
7.	___	___	___	___
8.	___	___	___	___
9.	___	___	___	___
10.	___	___	___	___

ATTACHMENT 6-2: SAMPLE TRAINING INFORMATION SHEET

I. Survey Population: All adult (18 years or older) Hawaiians in lower Puna (Hawaiian Beaches to Kapoho to Kalapana)

II. Questionaire Format:

The questionaire is divided into the following sections:

A. Household Members (1 question for each family - collected through interview by survey team member)
B. Cover letter from Peter
C. Background Information (8 questions)
D. Attitudes toward Geothermal Development (17 questions)
E. Uses of Geothermal Energy (6 questions)
F. Hawaiian Lifestyle (12 questions)

III. Procedures:

A. Explain who you are and who you represent (Hui)
B. Explain reasons for survey (See questionaire instructions)
C. Request Kokua in completing questionaire
   - emphasize confidentiality
   - be polite
   - don't be pushy or alienate people
D. Ask about people in the household and record information on the form (one form per household)
E. Give out questionaire (in manila envelope) to each adult Hawaiian in household and check your list to show the questionaire was delivered.
F. Do not help people fill out the questionaire. If they have questions about the meaning of any of the items, explain the item using a blank survey (not theirs).
G. Arrange to pick up questionaire and thank the person for helping.
H. Pick up questionaire in manila envelope
   - be sure not to identify or mark the envelope, but cross the name off your list
   - thank the person again
   - ask about other Hawaiians in the area (Hawaiian Beaches)
I. Return completed questionaires to your team leader and be sure the team leader records how many you handed in. Save your lists until the survey is completed.

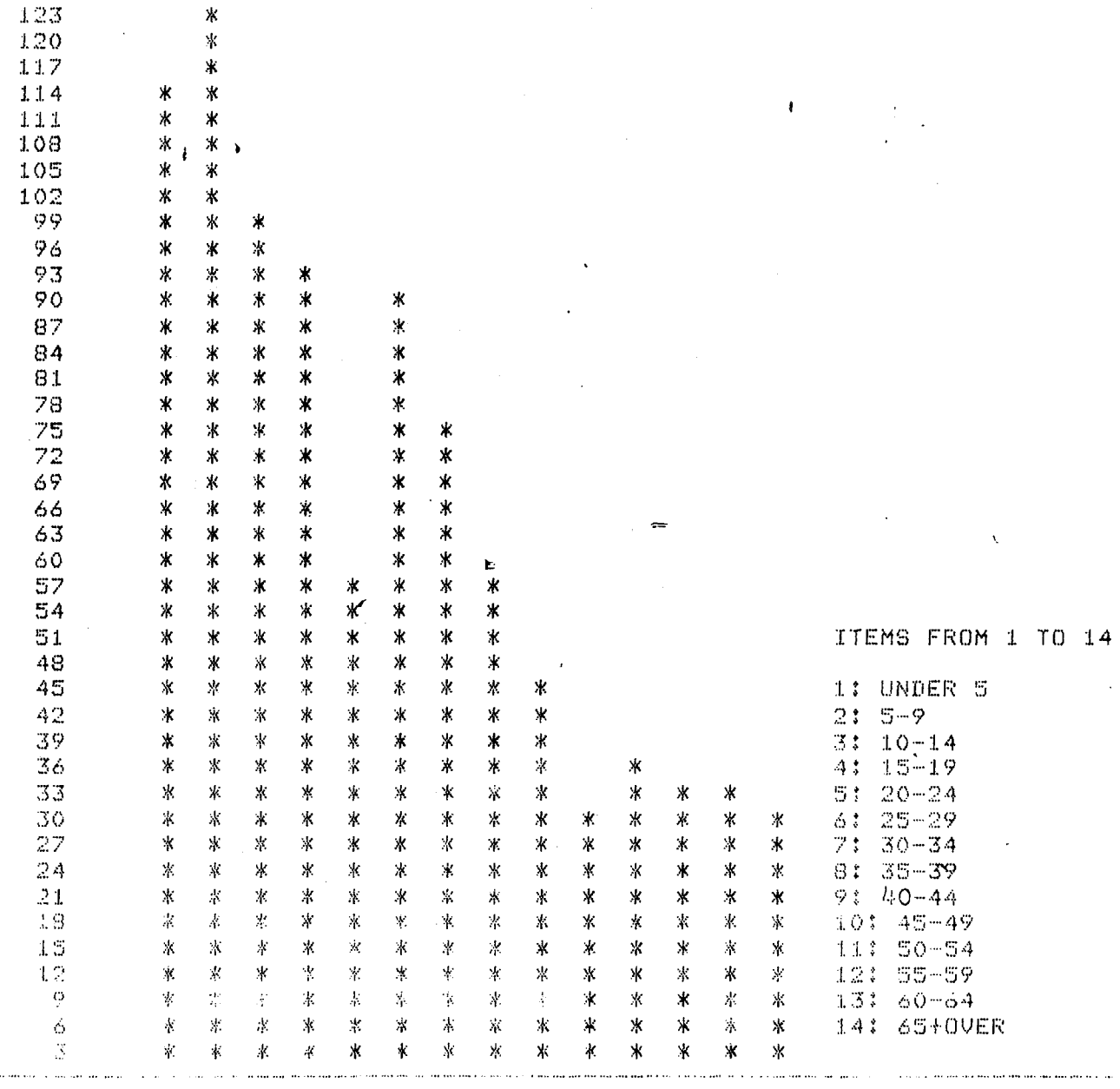
IV. Any information you collect on the questionaire or observe as a survey team member is confidential and is not to be passed to others. This is very important for the credibility of the project and the Puna Hui Ohana.

ATTACHMENT 6-3: HISTOGRAM: AGE

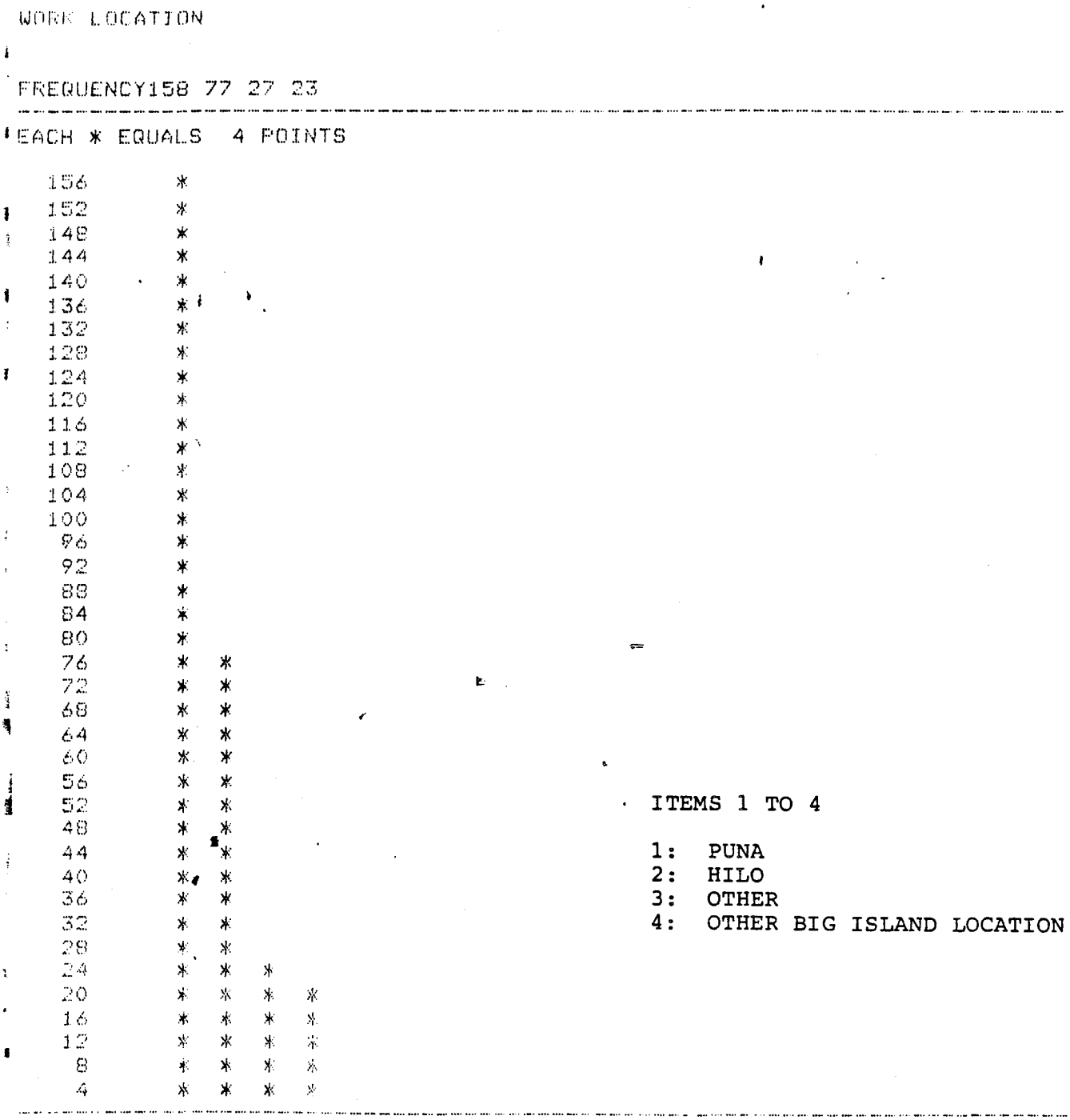
PUNA HAWAIIAN POPULATION BY AGE GROUP

FREQUENCY 116 125 101 94 59 91 75 57 45 31 37 33 33 31

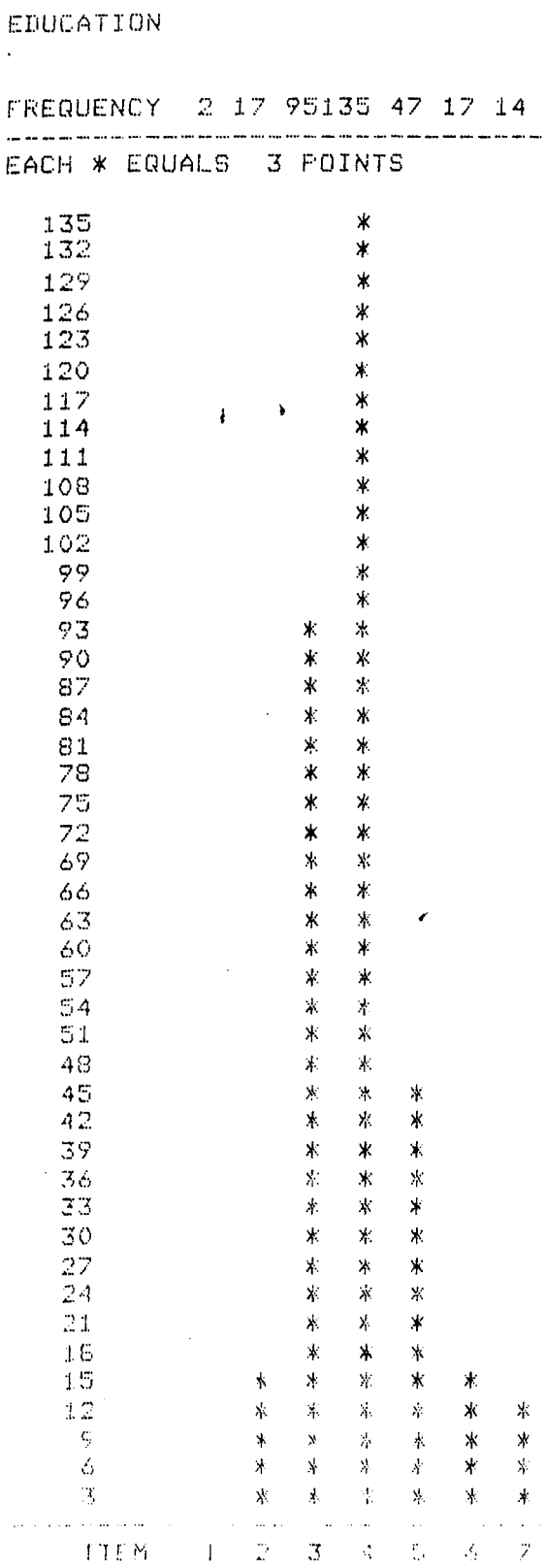
EACH * EQUALS 3 POINTS



ATTACHMENT 6-4: HISTOGRAM: LOCATION OF WORK



ATTACHMENT 6-5: HISTOGRAM: EDUCATION



ITEMS 1 TO 7

1: ADVANCED DEGREE
2: COLLEGE DEGREE
3: SOME COLLEGE
4: HIGH SCHOOL GRADUATE
5: SOME HIGH SCHOOL BEYOND GRADE 8
6: GRADE 8 COMPLETED
7: BELOW GRADE 8

ATTACHMENT 6-6: HISTOGRAM: ORGANIZATIONS

PUNA HAWAIIAN ORGANIZATIONS

FREQUENCY 64 53 24 18

EACH * EQUALS 2 POINTS

```
    64      *
    62      *
    60      *
    58      *
    56      *
    54      *
    52      *  *
    50      *  *
    48      *  *
    46      *  *
    44      *  *
    42      *  *
    40      *  *
    38      *  *
    36      *  *
    34      *  *
    32      *  *
    30      *  *
    28      *  *
    26      *  *
    24      *  *  *
    22      *  *  *
    20      *  *  *
    18      *  *  *  *
    16      *  *  *  *
    14      *  *  *  *
    12      *  *  *  *
    10      *  *  *  *
     8      *  *  *  *
     6      *  *  *  *
     4      *  *  *  *
     2      *  *  *  *
  ITEM      1  2  3  4
```

ITEMS 1 TO 4

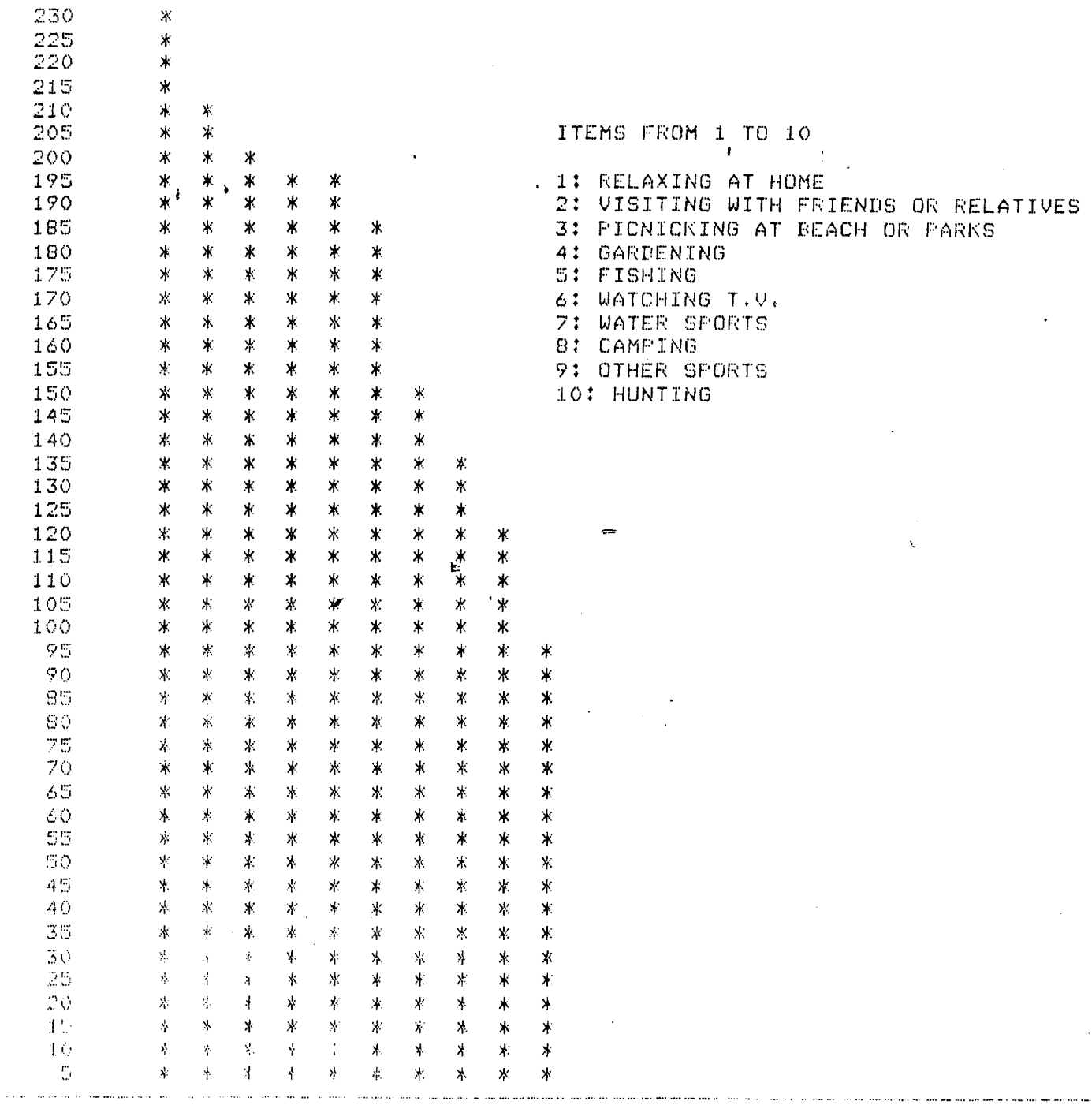
1: PUNA HUI OHANA
2: HAWAIIAN CLUB
3: YOUNG HAWAIIANS OF PUNA
4: HAWAIIAN PARENTS SOCIETY

ATTACHMENT 6-7: HISTOGRAM: LEISURE TIME

LEISURE TIME

FREQUENCY231212200196195185153136124 98

EACH * EQUALS 5 POINTS

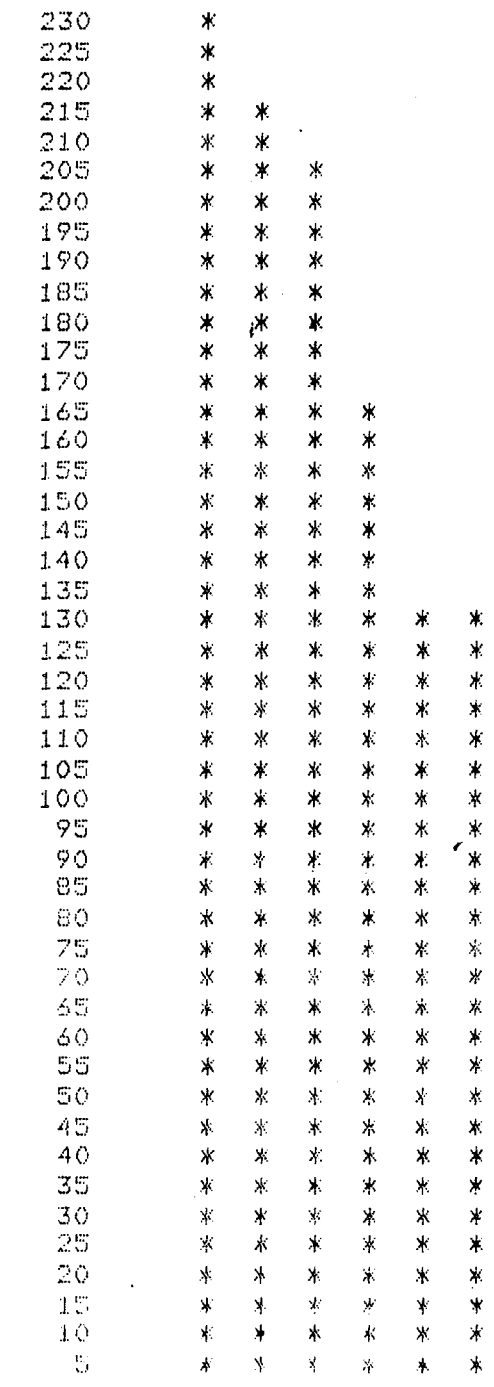


ATTACHMENT 6-8: HISTOGRAMS: HUNTING, FISHING, GATHERING

HUNTING,FISHING,GATHERING: FOR FAMILY USE

FREQUENCY232219207169132131

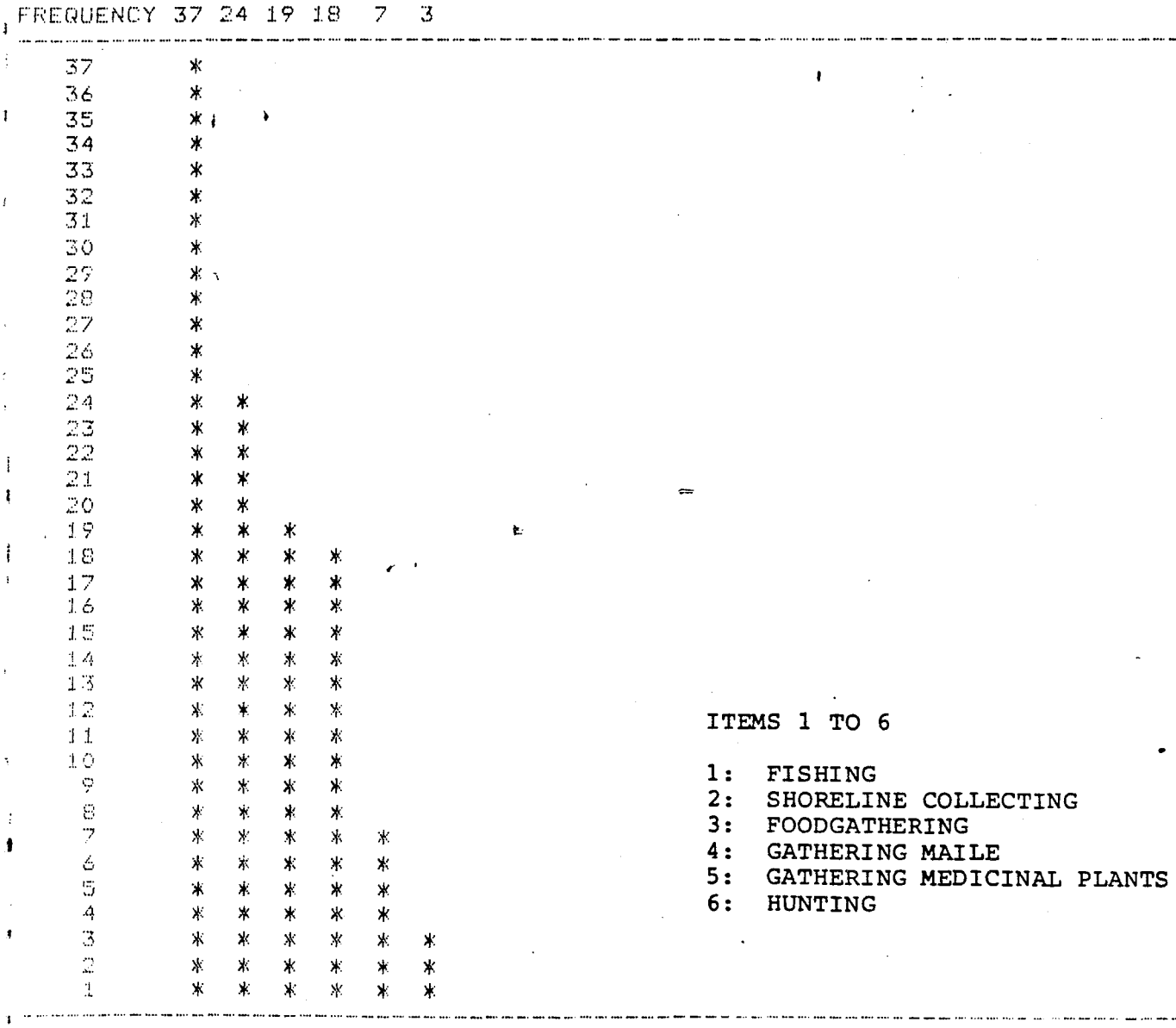
EACH * EQUALS 5 POINTS



ITEMS 1 TO 6

1: FISHING
2: SHORELINE COLLECTING
3: FOODGATHERING
4: GATHERING MEDICINAL PLANTS
5: GATHERING MAILE
6: HUNTING

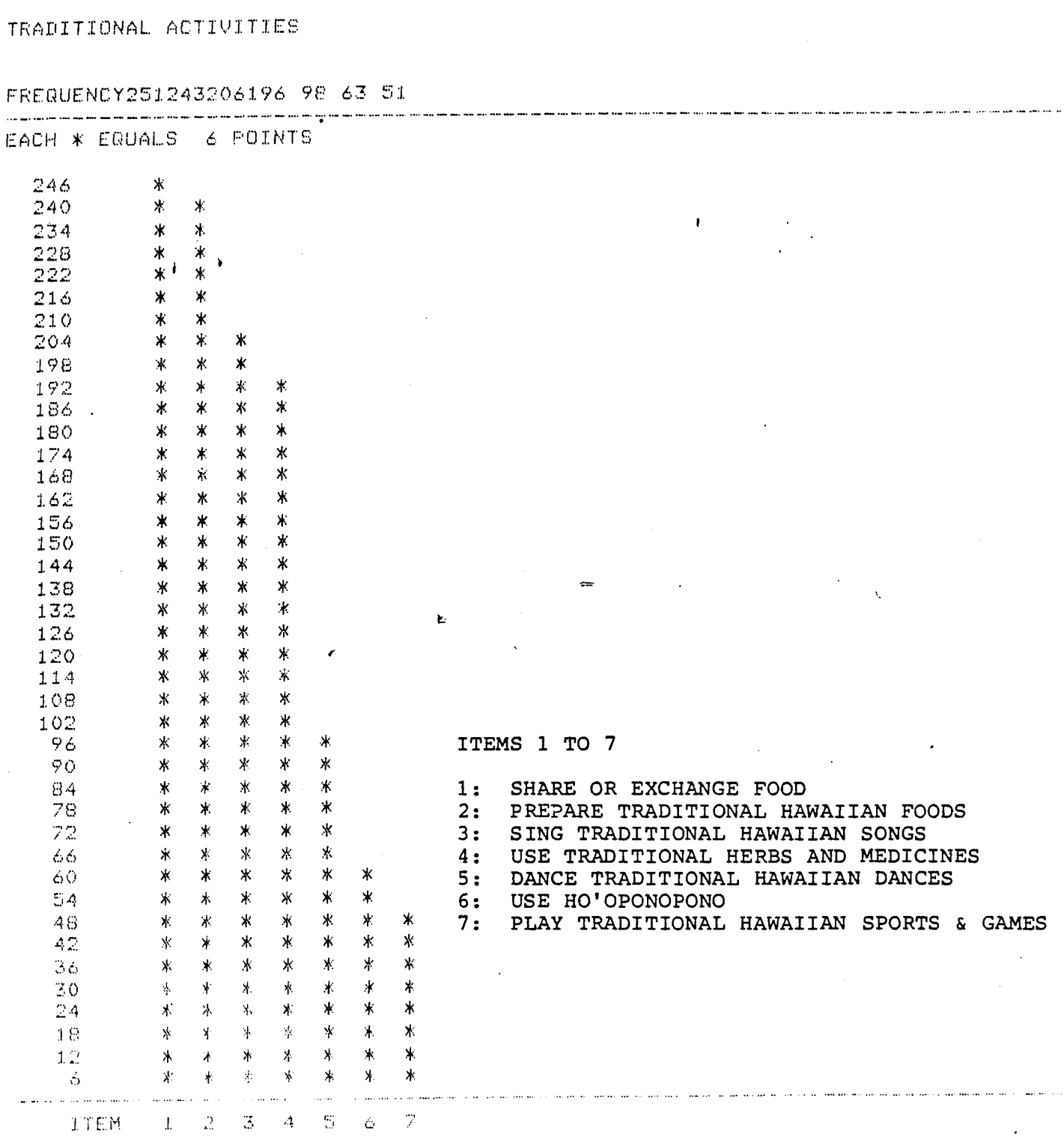
HUNTING,FISHING,GATHERING: COMMERCIALLY



ITEMS 1 TO 6

1: FISHING
2: SHORELINE COLLECTING
3: FOODGATHERING
4: GATHERING MAILE
5: GATHERING MEDICINAL PLANTS
6: HUNTING

ATTACHMENT 6-9: HISTOGRAM: TRADITIONAL ACTIVITIES

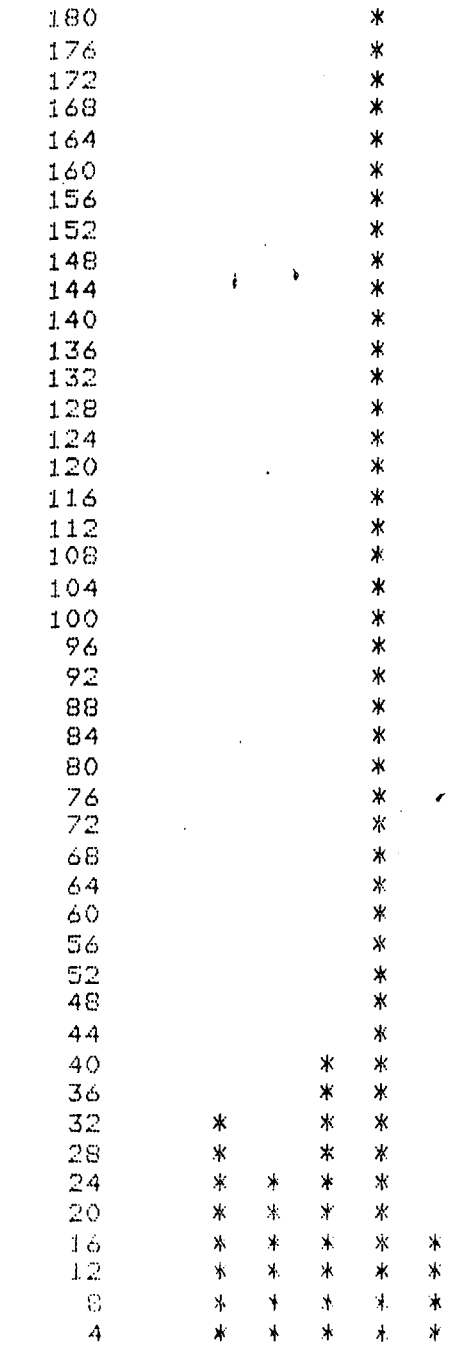


ATTACHMENT 6-10: HISTOGRAMS: LANGUAGE

HAWAIIAN LANGUAGE: SPOKEN

FREQUENCY 33 24 42180 19

EACH * EQUALS 4 POINTS



ITEMS 1 TO 5

1: FLUENTLY
2: GOOD, BUT NOT FLUENTLY
3: FAIR
4: A FEW WORDS AND PHRASES
5: NOT AT ALL

HAWAIIAN LANGUAGE: UNDERSTOOD

FREQUENCY 38 22 46151 S

EACH * EQUALS 4 POINTS

```
 148                *
 144                *
 140                *
 136                *
 132                *
 128                *
 124                *
 120                *
 116                *
 112                *
 108                *
 104                *
 100                *
  96                *
  92                *
  88                *
  84                *
  80                *
  76                *
  72                *
  68                *
  64                *
  60                *
  56                *
  52                *
  48                *
  44           *    *
  40           *    *
  36      *    *    *
  32      *    *    *
  28      *    *    *
  24      *    *    *
  20      *  * *    *
  16      *  * *    *
  12      *  * *    *
   8      *  * *    *
   4      *  * *    *  *
```

ITEM 1 2 3 4 5

ITEMS 1 TO 5

1: FLUENTLY
2: GOOD, BUT NOT FLUENTLY
3: FAIR
4: A FEW WORDS AND PHRASES
5: NOT AT ALL

ATTACHMENT 6-11: HISTOGRAMS: CULTURAL VALUES

ALOHA: IMPORTANCE

FREQUENCY278 33 2 4 0 1 0

EACH * EQUALS 6 POINTS

```
 276      *
 270      *
 264      *
 258      *
 252      *
 246      *
 240      *
 234      *
 228      *
 222      *
 216      *
 210      *
 204      *
 198      *
 192      *
 186      *
 180      *
 174      *
 168      *
 162      *
 156      *
 150      *
 144      *
 138      *
 132      *
 126      *
 120      *
 114      *
 108      *
 102      *
  96      *
  90      *
  84      *
  78      *
  72      *
  66      *
  60      *
  54      *
  48      *
  42      *
  36      *
  30      *  *
  24      *  *
  18      *  *
  12      *  *
   6      *  *
```

ITEM 1 2 3 4 5 6 7

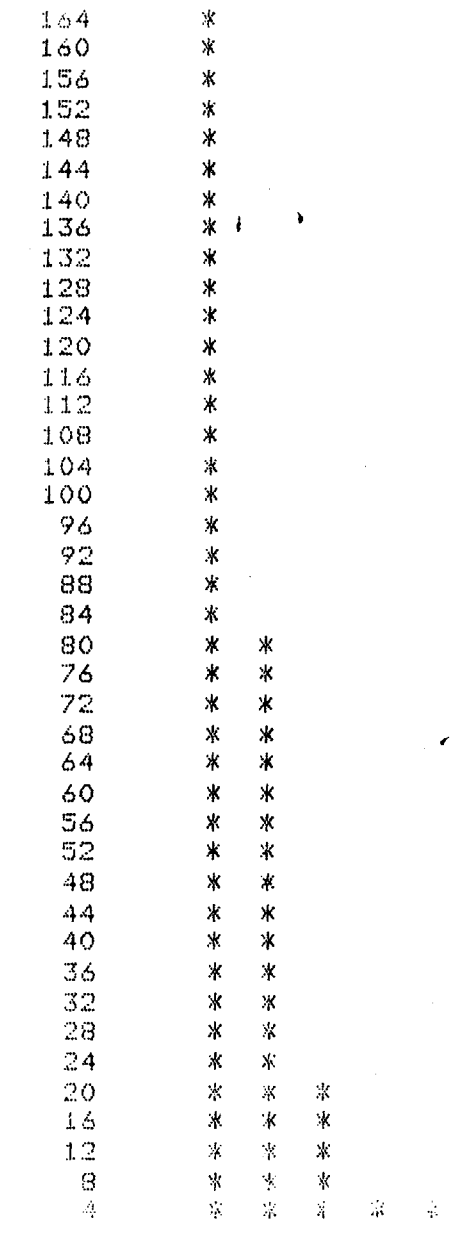
ITEMS 1 to 7

1: VERY IMPORTANT
2: IMPORTANT
3: SLIGHTLY IMPORTANT
4: NEITHER IMPORTANT NOR UNIMPORTANT
5: SLIGHTLY UNIMPORTANT
6: UNIMPORTANT
7: VERY UNIMPORTANT

ALOHA: HOW COMMON

FREQUENCY166 93 23 7 7

EACH * EQUALS 4 POINTS



ITEMS 1 TO 5

1: VERY COMMON
2: COMMON
3: UNCOMMON
4: VERY UNCOMMON
5: NOT PRESENT

ITEM 1 2 3 4 5

LOVE OF THE LAND: IMPORTANCE

FREQUENCY269 39 5 2 0 1 0

EACH * EQUALS 6 POINTS.

```
264      *
258      *
252      *
246      *
240      *
234      *
228      *
222      *
216      *
210      *
204      *
198      *
192      *
186      *
180      *
174      *
168      *
162      *
156      *
150      *
144      *
138      *
132      *
126      *
120      *
114      *
108      *
102      *
 96      *
 90      *
 84      *
 78      *
 72      *
 66      *
 60      *
 54      *
 48      *
 42      *
 36      *  *
 30      *  *
 24      *  *
 18      *  *
 12      *  *
  6      *  *
```

ITEM 1 2 3 4 5 6 7

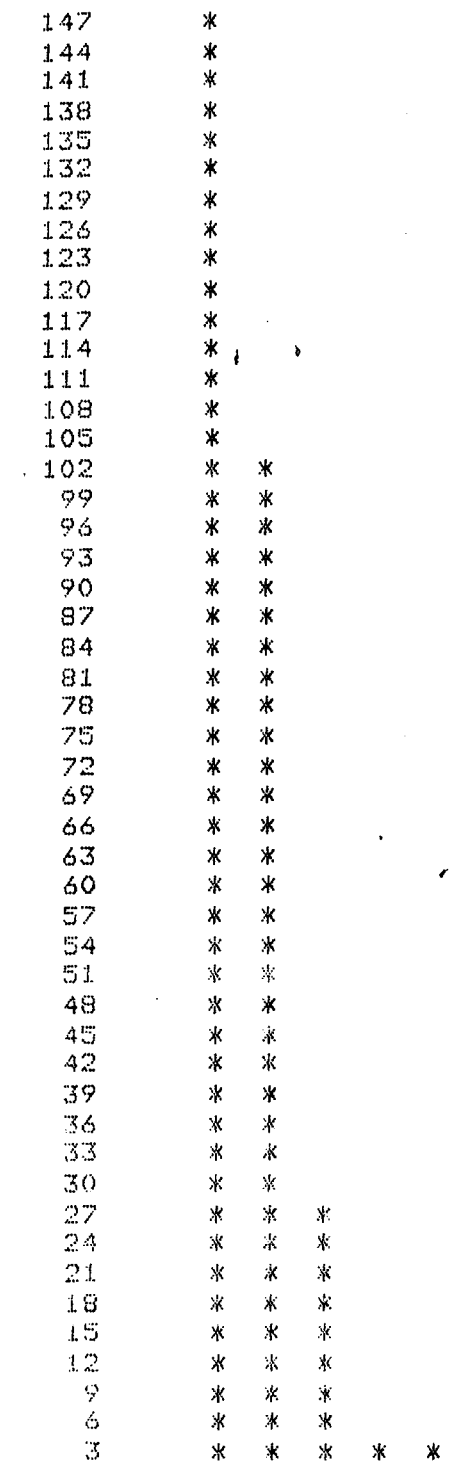
ITEMS 1 to 7

1: VERY IMPORTANT
2: IMPORTANT
3: SLIGHTLY IMPORTANT
4: NEITHER IMPORTANT NOR UNIMPORTANT
5: SLIGHTLY UNIMPORTANT
6: UNIMPORTANT
7: VERY UNIMPORTANT

LOVE OF THE LAND: HOW COMMON

FREQUENCY149102 28 3 5

EACH * EQUALS 3 POINTS



ITEMS 1 to 5

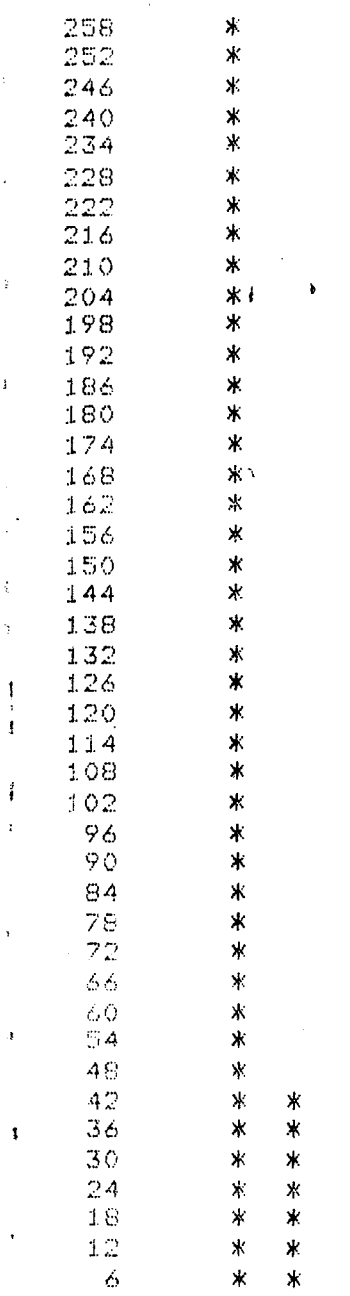
1: VERY COMMON
2: COMMON
3: UNCOMMON
4: VERY UNCOMMON
5: NOT PRESENT

ITEM 1 2 3 4 5

OHANG: IMPORTANCE

FREQUENCY263 47 4 2 0 1 0

EACH * EQUALS 6 POINTS



ITEMS 1 to 7

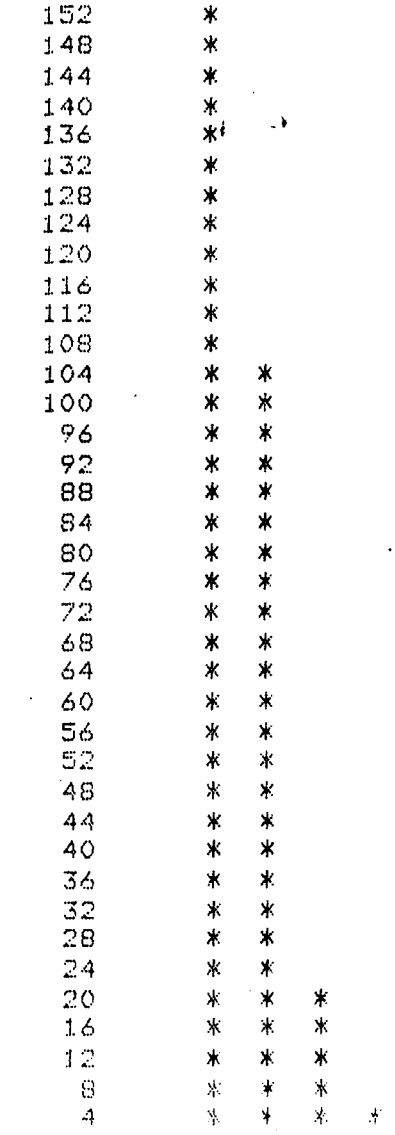
1: VERY IMPORTANT
2: IMPORTANT
3: SLIGHTLY IMPORTANT
4: NEITHER IMPORTANT NOR UNIMPORTANT
5: SLIGHTLY UNIMPORTANT
6: UNIMPORTANT
7: VERY UNIMPORTANT

ITEM 1 2 3 4 5 6 7

OHANA: HOW COMMON

FREQUENCY152104 21 5 3

EACH * EQUALS 4 POINTS



ITEMS 1 TO 5

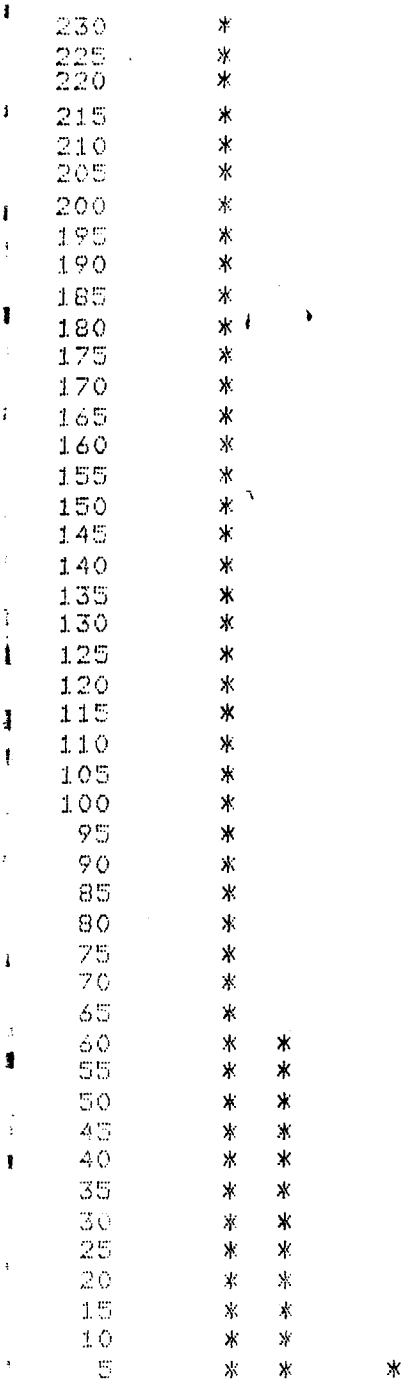
1: VERY COMMON
2: COMMON
3: UNCOMMON
4: VERY UNCOMMON
5: NOT PRESENT

ITEM 1 2 3 4 5

RESPECT FOR KUPUNAS: IMPORTANCE

FREQUENCY 234 64 4 6 2 4 0

EACH * EQUALS 5 POINTS



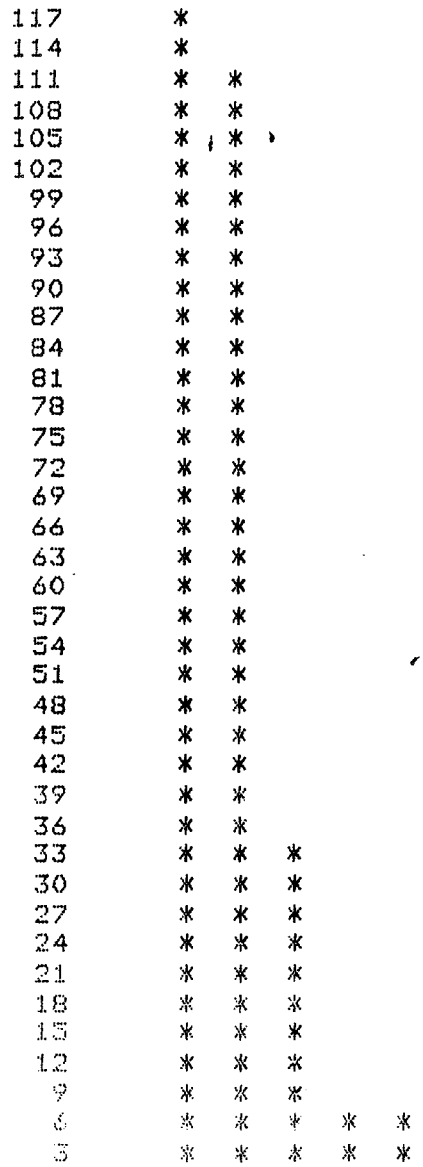
ITEMS 1 to 7

1: VERY IMPORTANT
2: IMPORTANT
3: SLIGHTLY IMPORTANT
4: NEITHER IMPORTANT NOR UNIMPORTANT
5: SLIGHTLY UNIMPORTANT
6: UNIMPORTANT
7: VERY UNIMPORTANT

RESPECT FOR KUPUNAS: HOW COMMON

FREQUENCY119113 35 6 6

EACH * EQUALS 3 POINTS



ITEMS 1 to 5

1: VERY COMMON
2: COMMON
3: UNCOMMON
4: VERY UNCOMMON
5: NOT PRESENT

ATTACHMENT 6-12: HISTOGRAM: QUALITY OF LIFE IN PUNA

SATISFACTION WITH PRESENT QUALITY OF LIFE IN PUNA

FREQUENCY 139 94 44 28 12 11 9

EACH * EQUALS 3 POINTS

```
 139      *
 135      *
 132      *
 129      *
 126      *
 123      *
 120      *
 117      *
 114      *
 111      *
 108      *
 105      *
 102      *
  99      *
  96      *
  93      *
  90      *
  87      *
  84      *  *
  81      *  *
  78      *  *
  75      *  *
  72      *  *
  69      *  *
  66      *  *
  63      *  *
  60      *  *
  57      *  *
  54      *  *
  51      *  *
  48      *  *
  45      *  *
  42      *  *  *
  39      *  *  *
  36      *  *  *
  33      *  *  *
  30      *  *  *
  27      *  *  *  *
  24      *  *  *  *
  21      *  *  *  *
  18      *  *  *  *
  15      *  *  *  *
  12      *  *  *  *  *
   9      *  *  *  *  *  *
   6      *  *  *  *  *  *  *
   3      *  *  *  *  *  *  *
 ITEM     1  2  3  4  5  6  7
```

ITEMS FROM 1 TO 7

1: VERY HAPPY
2: HAPPY
3: SOMEWHAT HAPPY
4: NEITHER HAPPY NOR UNHAPPY
5: SOMEWHAT UNHAPPY
6: UNHAPPY
7: VERY UNHAPPY

ATTACHMENT 13: HISTORIC PRESERVATION CONCERNS IN LOWER PUNA

HISTORIC PRESERVATION CONCERNS IN LOWER PUNA

Craig J. Severance, Ph.D.
University of Hawaii at Hilo
Member: Project Advisory Board

The Lower Puna area includes a number of known significant historic sites. It is probable that there are unknown significant sites as well. There are also a number of Hawaiian residents who have oral history information about the recorded and unrecorded sites and their uses. Thus, a sizeable amount of information about precontact and postcontact Hawaiian cultural adaptations is potentially available. It is important to note that a variety of sites, including inland planting areas, burial sites, temporary encampments and food gathering areas may yield significant information. Future archeological surveys, therefore, should not merely focus on substantially sized architectural remains as the only type of site with potential eligibility for nomination to the State Register or the National Register. In addition, while the Puna District may not have had the same central sociopolitical significance to Hawaiian history as, for example, Kona, an understanding of the possible reasons for Puna's traditional political dependency on neighboring districts which could be provided by comprehensive archeological work is very important. In fact, the Lower Puna area may well be just as significant in providing an understanding of societal transformations in Hawaii as archeologically better known areas.

So far, archeological work in the Lower Puna area has been limited to generalized coastal area reconnaissance surveys and a small number of more intensive surveys related to roadbuilding and other construction activities. Geothermal development related surveys include the original HGP-A baseline survey, which discussed known sites in the coastal areas but did not intensively survey outside the wellsite areas, and a small number of limited surveys related to exploratory drilling permits. The latter surveys have generally been restricted to small, one to four acre parcels and have not included surveys of easements to existing roads or adjacent areas. It is estimated that approximately 20 acres have been surveyed for sites that might be impacted by geothermal development. While some of the inland areas are covered by recent lava flows and papaya farms, this is still a tiny percentage of the estimated impact area of 15-20 square miles should large-scale geothermal development occur. There is also a lack of predictive surveys of the type that would indicate the relative likelihood of the presence of significant sites in those inland areas currently being considered for geothermal development. The historic sites and resources of Lower Puna thus remain largely unknown. Continued piecemeal permitting of roadbuilding, well drilling and other geothermal development related construction activities without comprehensive surveys has the potential of creating adverse effects on the preservation of historic sites in Lower Puna.

SECTION IV

REPRESENTATION AND COMMUNICATION

Described in this section are the Hui's efforts to communicate to both the Puna Hawaiian Community and Hawaiian organizations statewide information about geothermal development and its possible effects on Puna Hawaiians. Included are descriptions of the Hui sponsored geothermal symposium, special Hui Newsletters about geothermal development and presentations to a variety of community groups. A record of the Hui representations to government decision making bodies and private companies involved in the geothermal development process is presented.

CHAPTER 7

COMMUNICATION WITHIN THE HAWAIIAN COMMUNITY

The Puna public is variously uninformed or misinformed about geothermal matters. This is especially true of the potential effects geothermal development may have on the individual. The Puna Hui Ohana's efforts to educate residents about geothermal energy have included a symposium, newsletters, presentations to community organizations, and the formation of a library of relevant materials for community members to consult.

The Puna Hui Ohana, in recognition of the community's need to be informed on geothermal matters, sponsored a one day geothermal symposium. This seminar was to provide fundamental information about geothermal development to the general public. The Hui conducted the symposium with the cooperation of the State Geothermal Advisory Committee and the Hawaii Geothermal Project. Presentations addressed four main areas of information: (1) resource assessment, (2) exploration (3) utilization and (4) impacts. Appendix 2 contains a copy of the symposium program.

Puna Hui Ohana officials expressed concern about the relatively low level of community participation in the symposium. According to sign-in lists most attendees were non-Hawaiian and non-lower Puna residents. Participants did, however, report that they found the information useful and the Puna Hui Ohana decided that more discussions covering related subjects should be held at the community level.

The mailing list for the Hui newsletter was expanded to include 87 aboriginal Hawaiian civic, church, business, cultural, educational business and fraternal organization through out the State. When non-Hawaiian organizations representing geothermal, business and governmental agencies were added to the list, it raised the mailing list to 404. A sample newsletter is located in Appendix 3.

The Puna Hui Ohana was invited to present information about geothermal development to a variety of organizations. Appendix 4 contains a list of those organizations and the topics addressed by the presentations.

Reading materials related to geothermal development were collected and placed in the Pahoa Community Center. Appendix 5 contains a list of materials in the library. These materials were made available to community residents interested in learning more about geothermal development. A list of individuals who used the resources of the Puna Hui Ohana is provided in Appendix 6.

CHAPTER 8

REPRESENTATION TO GOVERNMENT AND PRIVATE AGENCIES

One major objective of this project was to communicate Hawaiian concerns and attitudes to appropriate government decision-making bodies. The Project Director represented the views of the Puna Hui Ohana at a variety of meetings in both the government and private sector.

To adequately represent issues and policy positions adopted by the aboriginal Hawaiian community, it was necessary for the Project Director to identify and access relevant organizations. These organizations were expected to address concerns relevant to geothermal development. These interactions required support for information-producing and decision-making groups.

Positive impacts of geothermal development were endorsed at these meetings. The identification of negative concerns led to problem-solving suggestions reflecting the views of the Aboriginal Hawaiian community. These concerns were also addresssed in the Hui's consultation regarding economic development programs and applicable research projects.

In a majority of instances, the Hui was represented by the Project Director who reported and interpreted the results of representative action to the Hui Board of Directors for further discussion and decision-making. A chart depicting representative activities may be found in Table 8-1.

TABLE 8-1

REPRESENTATION OF COMMUNITY CONCERNS

Agency or Organization	Representation
a. Baker, Discussion, 1981.	Participated in a meeting to discuss House bills introduced by Rep. Baker to legislatively declare all geothermal resources to be owned by the State. Puna Hui Ohana objected to Baker's proposal favoring, instead; private ownership or an ownership program in wich royalties or taxes would be deposited in Section 5-f of the State's Admission Act thus benefiting the Hawaiian Community.
b. Dillingham Corp.	Served as a consultant to discuss community concerns-on proposal for industrial park in Pahoa, using direct use process applications.
c. Dillingham Corp.	Assisted in identifying social barriers relative to proposal for ethanal alcohol plant using geothermal steam.
d. FUND	Prepared proposals for social-cultural impact analysis.
e. Geothermal Resource Council	Attend conferences on mainland pertinent to Hui geothermal interests.
f. Hawaii County Alternate Energy Advisory Committee	Attend meetings in Hilo and discussed county energy situation.
g. Hawaii County Planning Commission	Identified concerns regarding issuance of special use permits for geothermal drilling/exploration without long-range planning program, and showed slides and maps to call County's attention to community concerns.
h. Hawaii Geothermal Advisory Council-GAC	Attend monthly meetings in Honolulu. Presented Hui/Community views in discussions on State Geothermal Policy.

i.	Hawaii Geothermal Program, HGP-A	Attend monthly meetings in Honolulu as funds allow, discussed progress of project in Puna.
j.	Hawaii State Legislature Nov. 9, 1979	Attended Legislative review sessions on technical aspects of geothermal, wind, biomass, OTEC solar resources. self-sufficiency and discussed the need for Community participation in geothermal planning and policy formation.
k.	Hawaii State Legislative Geothermal Advisory Committee	Served as a member on committee to make recommendation to the Geothermal Advisory Committee
l.	Hawaii State Special Legislative Session	Participated in panel discussions focused on application of geothermal resources in small-scale hydro projects. Puna Hui Ohana discussed Hawaiian attitudes towards ownership of the geothermal resource.
m.	Press Releases West Hawaii Hawaii Herald-Tribune Honolulu Advertiser Honolulu Star-Bulletin Honolulu Magazine, Puna Plant	On various geothermal related subjects.
n.	Radio KPUA, Hilo	Interviewed on Maori site visit before and after the trip.
o.	Radio KIPA, Hilo	Discuss status of geothermal development especially with regard to HGP-A. Interviews also raised questions of various impacts. Project Director initiated discussion on massive industries including manganese and alumina refining process complexes.

Several policy committees of which the Hui is a member served as vehicles for additional representation efforts. These memberships include the State Geothermal Advisory Committee, the Hawaii Geothermal Project, and the Hawaii County Alternative Energy Committee.

Below is a description of the Puna Hui Ohana's position on several key issues at the state and county governmental levels.

The Hui realized that state policy regarding geothermal development in the Puna district required appropriate legislative action. In May of 1979 the Hui extended an invitation to a Senate energy committee under the chairmanship of Senator T. C. Yim to visit the Puna geothermal district. Accompanied by Senators Dante Carpenter and Joseph Kuroda, the committee was throughly briefed on the Hui's concerns and was invited to submit legislative proposals of vital interests to the Hawaiian community in Puna. Through its membership on the Geothermal Advisory Committee's legislative subcommittee the Hui introduced several legislative proposals. The principal proposal (H.B.#1095) would establish a funding program designed to provide "affected communities" the opportunity to employ appropriate expertise to protect their positions in planning and zoning matters relating to geothermal development. A list of suggested legislative actions regarding the position of the community in the developmental process was presented to the Representative District in which Lower Puna is located. Acting in a consultant capacity, the Hui recommended a job or career development program which would prepare local people for the geothermal job market to Representative Levin's committee.

The Hui strenuously opposed the Hawaii County Planning Commission's approval of special use permits for drilling purposes. It seemed that the Planning Commission failed to consider

a fundamental assumption that an exploration well might become a productive well. From the Hui's point of view, more careful planning was important because a productive well might contribute to land-use conflicts regarding: (1) siting of the geothermal well-field, (2) the location of energy-conversion facilities, and (3) the location, nature, scope of utilization processes.

The Hui experienced great difficulty in understanding the government's early commitment of land to uses, vitally affecting the physical, social, cultural, and economic environments. Such uses are certain to alter the lifestyle of Lower Puna and it's peripheral communities, particularly Keaau. The Hui chose to continue to oppose the State and County actions towards development without adequate planning.

SECTION V

ATTITUDES OF THE LOWER PUNA HAWAIIAN COMMUNITY TOWARD GEOTHERMAL DEVELOPMENT

An important component of the Puna Hui Ohana Project was the collection of information about the attitudes of the Hawaiian Community of Lower Puna toward geothermal development and the various potential uses of the geothermal resource. This was viewed by the Hui as important for two reasons. First, such information would assist the Hui in accurately representing Community interests before the various government planning groups and agencies involved in decision-making regarding geothermal development. Without this information it would be possible for extreme groups either for or against development to claim to represent the attitudes of the larger Community. Secondly, the information gathered would serve as a baseline measure of Community attitudes against which later assessments could be compared, should commercial development of the Puna geothermal resource occur.

The information on attitudes contained in this section was derived from informal interviews of aboriginal Hawaiians in Lower Puna and informal meetings and discussions with community residents (Chapter 9) as well as a survey conducted by the Puna Hui Ohana (Chapter 10).

CHAPTER 9

INTERVIEWS WITH LOCAL COMMUNITY LEADERS

In an attempt to better understand the views of the Hawaiian Community, regarding the development of geothermal resources in Lower Puna, personal interviews were conducted with twelve community leaders. These interviews, conducted by the Project Director, occurred at the same time as the interviews concerning the contemporary Hawaiian Culture (Chapter 5). Thus, these views represent the same 12 local experts. Each expert was asked to: (1) discuss changes anticipated as a result of geothermal development, (2) identify specific cultural effects, (3) identify potential benefits to Hawaiians, (4) identify potential losses for Hawaiians, and (5) discuss the ability of Hawaiians to adjust to the potential changes. Selected responses to these questions follow:

1. What specific changes do you anticipate will occur as a result of geothermal and economic growth?

> "People will be more critical of geothermal, asking questions they might not have asked in early geothermal days"
>
> "Population growth will be faster"
>
> "Crime will get worse"
>
> "Geothermal will be too technical for the Hawaiians ---outsider Caucasians (haoles) will get all the jobs---community people will get the low-paying, menial jobs"
>
> "Geothermal industrial growth will so affect the lifestyle, so that even the haoles will be affected"

"Drastic changes in land prices, housing; farm leases will triple"

"Geothermal growth will probably invite new factories needing new support businesses"

"There will be a cultural breakdown in the scramble for jobs"

"Office of Hawaiian Affars should be moving faster to protect the Hawaiian condition"

"Subdivisions will increase pace of development"

"New migrants will not come from Honolulu as is expected---most will continue to come from the mainland"

"Industries will bring their own specialists/ management force"

2. Can you list some specific areas in which the cultural lifestyle of the Hawaiian may be expected to break down in the change process?

"The characteristics of cultural ways of life, the way you were brought up, will be hard to erase"

"What we learned early will stay with us"

"Most basic Hawaiian concepts like Ohana, aloha aina, or laulima will not change"

"The 'ohana will continue to undergo changes"

"Loss of the recreation/leisure places where the Hawaiians have traditionally gone"

"Loss of security and privacy with the land"

"That each generation must work to protect and perpetuate the culture"

"Concerned about new attitudes to the kupuna. Afraid the family structure will breakdown; some young people think they know it all"

"Kupuna can teach culture through the mo'opuna, the grandchildren"

"Kupuna will remain the source of learning"

"Hostility and resentment will continue over Caucasians (haoles) gathering traditional Hawaiian foods to sell"

"Hawaiian food preferences will continue to get more expensive"

"Aloha Spirit will be more misused by outsiders; more misinterpreted by the Hawaiians themselves"

"Lifestyle will change but the cultural traditions or heritages will continue"

3. If geothermal/economic development becomes a reality, in what ways do you believe the Hawaiians will benefit?

"Share in lesser electricity costs"

"Get things they never had before or think they're missing"

"Hawaiians will benefit to the extent that other groups may teach him to understand the Caucasian (haole) ways and how to live in the white man's world"

"Depend on the developers, Hawaiians should not depend on the people; Hawaiians must push to help themselves"

"Will benefit only if they get a piece of the action, a job with a future in it"

"Benefit if they can get into the initial planning stages; cultivate good developer/Hawaiian relationships"

"Benefit from energy self-sufficiency in the manner it will benefit everyone else"

"Call upon the Puna Hui Ohana to act more strongly on behalf of the Hawaiians"

"Some Hawaiians may be able to go into business with the Hui's help"

4. In what ways do you believe they will lose?

"It is just scary when you think about it---everything will revolve around money, everyone will become greedy to survive"

"With growth will come more inter-marriages, cultural diffusion will result"

"They must stop arguing with each other over small issues, must seek sources of information on how they can unite and best help themselves"

"Loss of the open space"

"Loss of the lifestyle or way of life"

"More different people will be moving into Lower Puna because of jobs and business opportunities"

"Pressure for land may cause more Hawaiian to lose their lands"

"Native claims to resource ownership will greatly affect Hawaiian benefits"

"Outsiders will use and control the geothermal market"

"There will probably be no guarantee of jobs for locals"

"Land taxes will increase because of land development"

"The greatest loss will be in the changes of Hawaiian attitudes and values. Hawaiians may adopt Western ideas that will reduce their 'Hawaiianness'"

5. Do you feel the Hawaiians in Lower Puna will be able to adjust to the new technology and innovation and retain and preserve their cultural heritage? Why? How?

"Don't think Hawaiians can truly do so"

"Yes, the Hawaiian will be able to adjust the new technology"

"They will try as they are now trying"

"Our kupunas will not be around to help us and that might make it harder to hang on to our Hawaiianness"

"Other local ethnic groups are going to have it tough but the Hawaiians will have it the hardest because there will be too many influences coming in which they won't accept right away---until it is too late to do anything about it"

"His opinion will not be worth anything and he is going to be taken along whether he wants to or not"

"Haoles are going to come and move with ideas developed earlier by the Hawaiians"

"The Kupunas must help teach the Young Hawaiian"

"The new technology will never change the Hawaiian if he learned well from his parents"

"He will be pressured to accept; he has no other place to go"

"If they really want to survive they must hold on to their culture first and adjust to the new technology"

"It is worthwhile saving our culture because it is what identifies us"

"Hawaii is the place of our identity---there is no place else we can call home"

"Other ethnic groups have their respective homelands -this is ours"

"Hawaiians must learn more of the traditional culture"

Interpretation of the Results:

The interview responses provide additional information regarding the perceptions of lower Puna's Hawaiian leaders. The results are seen as representative of the aboriginal population. Though the sample size was small (N = 12), close familial relationships

and a high level of communication are believed to enhance the representativeness of the sample.

According to results, contemporary changes are the result of gross in-migrations. Respondents believed that the development of geothermal resources will increase this in-migration and result in major cultural changes.

The growing Caucasian population is characterized as persistently contributing the greatest impact on the Hawaiian cultural system. The respondents expect these social-economic impacts will be increased during geothermal development. It is also felt that Caucasians will control the economic benefits of geothermal development. Respondents felt that unless Hawaiians help themselves or develop fruitful relationships with the developer, Hawaiians' benefits will be very limited at best.

Undercurrents of hostility may be more adequately addressed in the apparent transfer of political social power from the local Japanese political establishment to the Caucasians. Also feared is the economic power of mainland Caucasian investors who will ultimately control the production of geothermal energy. The political resurgence of the Hawaiian is a relatively new phenomena, apparent in the recent Office of Hawaiian Affairs election.

Aboriginal Hawaiian attitudes regarding interpersonal relationships are expected to change with increased geothermal development. Respondents believed that attitudes about the individual, family, extended family, friendship associations, occupational

association and roles, will change to the extent that the individual participates in the new system.

For the Puna Hawaiians, technological and commercial development may bring changes in knowledge and skill. However, the respondents expect even wider ramifications in the ways Hawaiians have traditionally looked at what is and what ought to be. The Hawaiians' thought regarding their relationship to nature, to man, and to the supernatural will be deeply affected. Feelings of independence, ideas for self determination (and in situations dealing with class differentiations) flourished much more easily in a homogeneous Puna than it will in a competitive-assertive society. Many Hawaiians have historically found such a society threatening to their survival as Hawaiians, and expect such a society to result from geothermal development.

Technological innovations are only a part of the aboriginal Hawaiian concern. They feel more changes will come from the outside to disturb the way of life. These include changes in the schools where Hawaiians are presently struggling to attain academic equality; changes in business-commercial opportunities; increased racial tension; disruption of communication networks; and evolution of new careers which will favor newcomers.

Most aboriginal Hawaiians at Hui meetings and in discussions on geothermal and economic development have expressed a desire to insure continued functioning of the Hawaiian society. They have not chosen to oppose geothermal exploration, but retain the right to approve development in terms of its impact on the

environment, the Hawaiians' ability to cope with it and its effects on the Hawaiians' cultural needs.

In summary, there are significant negative responses based on historical experiences, in which Hawaiians are seen as: (1) the least benefited, (2) the last employed, (3) losing their lands because of higher land taxes, (4) losing the native Hawaiian claim to resource ownership, (5) losing the traditional environment, (6) paying higher electricity bills, losing the community/ohana, and (8) losing Hawaii as a homeland.

Hawaiian leaders and elders of Lower Puna believe that population and economic growth in connection with geothermal development continues to be a serious threat to the preservation of the Hawaiian culture as it exists in lower Puna. They also believe that the culture can be preserved if families will learn the concepts well and pass it on to their descendants.

Overall community attitudes gathered over a two-year period of discussions with community groups, generally indicate a dislike or distrust of geothermal development. However, in recognition of (1) the State's determination to reduce fossil fuel dependency, (2) the need to stabilize or lower electric costs and, (3) the need to provide economic development meeting growth demands, the community seems to have approved geothermal development with strong reservations. These reservations focus on community demands for controlled and planned economic development causing the least damage to the area's lifestyle and disturbance of a tranquil environment.

Of great concern is the manner in which surplus energy will be utilized. Hawaii County requires approximately 50 MW to be self-sufficient. Estimates of resource availability indicate a potential of approximately 1000 MW's. At this point in time, the Planning Commission has approved 24 special use well-drilling permits. If all are productive, at the level of HGP-A (3 MW's), they represent a capability of approximately 70 MW's of electric power.

Informal public hearings uncovered conflicts connected with the impact of such development on a rural environment. Newcomers recall and fear industrial growth. They resent local residents who, after many years of existing within a marginal economy, suddenly see an opportunity to improve conditions for themselves and their children. Continued dialogue between newcomers and long time residents may promote a better understanding of economic growth consistent with concerns over environmental and social/cultural preservation.

CHAPTER 10

ATTITUDES OF THE LOWER PUNA HAWAIIAN COMMUNITY TOWARD GEOTHERMAL DEVELOPMENT

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One of the major data collection tasks of the Puna Hui Ohana Project was to conduct a survey of the attitudes of the Hawaiian Community of Lower Puna toward geothermal development and the various potential uses of the geothermal resource. First, a systematic study of the feelings of the larger Hawaiian Community would assist the Hui in accurately representing Community interests before the various government planning groups and agencies involved in decision-making regarding geothermal development. Without this information it would be possible for extreme groups either for or against development to claim to represent the attitudes of the larger Community. Secondly, the information gathered would serve as a baseline measure of Community attitudes against which later assessments could be compared, should commercial development of the Puna geothermal resource occur.

It was initially anticipated that the Community survey would be conducted early in the project period. However, it became

clear that a Community education program was needed before a meaningful assessment of attitudes could be made. The activities initiated by the Hui to create a better informed Community are described elsewhere in the final report. The issue of Community education will be addressed in the final section of this report. The practical effect of these activities on the data collection effort was that the survey of Community attitudes became the final project task. The present report describes the results of this survey.

METHODS

Chapter 6 describes the sampling, data collection, and questionaire construction used in the survey. The first section of the questionaire addressed attitudes toward geothermal development. A more detailed presentation of these topics can be obtained from the methodology section of Chapter 6.

The questionaire was administered by members of the Puna Hui Ohana to all adult (18 years of age or older) Hawaiian and Part-Hawaiian residents of the area who could be located and who were willing to complete the questionaire. The questionaires were individually delivered and collected by a member of the Hui. With the exception of the Hawaiian Beaches subdivision, the survey team member knew the person completing the questionaire. The form listing the members of each household was completed by the survey team member at the time the questionaires were delivered, but all other information was provided by the respondent anonymously on the survey form.

It was assumed that questions about geothermal development would be relatively less sensitive than some other topics, but potentially susceptible to influence by the process of data-collection. In order to minimize the likelihood of an interviewer biasing the responses, a written questionaire format was used.

The content of the items on the questionaire was determined by a review of the literature about possible impacts of geothermal development; from numerous discussions by the Hui Board of Directors about Community concerns; and from the information acquired from the earlier survey. Attachment 10-1 contains a copy of the final questionaire form. The information solicited from respondents included backgrcund information of a descriptive or demographic nature, perceived effects of geothermal development, desirable uses of the geothermal resource, and related topics such as resource ownership and satisfaction with the present quality of live in Puna.

RESULTS

The census of the Community identified a total of 413 Hawaiian or Part-Hawaiian adults in Lower Puna. An attempt was made to contact each adult Hawaiian personally to explain the rationale for and nature of the survey; and to solicit their cooperation in completing the questionaire. This procedure led to a return-rate of 85% (351 questionaires). Missing data is do to an

inability to contact the respondent, the respondent's refusal to complete the questionaire, or to a blank questionaire being returned to the survey team member. The latter problem was possible because the surveys were returned in unmarked envelopes to insure anonymity.

The 1980 Federal Census identified 1712 households and 4696 individuals in the Lower Puna census tract. The adult respondents who completed the questionaire represent 255 households in which 928 people reside. The survey thus includes data from 14.9% of the households and 19.8% of the population of Lower Puna.

Respondent Characteristics

The respondents included 53.5% females and 46.5% males who averaged 39 years of age (range from 18 to 81) and have lived in Puna for an average of 22 years (range from less than one to 81 years). As Table 10-1 indicates, the geographical areas of Lower Puna with the largest number of Hawaiian residents are Hawaiian Beaches (42.5%), Pahoa (21.9%) and Kalapana (18.8%).

Table 10-1

AREA OF RESIDENCE FOR TOTAL SAMPLE

AREA	NUMBER	PERCENT
Hawaiian Beaches	149	42.45
Pahoa	77	21.94
Kalapana	66	18.80
Opihikao	29	8.26
Nanawale Estates	17	4.84
Kapoho	5	1.42
Leilani Estates	2	0.57
Ainaloa	1	0.28
Paradise Park	1	0.28
Orchid Land	0	0.00
No Response	4	1.14

Respondents' perceptions of their level of knowledge about geothermal development are presented in Table 10-2. The majority feel that they have a small (25%) or moderate (30%) amount of information, with relatively few perceiving themselves as having large (8.5%) or very large (4.5%) amounts of information. Almost 30% of the Community reports having either a very small amount or no information about geothermal development.

Table 10-2

KNOWLEDGE ABOUT GEOTHERMAL DEVELOPMENT

AMOUNT OF INFORMATION	NUMBER	PERCENT
Very Large Amount	16	4.56
Large Amount	30	8.55
Moderate Amount	105	29.91
Small Amount	87	24.79
Very Small Amount	79	22.51
None	26	7.41
No Response	8	2.28

The newspaper is clearly the most common source of information about geothermal development for the Lower Puna Hawaiian Community (see Table 10-3). Two-thirds of the respondents indicated the newspaper as a source of information, with radio (47%), friends (42%) and television (37%) also frequent sources. Thirty percent of the respondents report receiving information directly from the Hui, while only 13% have attended geothermal workshops or conferences.

Table 10-3

SOURCE OF INFORMATION ABOUT GEOTHERMAL DEVELOPMENT

SOURCE	NUMBER	PERCENT
Newspaper	238	67.81
Radio	167	47.58
Friend	146	41.60
Television	130	37.04
Puna Hui Ohana Newsletter	104	29.63
Puna Hui Ohana Meetings	63	17.95
Other	57	16.24
Geothermal Workshop or Conference	44	12.54
No Response	12	3.42

While the sources described above provide secondary information about geothermal development, it is also possible to gain information firsthand by visiting the HGP-A wellsite in Puna or by visiting some other geothermal field. Slightly less than half (49%) of the members of the Lower Puna Hawaiian Community reported having visited the HGP-A wellsite; while even fewer (7.3%) have visited some other geothermal field. Of the 25 people in the latter group, more than half would have visited the Wairakei geothermal fields as part of the New Zealand site visit which the Hui organized as part of the present Project. It seems clear that media reports and other sources of indirect experience have provided the bulk of the information to the Community to date, and that direct experience has played a relatively minor role.

Perceived Impact of Geothermal Development

The second section of the questionaire asked each respondent to rate both the magnitude and the favorability of a number of possible effects of geothermal development in Puna. Table 10-4 summarizes these perceived impacts.

Table 10-4

PERCEIVED IMPACT OF GEOTHERMAL DEVELOPMENT

GOOD*	NEITHER GOOD NOR BAD	BAD*
Economy	Social Conditions	Hawaiian Culture
	Community Closeness	Historical Sites
	Employment	Traditional Religion
	Overall Impact	Hunting, Fishing, Gathering
		Traffic
		Agricultural Land
		Land Taxes
		Physical Environment
		Quakes/Eruptions
		Plants/Animals

*All impact categories reported show nonchance ($p < .05$) frequencies in the indicated direction using a binomial test of significance.

More detailed information about the distribution of responses to each impact statement is given in Attachment 10-2 and Attachment 10-3. As Table 10-4 indicates, the economic impact of geothermal development is perceived as positive, but all other effects are perceived as either negative or neutral. It is particularly interesting that the item asking about the overall effect of geothermal development falls in the neutral category, given this ten to one ratio of perceived negative to positive effects. This apparent contradiction is clarified somewhat by the information in Table 10-5, which shows that only 18.5% of the sample actually perceived the overall impact to be "neither good nor bad."

Table 10-5

DISTRIBUTION OF RESPONSES TO "NEUTRAL" IMPACT ITEMS

IMPACT CATEGORY	RESPONSES							
	GOOD		NEITHER		BAD		NO-RESPONSE	
	#	(%)	#	(%)	#	(%)	#	(%)
Social Conditions	125	(35.6)	77	(21.9)	121	(34.5)	28	(7.98)
Community Closeness	110	(31.3)	112	(31.9)	96	(27.4)	33	(9.40)
Employment	135	(38.5)	70	(19.9)	107	(30.5)	39	(11.11)
Overall	114	(32.5)	65	(18.5)	141	(40.2)	31	(8.83)

Forty percent of the Community perceive an impact on the "bad" side of the continuum and 32.5% perceive an impact on the "good" side of the continuum. While the average of these values falls in the "neither good nor bad" category, this position does not reflect the views of three quarters of the sample. A similar conclusion can be drawn from the distribution of responses to each of the other three apparently "neutral" items. Inspection of Attachments 10-2 and 10-3 will show that this problem is not limited to the four "neutral" impact categories.

The survey provides information about two variables which might be hypothesized to account for some of the large variability in attitudes. Both age, and number of years lived in Puna, could be influencing the results. In order to investigate the possibility of generational differences in attitudes toward geothermal development, the sample was divided into three subgroups of 18-35 years (N = 170), 36-55 years (N = 105) and 56 years or older (N = 58). A comparison of the attitudes of these three groups shows them to be only minimally different from one another. The economic impact

of geothermal development is the only impact category perceived as positive by all three groups; and the only change in the perceived negative impacts is the shift of the overall impact from neutral to negative for the youngest group. Even in the latter case, the mean of the 18-35 group is only slightly different from that of the total sample, and the variability remains large (i.e. 32% positive, 20% neutral and 48% negative).

In order to assess the effects of length of residence in Lower Puna on attitudes toward geothermal development, the sample was divided into the following categories: 1-5 years, 6-10 years, 11-20 years, 21-40 years and 41 or more years of residence. The findings regarding the effects of length of residence on attitudes are similar to those for the age variable. The few differences that appear are small shifts in the value for the mean of a specific length of residence category when compared with the mean of the total sample. The variability in each case remains high. The following table summarizes the changes from the total sample for each length of residence category.

Table 10-6

ATTITUDE DIFFERENCES FROM THE TOTAL SAMPLE
FOR EACH LENGTH OF RESIDENCE CATEGORY

LENGTH OF RESIDENCE	ATTITUDE DIFFERENCE
1-5 years	no differences
6-10 years	employment to positive; culture and religion from negative to neutral
11-20 years	culture and religion from negative to neutral
21-40 years	economic to neutral; overall to negative
41 or more years	culture, religion, historical sites from negative to neutral

As the table indicates, there is no systematic pattern of differences, except perhaps some greater ambiguity among longer-term residents about the effect of goethermal development on the Hawaiian Culture.

In addition to questions about the favorability of the possible impacts of geothermal development, respondents were asked to rate the expected magnitude of the impacts. Responses were consistently near the "large" end of the continuum for all categories, regardless of whether the value of the impact was perceived to be good or bad.

Uses of Geothermal Energy

The six uses of geothermal energy which have been most frequently proposed for Hawaii were presented to respondents for their evaluation on a seven-point scale from good to bad. Table 10-7 presents the results of this evaluation. More detailed information about the means and distributions of responses is presented in Attachment 10-4 and Attachment 10-5.

Table 10-7

OVERALL SAMPLE: USES OF GEOTHERMAL ENERGY

GOOD*	NEITHER GOOD NOR BAD	BAD*
Agriculture/ Aquaculture	Electric Power for Oahu	Large Industries
Small Industries	Hotels/Spas	
Electric Power for Big Island		

*All impact categories reported show nonchance ($p<.05$) frequencies in the indicated direction using a binomial test of significance.

The favored uses imply either support of existing Island needs and activities (i.e., agriculture, Big Island electric power) or relatively small scale industrial activities; rather than large scale development.

Variations in attitudes toward the various uses of the geothermal resource were also examined for the age groups and length of residence categories described above. Age differences were once again minimal, with the same three uses perceived positively by all three groups. The only changes in perceived negative uses were the inclusion of the generation of electrical power for Oahu in the negative category by the 18-35 group, and the perception of large industries as neither good nor bad by the two older groups.

There were some differences in attitudes toward uses of geothermal energy, as a function of length of residence. The differences, however are neither large nor systematic. The following table summarizes these differences.

Table 10-8

ATTITUDES TOWARD VARIOUS USES OF GEOTHERMAL ENERGY FOR LENGTH OF RESIDENCE CATEGORIES

ENERGY USE	ATTITUDE TOWARD USE
Electric Power for Big Island	Positive for all groups
Small Industries	Positive for 4 groups; neutral for one group (11-20)
Agriculture/ Aquaculture	Positive for 3 groups (6-10, 21-40 40+): neutral for 2 groups
Electric Power for Oahu	Neutral for all groups
Hotels/Spas	Neutral for 3 longer-term residence groups; Positive for 6-10 year group; Negative for 1-5 year group
Large Industries	Negative for 3 groups (1-5, 11-20, 21-40); Neutral for 2 groups

Ownership of the Geothermal Resource

In response to the question of who should own geothermal energy and receive the income from it, the majority (52.4%) of the respondents indicated Native Hawaiians. In order, the other choices were the surface land owner (23.8%), the owner of the mineral rights for the land (12.5%) and the State government (11.38%). It is interesting that the least popular position among the members of the Puna Hawaiian Community is the position taken by the State Government. The distribution of responses to the ownership question is presented by the Histogram in Attachment 10-6.

Quality of Life in Puna

In order to assess the degree of satisfaction among the Hawaiian Community with the present lifestyle of Puna, respondents were asked to indicate on a seven-point scale how happy or unhappy they were with the quality of life in Puna. Responses to this question produced greater concensus than did those to any other question in the survey. The great majority (81.9%) responded that they were happy with the present quality of life in Puna, while only 9.5% were unhappy, and 8.6% were neither happy nor unhappy. Attachment 10-7 presents the distribution of responses to this item.

Attitudes of Subgroups Within the Community

The information available about the background of the Community members makes it possible to investigate potential differences in attitudes for different subgroups of the Community in addition to those for age and length of residence. The variables of particular interest are 1) whether either HGP-A or other geothermal wells have

been visited, 2) the amount of information people believe they have about geothermal development and 3) the geographical area of Lower Puna in which people live.

Approximately one-half of the sample has visited the HGP-A wellsite; however the observation of one well has had little effect on their attitudes. The responses to the survey questions for those who have visited HGP-A do not differ from those who have not.

Twenty-five people indicated that they had visited a geothermal well other than HGP-A. At least 17 of these people would have seen the geothermal fields in New Zealand, but it is not clear where the other 8 people visited. There were only two significant differences in the attitudes of those who had, or had not, visited another geothermal well. The impact on the Hawaiian culture was perceived to be larger by the former group, and those who had visited other sites rated large industrial use as more negative than those who had not.

A relationship was found between the amount of information that respondents felt they had about geothermal development and their overall attitudes toward it; but the relationship is not a simple one. Those who reported having either "very small," or "large", amounts of information had more negative overall perceptions than did those who reported "very large," "moderate," "small" or "no information." In addition, those feeling they had "large" amounts of information perceived large industrial use of the geothermal resource as more negative than did the other groups.

The final variable, geographical area of residence in Puna, did not reflect differences in attitudes toward either the expected

impacts or the uses of the geothermal resource. Table 10-9 summarizes the response distributions for residents of the major geographical areas of Lower Puna to the question about the overall impact of geothermal development.

Table 10-9

DISTRIBUTION OF RESPONSES TO OVERALL IMPACT QUESTION BY GEOGRAPHICAL AREA WITHIN LOWER PUNA

Area	Very Good 1		Good 2		Slightly Good 3		Neither Good Nor Bad 4		Slightly Bad 5		Bad 6		Very Bad 7	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Hawaiian Beaches	11	(8)	20	(15)	17	(13)	25	(19)	12	(9)	19	(14)	31	(23)
Pahoa	3	(4)	10	(14)	10	(14)	22	(32)	6	(9)	8	(12)	10	(14)
Nanawale	2	(13)	7	(47)	0	(0)	2	(13)	2	(13)	1	(7)	1	(7)
Kalapana Opihikao Kapoho	10	(11)	11	(12)	10	(11)	14	(15)	5	(5)	11	(12)	32	(34)
Total	26	(8)	48	(15)	37	(12)	63	(20)	25	(8)	39	(13)	74	(24)

The responses to this question are typical of the other categories as well. Of particular interest is the fact that the pattern of responses for each area of Lower Puna resembles that of the total sample. While the average of the responses falls in the "neither good nor bad" category, the wide variability noted earlier is present in each residential area.

DISCUSSION OF RESULTS

One of the most stable of the findings of the survey was that the Hawaiian Community of Lower Puna is quite satisfied with the

present quality of life in their Community. How, then, is the appearance of geothermal development perceived by the Community? The second major point of agreement among the respondents to the survey was that the impact of such development would be "large" in scale. However, a consensus about the desirability of these potentially large impacts was not so readily apparent.

A large number of impacts were perceived as negative by the respondents; and only one, economic impact, was reported to be clearly positive. Yet the question asking about the "overall" impact of geothermal development in Puna produced responses averaging in the "neither good nor bad" middle ground. There seems to be a balancing of the potential economic benefits of geothermal development with the environmental and social costs of development. As indicated earlier, the actual situation is not so much one of agreement that the effects are "neither good nor bad" as it is a polarization of people at the two ends of the continuum. Some people seem to be weighting the economic end of the balance, while others are weighting the environmental and social end. This situation is not unique to the Puna Hawaiian Community, and has also been described among the residents of Lake County in the Geysers geothermal field in California (Vollintine & Weres, 1976).

The means of the responses to the various impact items on the questionaire generally fall in the "slightly good" or "slightly bad" categories. Though statistically reliable, these values do not suggest that extreme positions are held by the Hawaiian Community at large. However, the great variability in responses described by the histograms in Attachment 10-3 indicates that substantial

numbers of people are taking opposing positions on the favorability of the expected impacts. It seems reasonable to ask what the effects on attitudes toward geothermal development of a Community education program might be.

Is there any information in the present data to suggest that a Community consensus might result if more information was made available to the Community? A small number of the respondents (25) reported having had firsthand experience with geothermal development by having visited a geothermal well other than the HGP-A well in Puna. The majority of these people were part of the New Zealand site visit sponsored by the Hui, and thus saw geothermal development from the viewpoint of another Polynesian people. The measures clearly differentiating these 25 people from the others in the sample were their more negative perception of the effects of geothermal development on the Hawaiian Culture, and their more negative view of large industrial use of the geothermal resource. The effect of this experience would thus appear to be to create more negative attitudes in selected, but not all, impact categories. Travel to New Zealand, or to California, is not a very practical approach to Community education, even if it does allow people to clarify their feelings about development alternatives.

People who had visited another geothermal site had somewhat more negative attitudes toward some potential impacts of development. Consistent with this result is a similar finding among respondents who felt they had a "large" amount of information about geothermal development. Of the five other levels of information

reported, only the "very small amount" of information group of respondents were similarly negative. Although it would seem that people with a very small amount of information would be prime targets for a Community education program, the result of such a program might be a better informed group of people who hold the same attitudes they started with!

The Hui engaged in a variety of activities designed to create a better informed Hawaiian Community. Its consistent public position on the geothermal development issue was that more information was needed before a judgment about the desirability of such development for Puna could be made. Information was made available to the Hawaiian Community through a special geothermal edition of the Hui Newsletter, through a workshop in Puna with presentations by a number of geothermal experts, and through presentations to a number of Community organizations. The Hui library on geothermal development was also made available to interested individuals.

With all of the effort at Community education, which was sponsored by a grassroots Community group, only 30% of the respondents to the survey indicated that they learned about geothermal development from the Hui. While this figure would probably be much larger if the media coverage given to the Hui's involvement in the geothermal area was included as a product of its Community education efforts; the difficulties in reaching a large number of people with such an effort seem large. It, of course, is impossible to assess what respondents' self-reported level of information would have been without the Hui activities during the past year. It may very well be, for example, that the 30% of the Community

members who report having a "moderate amount" of information gained much of this information through the Hui's efforts.

It is particularly interesting that the classic form of Community education, the workshop, was mentioned by only 12% of the respondents as a source of information. The major source of information for the Lower Puna Hawaiian Community was the media, particularly the newspaper. It would seem that some serious study of the effectiveness of newspaper, radio and television as instruments of Community education would be suggested from these findings.

The findings regarding ownership of the geothermal resource and favored uses of it are interesting primarily in their divergence with the positions taken by the State government on both issues. It would be interesting to know the extent to which the feelings of the Puna Hawaiian Community are representative of the larger population of the State.

The fact that there were minimal differences in attitudes among residents of the various areas of Puna is also of interest. It is often speculated that the residents of the newer subdivisions such as Hawaiian Beaches are "different" in important ways from the longtime residents of the area. Given the fact that there are almost as many Hawaiians in the Hawaiian Beaches subdivision as in all the rest of Puna, such differences could be important to Community relationships. The present study, however, provides little evidence for the existence of these differences. The same general conclusion can be drawn from the similar attitudes expressed by Puna Hawaiians of differing ages and differing lengths of residence in Lower Puna.

None of these variables account for the frequently extreme differences in attitudes found in the Community. It would seem that Hawaiians young and old, residing for varying lengths of time in different parts of Lower Puna have in common a general disagreement about the perceived effects of geothermal development and the desirability of the potential uses of the geothermal resource.

The study which has been described was a Community-based approach to the assessment of attitudes toward geothermal development. It was sponsored by a grassroots Community organization, and the survey data was collected by its members. The survey instrument itself was created in continuous interaction with the Puna Hui Ohana Board of Directors to insure that it not only reflected their concerns about possible impacts of development; but also would be as clear as possible in wording and format to the people responding to it. Numerous changes in the survey were made as a result of three pilot administrations to the Hui Board. The results were that the survey reflected the guiding input of the Community members who were the target of study, and that the amount of cooperation with the data-collection effort was large. Contrasting the 85% return-rate of the present study with the 31% return-rate for a similar study in Lake County, California (Vollintine & Weres, 1976) illustrates one clear advantage of taking the time to actively and meaningfully involve the Community in such undertakings.

ACKNOWLEDGEMENTS

SUBSTANTIAL CONTRIBUTIONS TO THE PREPARATION OF THE REPORT WERE MADE BY PROFESSOR LEE HOWARD, COMPUTER PROGRAMMER AND MS. JAN AYABE, RESEARCH ASSISTANT. THEIR ASSISTANCE IN COMPLETING THE DATA SUMMARY AND ANALYSIS IS GRATEFULLY ACKNOWLEDGED.

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Sanford, Fonda L. & Fawett, Stephen B. Conséquence Analysis: Its Effects on Verbal Statements About an Environmental Project. Journal of Applied Behavior Analysis, in press.

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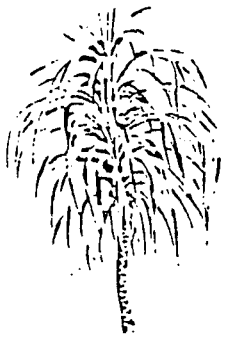
ATTACHMENTS

ATTACHMENT 10-1: PUNA HUI OHANA GEOTHERMAL SURVEY



PUNA HUI OHANA
A Non-Profit Tax Exempt
Organization
P.O. BOX 611
PAHOA, HAWAII 96778
PHONE: 965-9140

The Puna Hui Ohana has received a grant from the Federal government to study the effect that geothermal development might have on the Hawaiian community of Puna. As part of this project, we agreed to tell the government what the Hawaiian residents of Puna feel about geothermal development. In order to do this accurately, we need to know the feelings of as many people as possible.

Please kokua by filling in the survey so your attitudes will be included in the summary. All information you provide will be confidential and the results will only be made public in summary form -- no individuals will be identified.

Mahalo for your assistance.

Peter Hauanio
Chairman
Puna Hui Ohana

GEOTHERMAL SURVEY
PUNA HUI OHANA

BACKGROUND INFORMATION

1. AGE ____

2. SEX (CHECK ONE) ___MALE ___FEMALE

3. IN WHAT PART OF PUNA DO YOU LIVE? (CHECK ONE)

___ORCHID LAND	___NANAWALE ESTATES
___PARADISE PARK	___LEILANI ESTATES
___HAWAIIAN BEACHES	___KAPOHO
___AINALOA	___OPIHIKAO
___PAHOA	___KALAPANA

4. HOW MANY YEARS HAVE YOU LIVED IN PUNA? ____

5. HOW MUCH INFORMATION DO YOU FEEL YOU HAVE ABOUT GEOTHERMAL DEVELOPMENT? (CHECK ONE)

___VERY LARGE AMOUNT
___LARGE AMOUNT
___MODERATE AMOUNT
___SMALL AMOUNT
___VERY SMALL AMOUNT
___NONE

6. HOW HAVE YOU LEARNED ABOUT GEOTHERMAL DEVELOPMENT? (CHECK ALL WHICH APPLY)

___RADIO
___TELEVISION
___NEWSPAPER
___GEOTHERMAL WORKSHOP OR CONFERENCE
___PUNA HUI OHANA MEETINGS
___PUNA HUI OHANA NEWSLETTER
___FRIEND
___OTHER (PLEASE SPECIFY)_____

7. HAVE YOU VISITED THE GEOTHERMAL WELL IN POHOIKI?
___YES
___NO

8. HAVE YOU VISITED ANY OTHER GEOTHERMAL WELL OR FIELD?

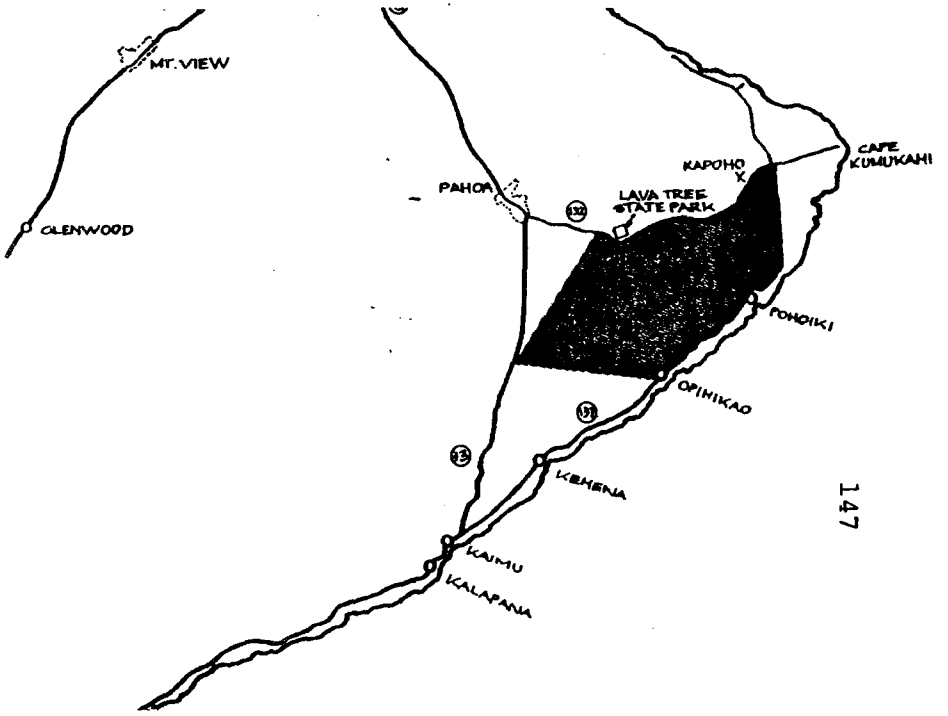
___YES
___NO

INSTRUCTIONS

AS YOU KNOW, THERE IS ONE GEOTHERMAL WELL IN PUNA NOW, AND THERE ARE PLANS TO DRILL MORE WELLS. AT THE PRESENT TIME, THE COUNTY HAS APPROVED PERMITS FOR DRILLING 24 WELLS. THE SCIENTISTS HAVE ESTIMATED THAT THE PUNA GEOTHERMAL AREA HAS ENOUGH STEAM TO PRODUCE AS MUCH AS 500 MEGAWATTS OF ELECTRICAL POWER. THE BIG ISLAND NOW USES ABOUT 90 MEGAWATTS AND OAHU USES ABOUT 1000 MEGAWATTS. IT WOULD PROBABLY TAKE ABOUT 160 WELLS AND 15 SQUARE MILES FOR A GEOTHERMAL FIELD PRODUCING 500 MEGAWATTS.

IN PUNA THE AREA MOST LIKELY FOR GEOTHERMAL DEVELOPMENT WOULD BE FROM LAVA TREE STATE PARK TO KAPOHO, FROM KAPOHO TO OPIHIKAO, FROM OPIHIKAO TO THE KALAPANA ROAD-OPIHIKAO ROAD JUNCTION, AND BACK TO LAVA TREE STATE PARK (SEE THE MAP BELOW). THIS COVERS ABOUT 30 SQUARE MILES AND IS LIKELY TO INCLUDE ANY GEOTHERMAL DEVELOPMENT FOR THE NEXT 10 YEARS OR SO. ABOUT HALF OF THIS AREA MIGHT BE DEVELOPED WITH WELLS, PIPES, POWER PLANTS, TRANSMISSION LINES, ROADS, ETC. WHEN YOU ANSWER THE FOLLOWING QUESTIONS ABOUT THE IMPACT OF GEOTHERMAL DEVELOPMENT IN PUNA, ASSUME THAT THE DEVELOPMENT WOULD BE ABOUT THIS SIZE.

PLEASE INDICATE WHAT YOU FEEL WOULD BE THE EFFECT OF GEOTHERMAL DEVELOPMENT IN PUNA BY CHECKING A) HOW LARGE A CHANGE YOU THINK GEOTHERMAL DEVELOPMENT MIGHT BRING AND B) HOW GOOD OR BAD A CHANGE.



1. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT IN PUNA BRING ABOUT ON HAWAIIAN CULTURAL VALUES AND BELIEFS.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

2. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HISTORICAL SITES IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

3. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT IN PUNA BRING ABOUT ON TRADITIONAL HAWAIIAN RELIGIOUS PRACTICES AND BELIEFS.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

4. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON HUNTING, FISHING AND FOOD GATHERING IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

5. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE SOCIAL CONDITIONS (FOR EXAMPLE, SCHOOLS, RECREATION, AND HOUSING) OF PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

6. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON COMMUNITY CLOSENESS AND GROUP RELATIONS IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

7. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON TRAFFIC IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

8. WHAT KIND OF CHANGE IN THE ECONOMY OF PUNA WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

9. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE AVAILABILITY OF AGRICULTURAL LAND IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

10. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON EMPLOYMENT FOR HAWAIIANS IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

11. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON LAND TAXES IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

12. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE PHYSICAL ENVIRONMENT (NOISE, AIR QUALITY, VISUAL ENVIRONMENT) OF PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

13. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON EARTHQUAKES AND ERUPTIONS IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

14. WHAT KIND OF CHANGE WOULD GEOTHERMAL DEVELOPMENT BRING ABOUT ON THE PLANTS AND ANIMALS IN PUNA.

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

15. OVERALL, THE EFFECT OF GEOTHERMAL DEVELOPMENT IN PUNA WOULD BE ...?

A. (CHECK ONE)

___VERY LARGE
___LARGE
___SMALL
___VERY SMALL
___NO CHANGE

B. (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

16. WHO DO YOU FEEL SHOULD OWN THE GEOTHERMAL ENERGY AND RECEIVE THE INCOME FROM IT? (CHECK ONE)

___THE STATE GOVERNMENT
___NATIVE HAWAIIANS
___THE SURFACE LAND OWNER
___THE OWNER OF THE MINERAL RIGHTS FOR THE LAND.

17. HOW HAPPY ARE YOU WITH THE QUALITY OF LIFE IN PUNA AT THE PRESENT TIME. (CHECK ONE)

___VERY HAPPY
___HAPPY
___SOMEWHAT HAPPY
___NEITHER HAPPY NOR UNHAPPY
___SOMEWHAT UNHAPPY
___UNHAPPY
___VERY UNHAPPY

USES OF GEOTHERMAL ENERGY

ASSUMING THAT SOME GEOTHERMAL DEVELOPMENT COMES TO PUNA, WHAT ARE YOUR FEELINGS ABOUT THE USE OF GEOTHERMAL ENERGY FOR EACH OF THE FOLLOWING:

1. AGRICULTURE OR AQUACULTURE (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

2. HEALTH SPAS/HOTELS (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

3. LARGE INDUSTRIES (FOR EXAMPLE, PROCESSING MANGANESE NODULES) (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

4. SMALL INDUSTRIES USING STEAM OR HOT-WATER DIRECTLY (FOR EXAMPLE, FRUIT PROCESSING, AQUACULTURE, AGRICULTURE) (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

5. ELECTRIC POWER FOR THE BIG ISLAND (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

6. ELECTRIC POWER FOR OAHU (CHECK ONE)

___VERY GOOD
___GOOD
___SLIGHTLY GOOD
___NEITHER GOOD NOR BAD
___SLIGHTLY BAD
___BAD
___VERY BAD

ATTACHMENT 10-2: MEANS FOR SURVEY ITEMS 1-15 (IMPACT)

IMPACT CATEGORY	MEAN	
	[1]MAGNITUDE	[2]VALUE
Values and beliefs	2.24	4.37
Historical Sites	2.21	4.88
Tradition/Religious	2.78	4.52
Hunting, etc.	2.41	5.11
Social Conditions	2.09	4.04
Community Closeness	2.43	4.03
Traffic	2.05	5.03
Economy	2.04	3.51
Agricultural Land	2.12	4.95
Employment	2.71	3.87
Land Taxes	1.93	5.21
Physical Environment	1.88	5.38
Earthquakes/Eruptions	2.95	4.93
Plants/Animals	2.40	5.20
Overall	1.78	4.36

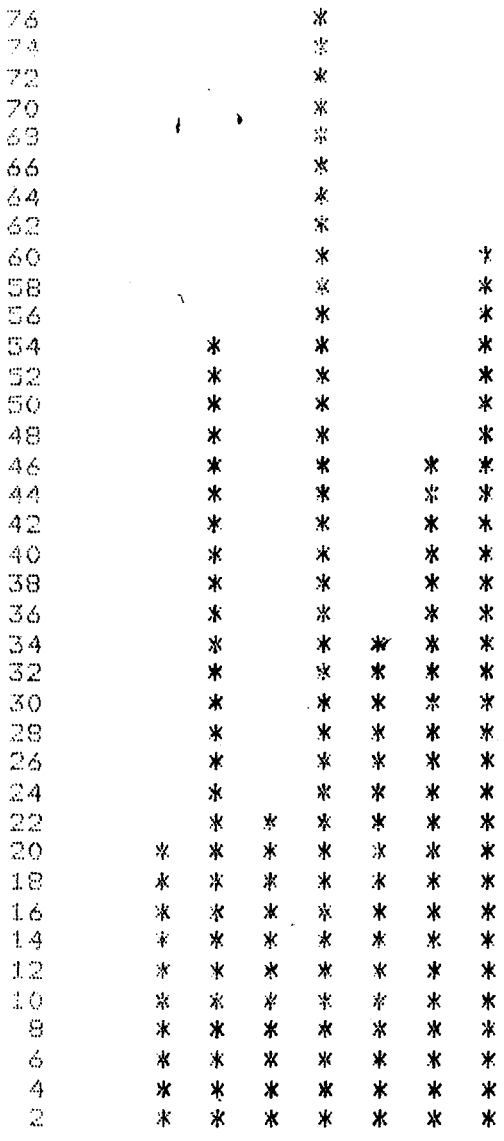
1. Scale from 1-5 (1 = Very Large; 5 = No Change)
2. Scale from 1-7 (1 = Very Good; 7 = Very Bad)

ATTACHMENT 10-3: HISTOGRAMS OF RESPONSES TO IMPACT QUESTIONS

HAWAIIAN CULTURAL VALUES

FREQUENCY 21 54 22 76 34 46 61

EACH * EQUALS 2 POINTS



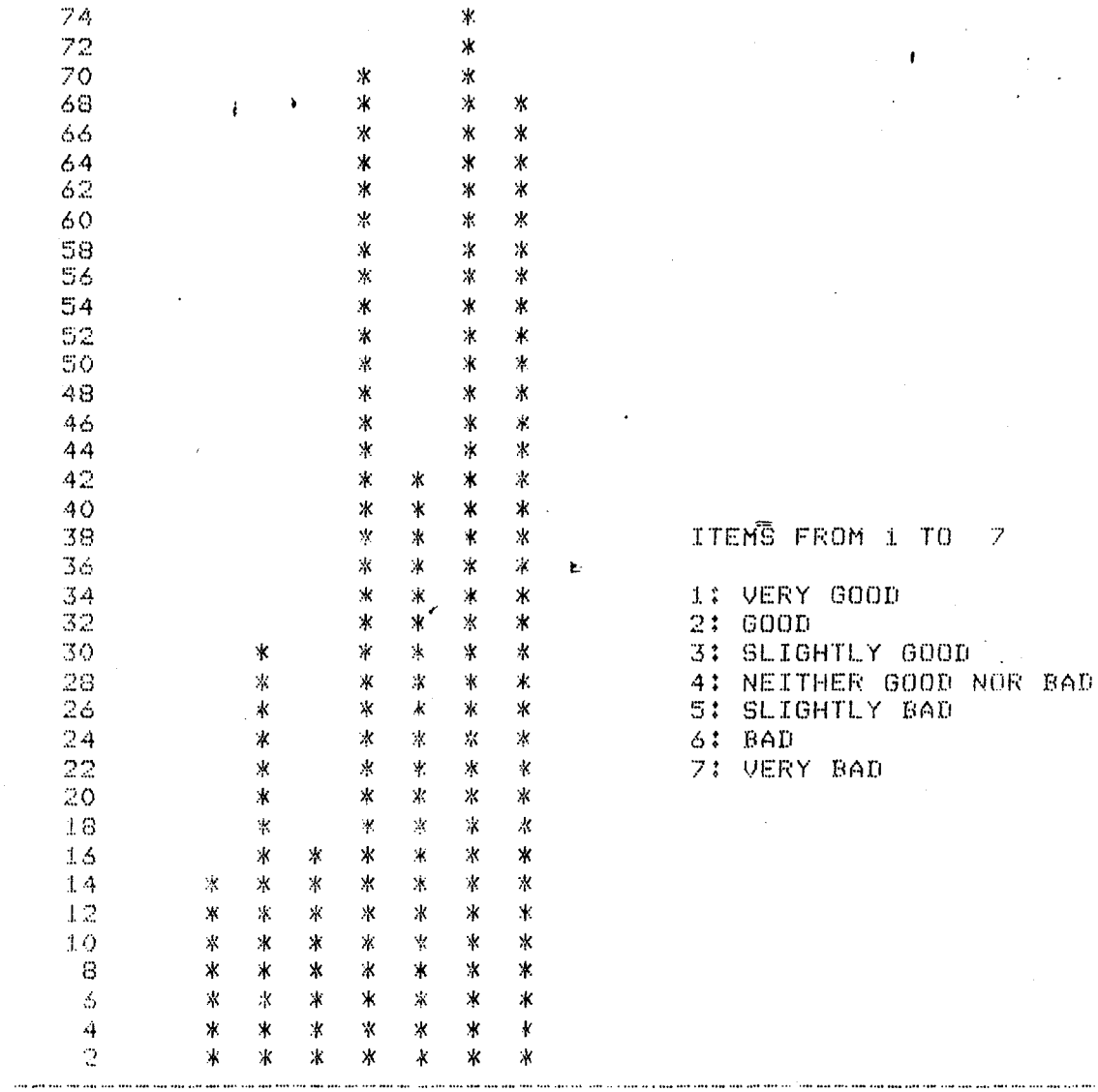
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

HISTORICAL SITES

FREQUENCY 14 30 17 70 43 75 69

EACH * EQUALS 2 POINTS



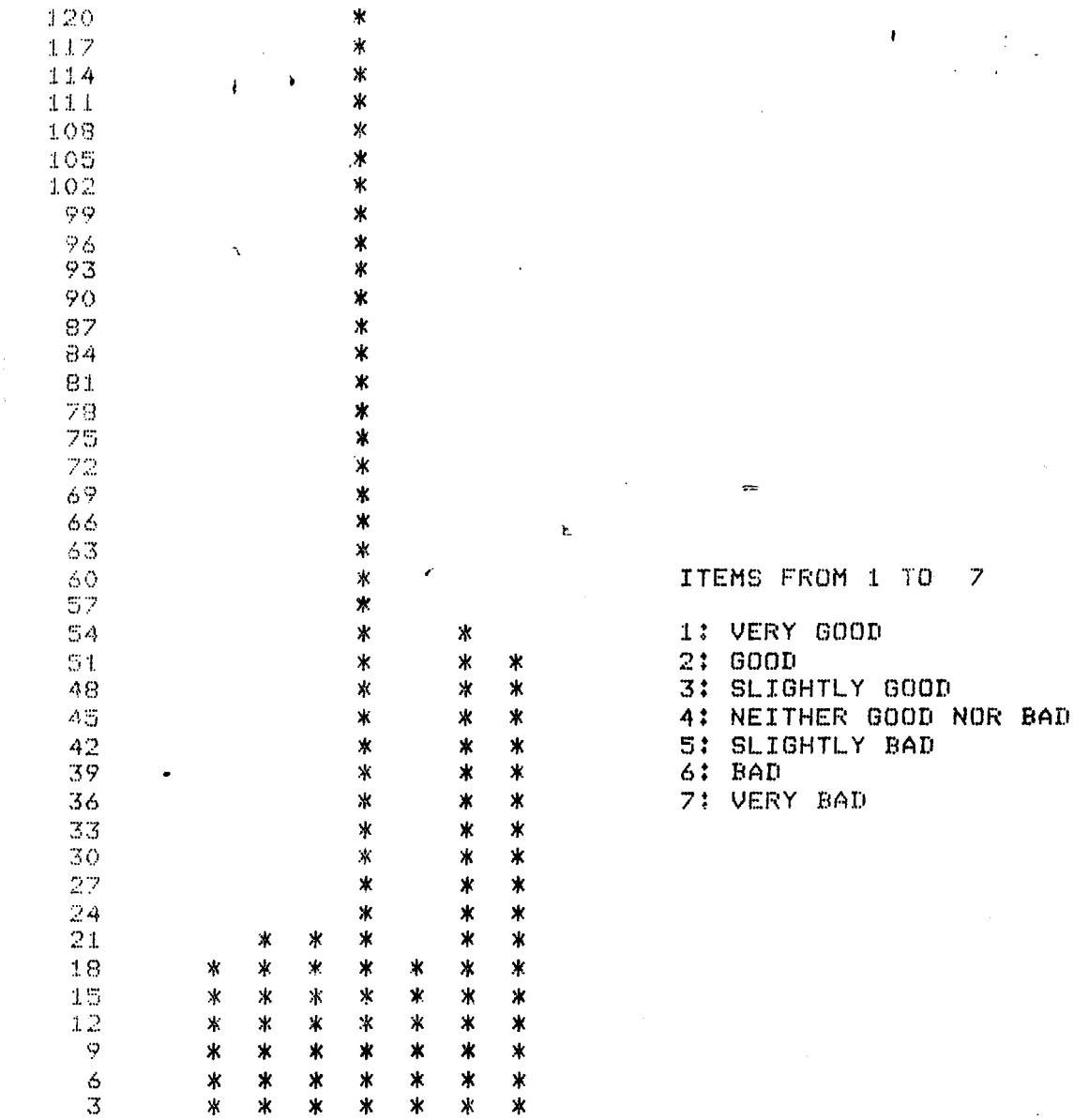
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

TRADITIONAL HAWAIIAN RELIGIOUS PRACTICES

FREQUENCY 18 23 22122 20 54 52

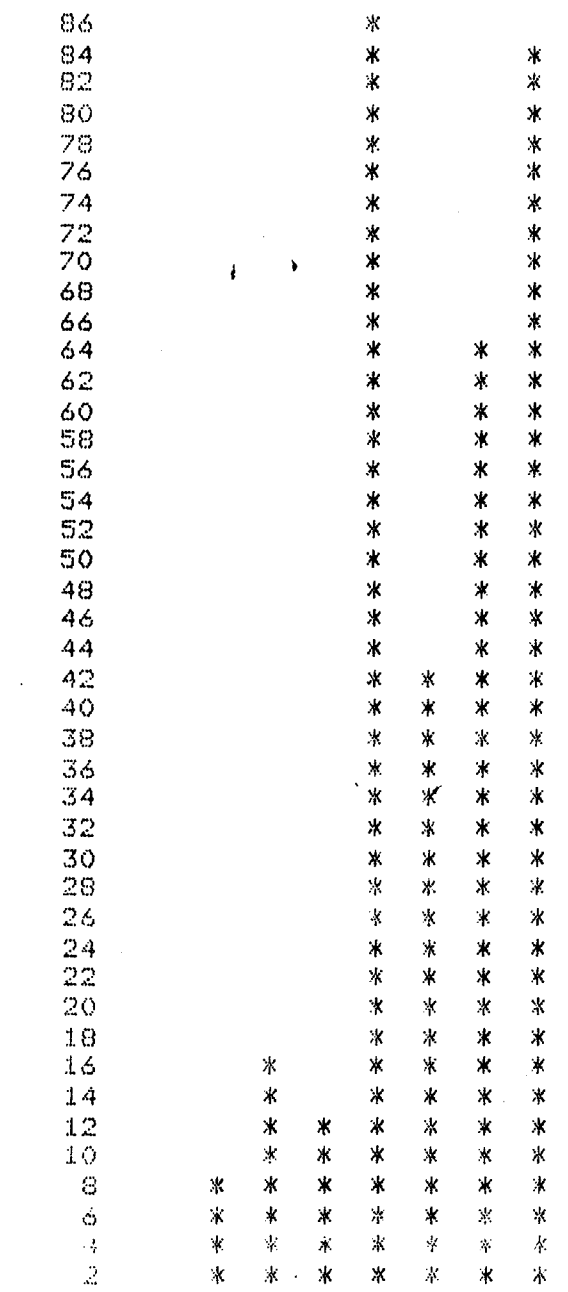
EACH * EQUALS 3 POINTS



HUNTING, FISHING, FOOD GATHERING

FREQUENCY 9 17 13 87 42 64 85

EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

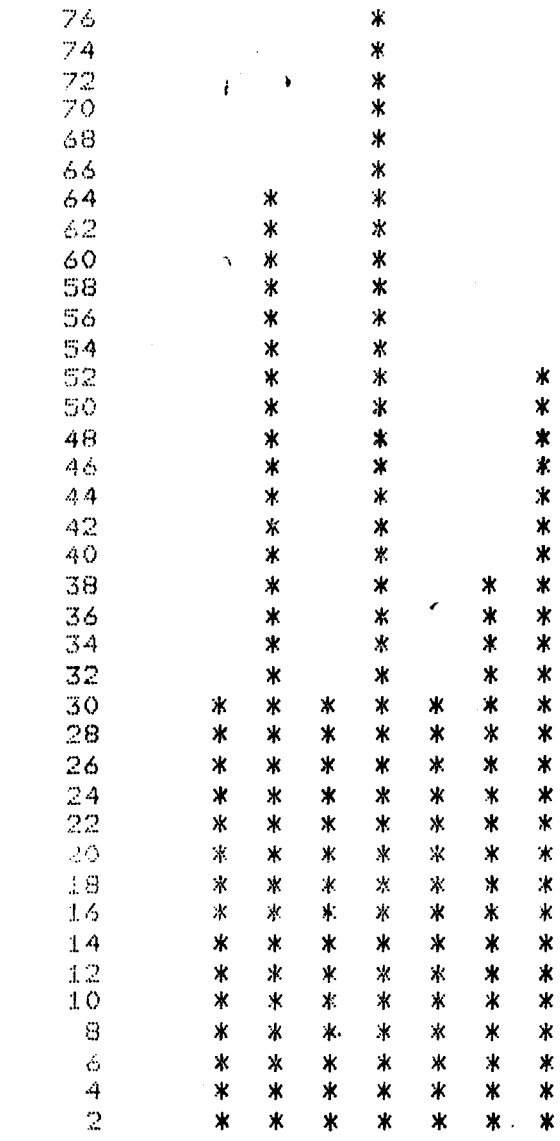
1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ITEM 1 2 3 4 5 6 7

SOCIAL CONDITIONS

FREQUENCY 31 64 30 77 30 39 52

EACH * EQUALS 2 POINTS



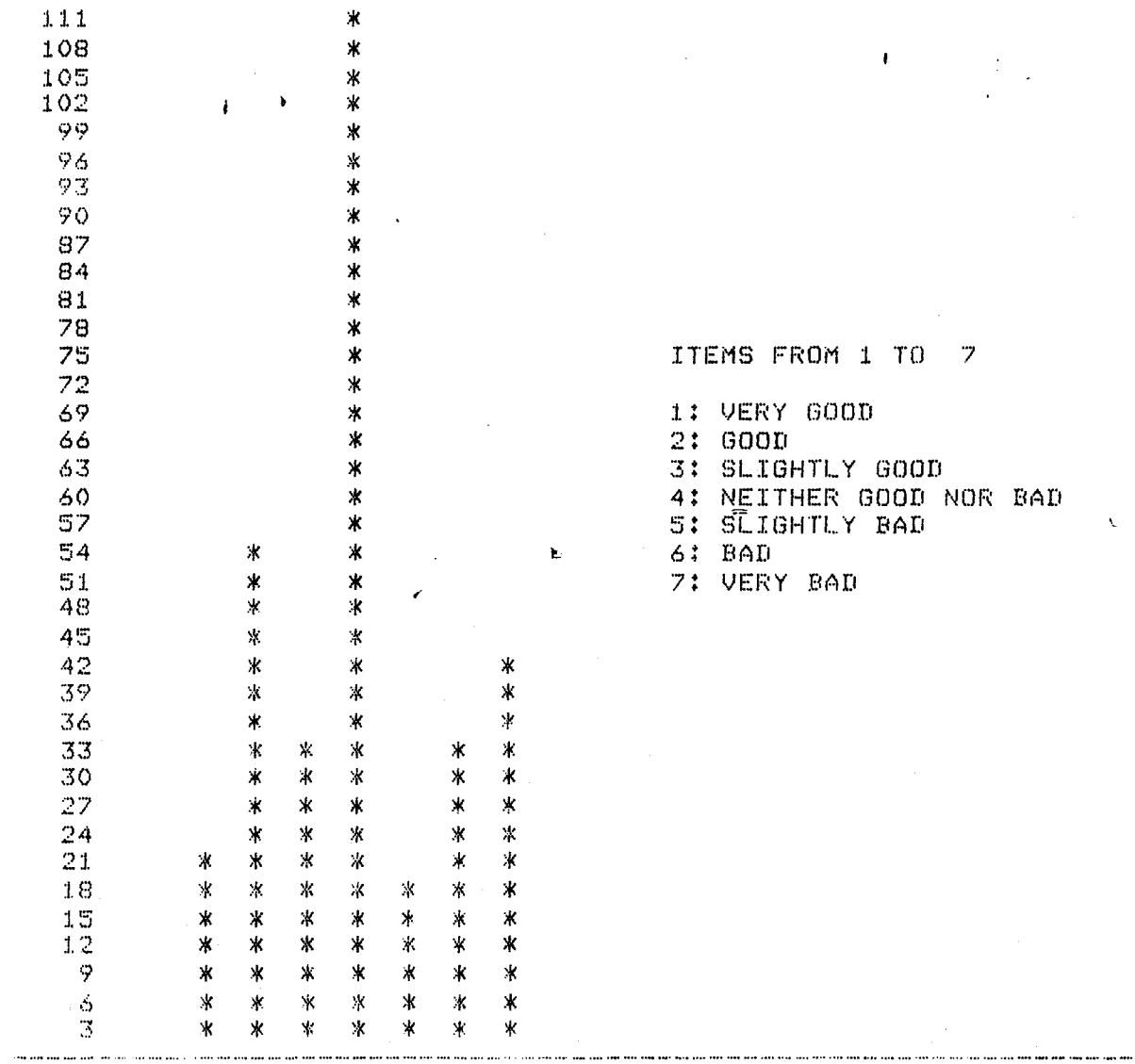
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

COMMUNITY CLOSENESS

FREQUENCY 21 54 35112 19 33 44

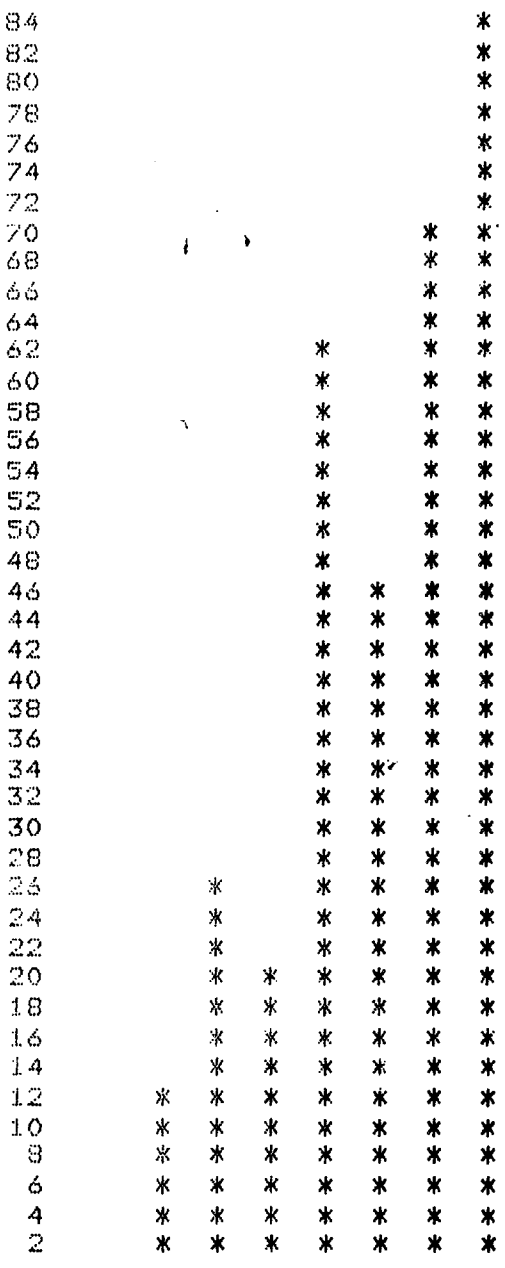
EACH * EQUALS 3 POINTS



TRAFFIC

FREQUENCY 12 26 20 63 46 70 84

EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

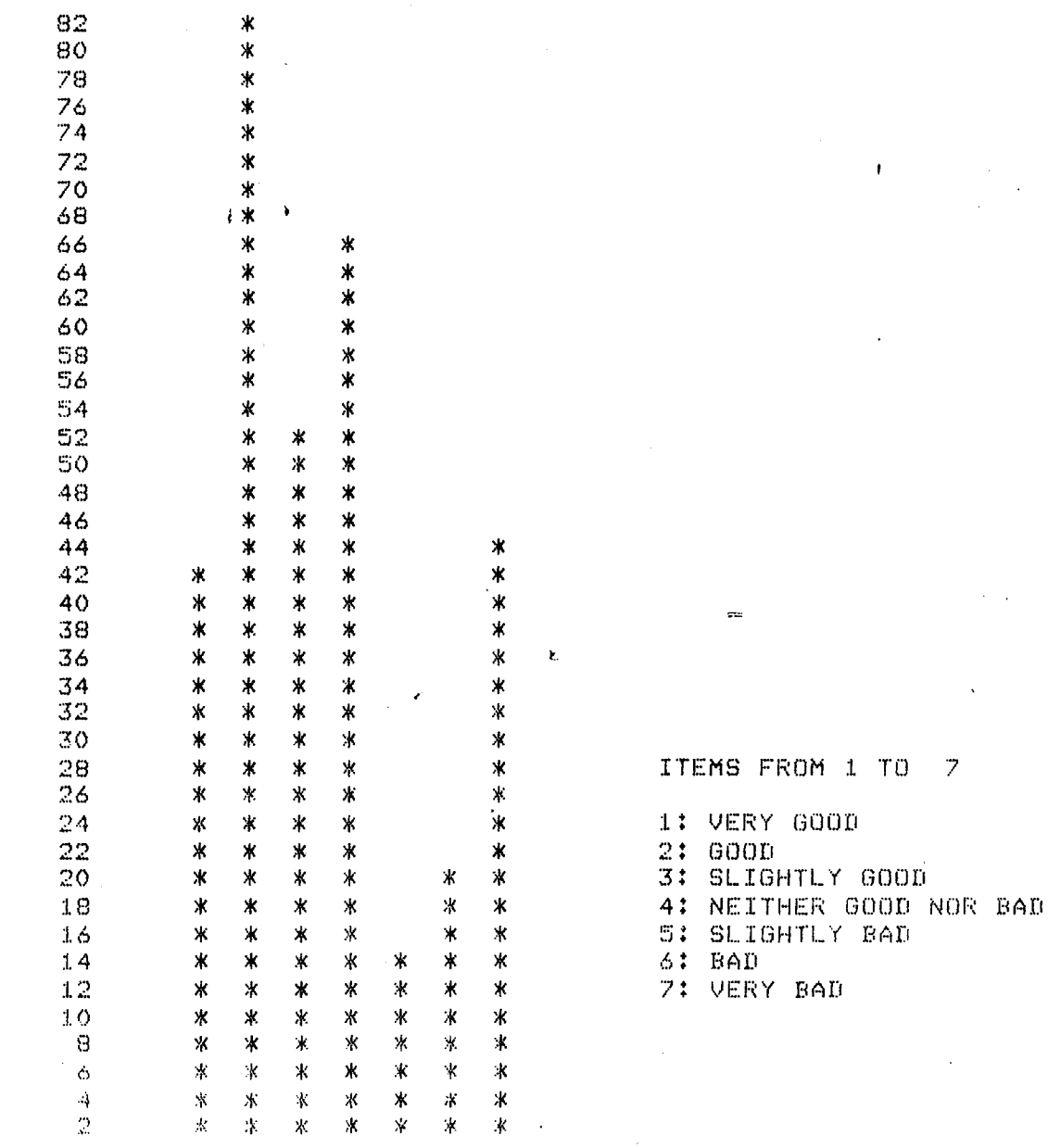
1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ITEM	1	2	3	4	5	6	7

ECONOMY

FREQUENCY 42 83 52 67 14 20 44

EACH * EQUALS 2 POINTS



ITEM 1 2 3 4 5 6 7

FREQUENCY 18 29 25 57 35 63 93

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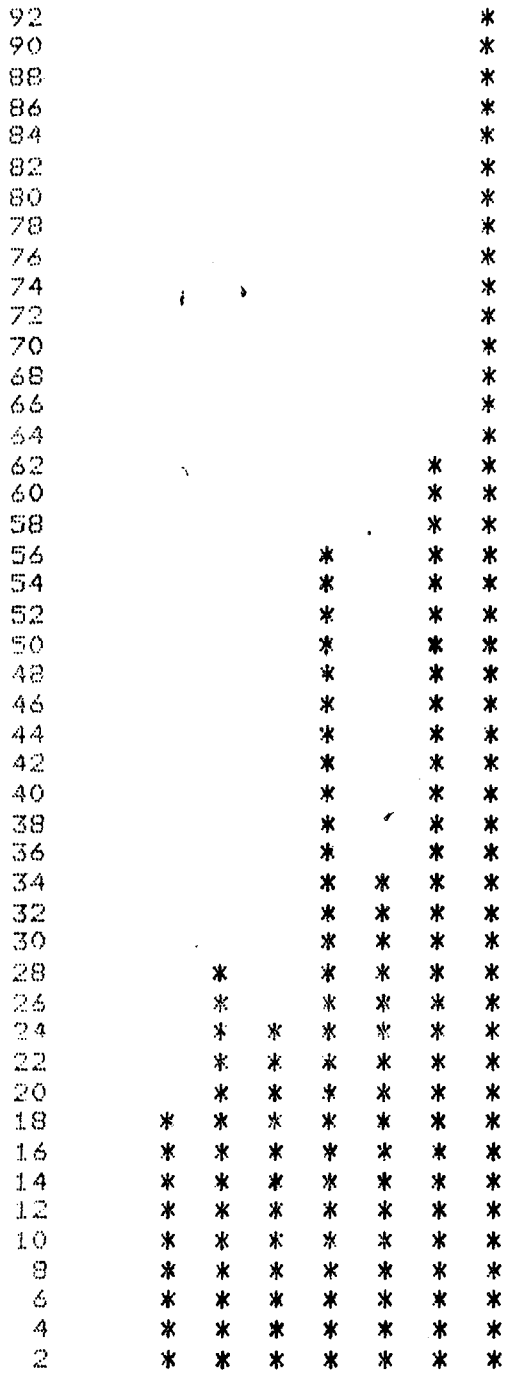


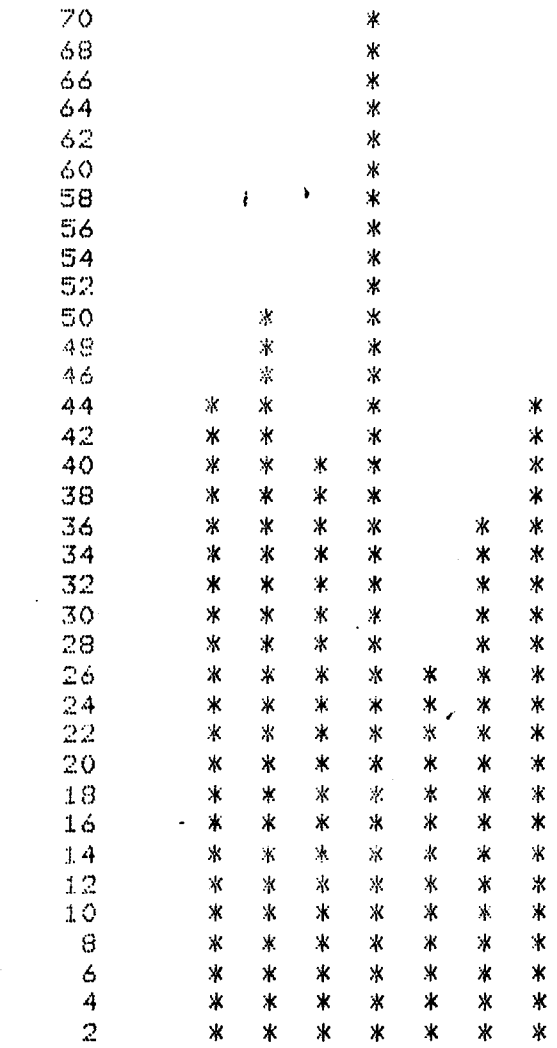
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

EMPLOYMENT FOR HAWAIIANS

FREQUENCY 44 50 41 70 26 36 45

EACH * EQUALS 2 POINTS



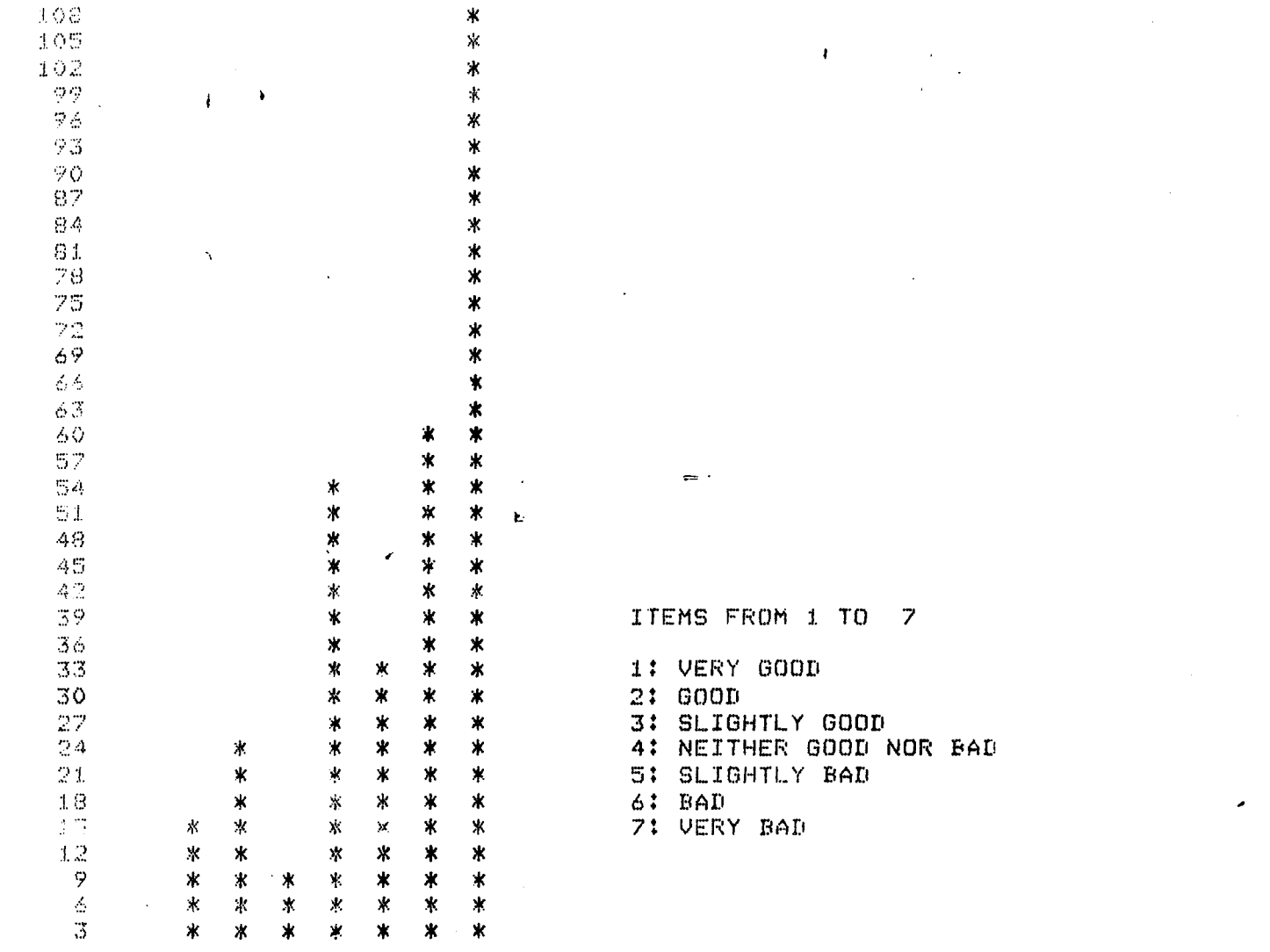
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

LAND TAXES

FREQUENCY 16 24 10 55 34 61108

EACH * EQUALS 3 POINTS



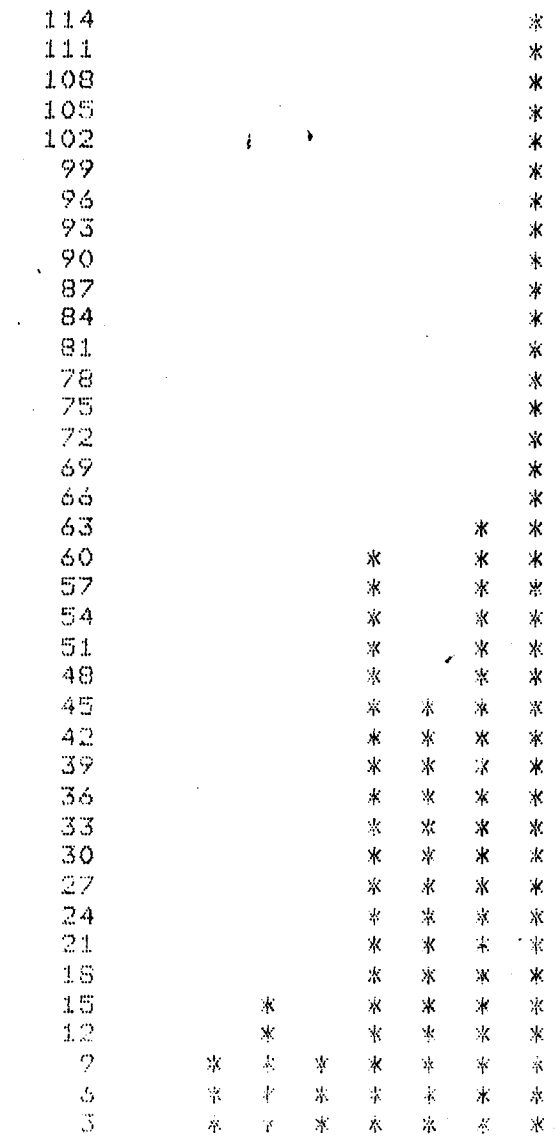
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

PHYSICAL ENVIRONMENT

FREQUENCY 10 16 11 60 46 65114

EACH * EQUALS 3 POINTS



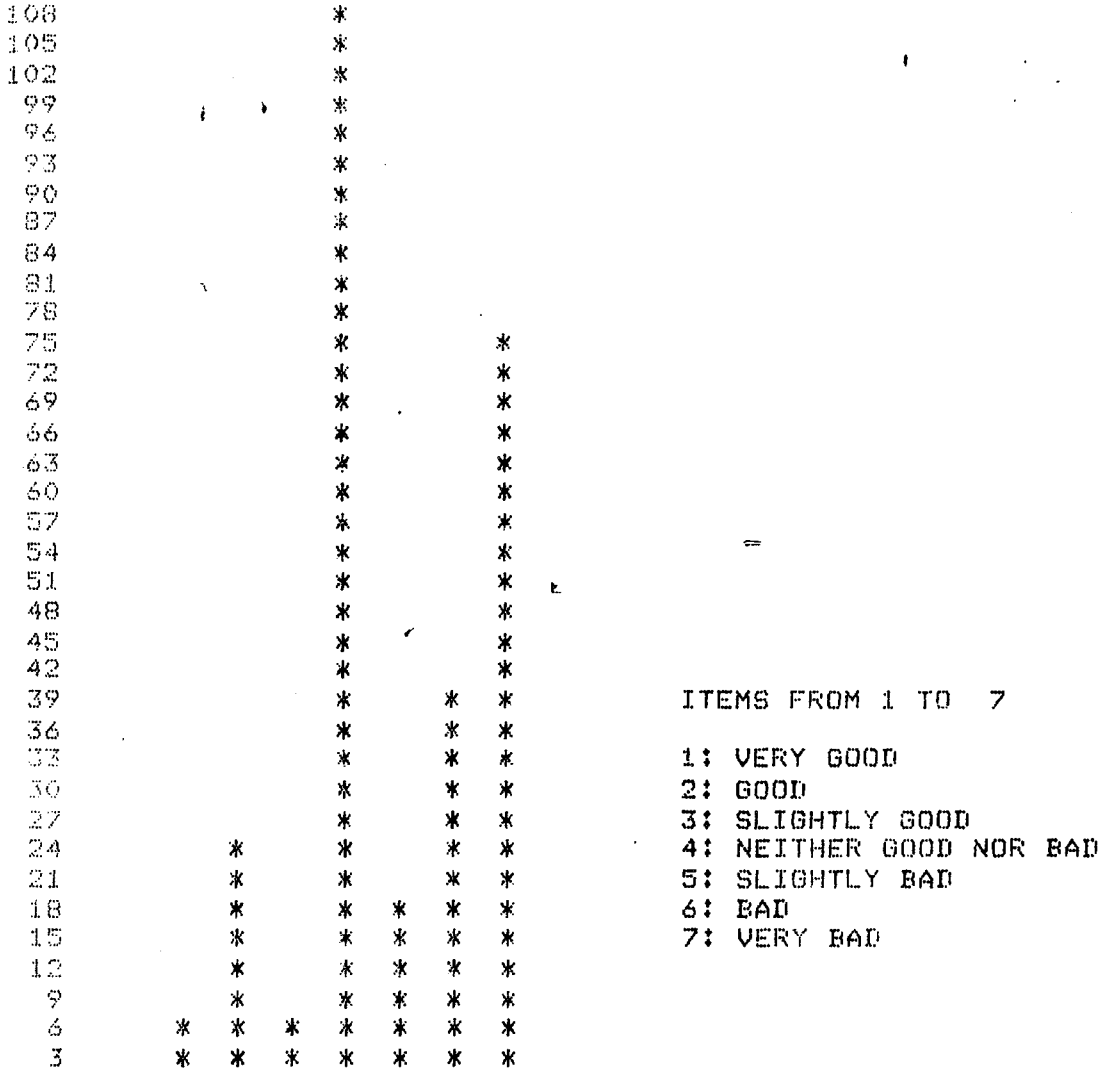
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

EARTHQUAKES AND ERUPTIONS

FREQUENCY 6 25 7109 19 41 76

EACH * EQUALS 3 POINTS

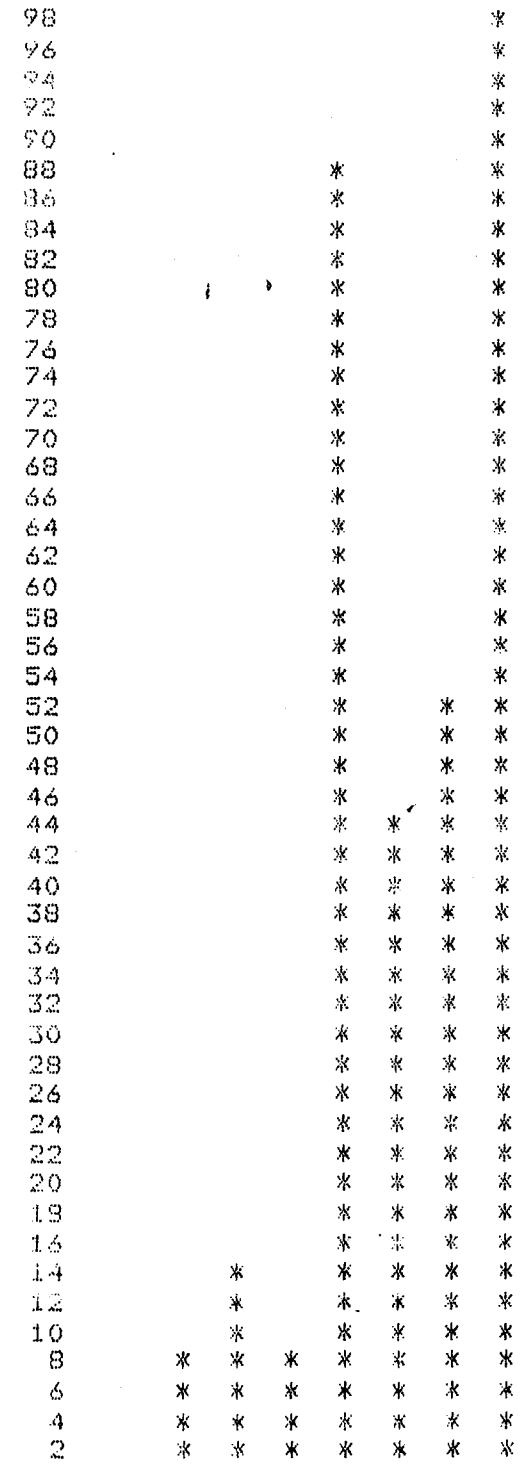


ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

FREQUENCY 9 15 8 89 44 53 98

EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

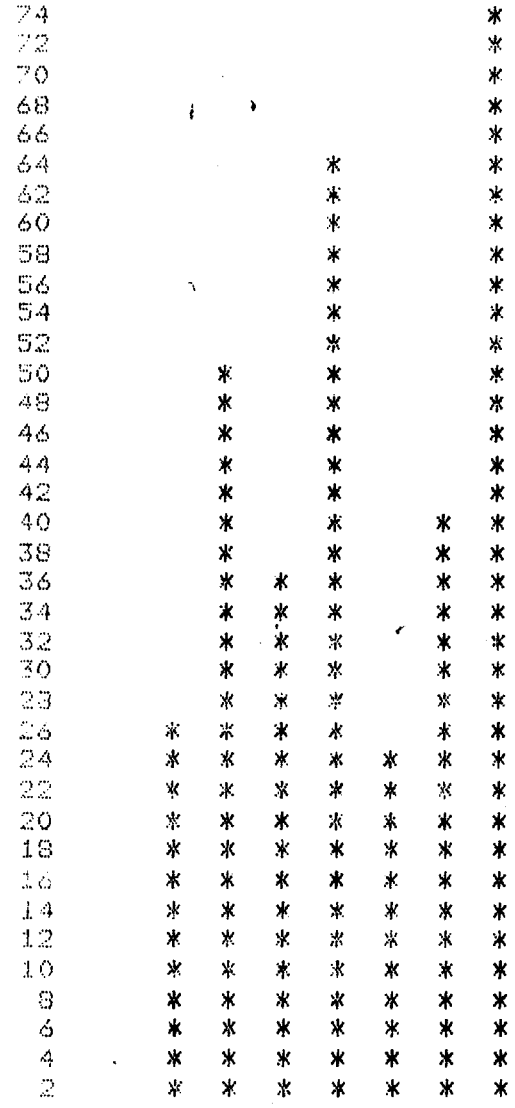
1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ITEM 1 2 3 4 5 6 7

OVERALL IMPACT

FREQUENCY 27 50 37 65 25 41 75

EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ATTACHMENT 10-4: [1]MEANS FOR SURVEY ITEMS 1-6 (USES)

USE	$\bar{X}$
Big Island Electric Power	2.33
Small Industries	2.95
Agriculture or Aquaculture	3.29
Health Spas/Hotels	4.07
Oahu Electric Power	4.25
Large Industries	4.47

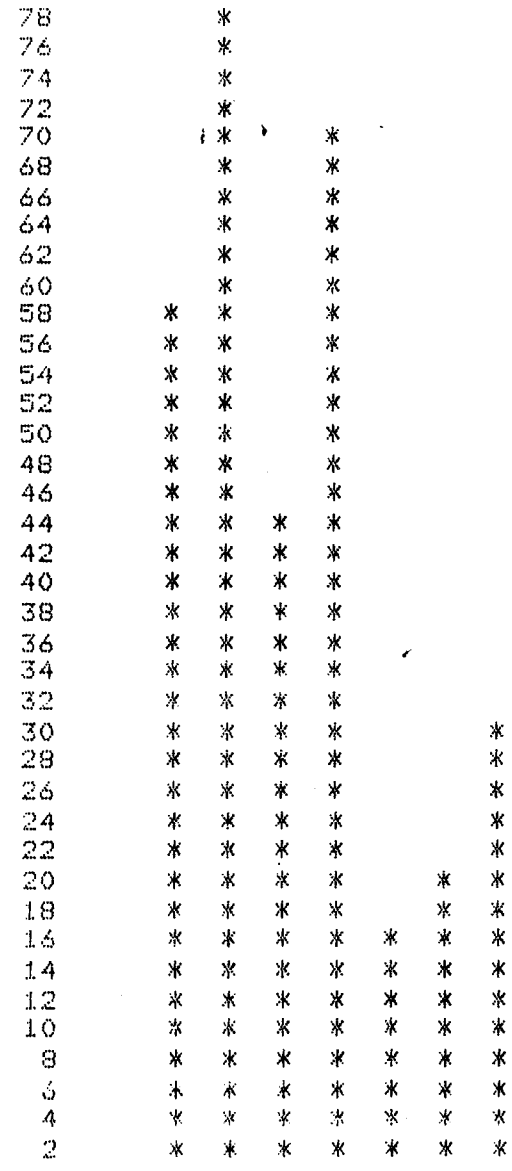
1. Scale from 1-7 (1 = Very Good; 4 = Neither Good Nor Bad; 7 = Very Bad)

ATTACHMENT 10-5: HISTOGRAMS OF RESPONSES TO USES QUESTIONS

USE FOR AGRICULTURE OF AQUACULTURE

FREQUENCY 58 79 45 70 17 20 31

EACH * EQUALS 2 POINTS



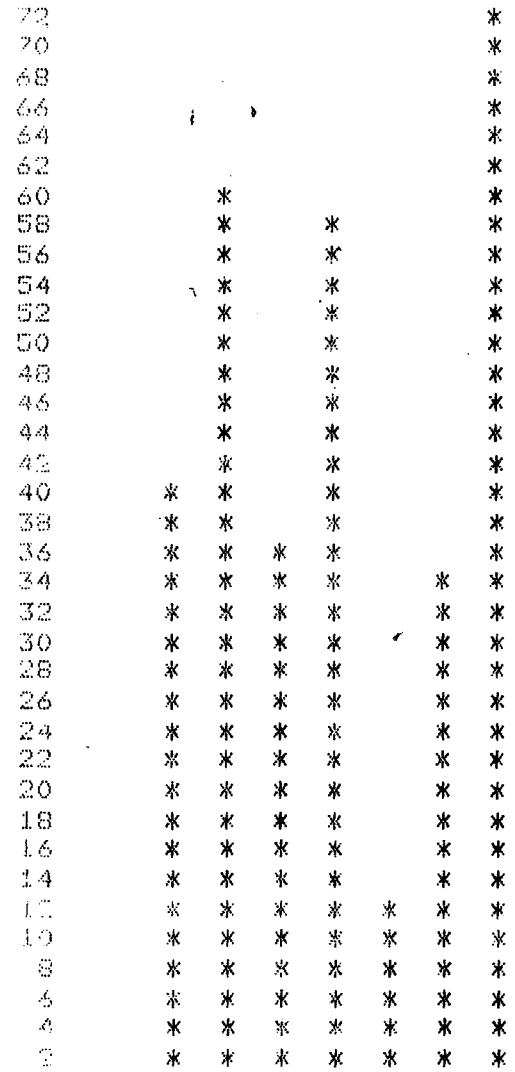
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

'ISP FOR HEALTH SPAS/HOTELS

FREQUENCY 40 60 37 59 12 35 72

EACH * EQUALS 2 POINTS



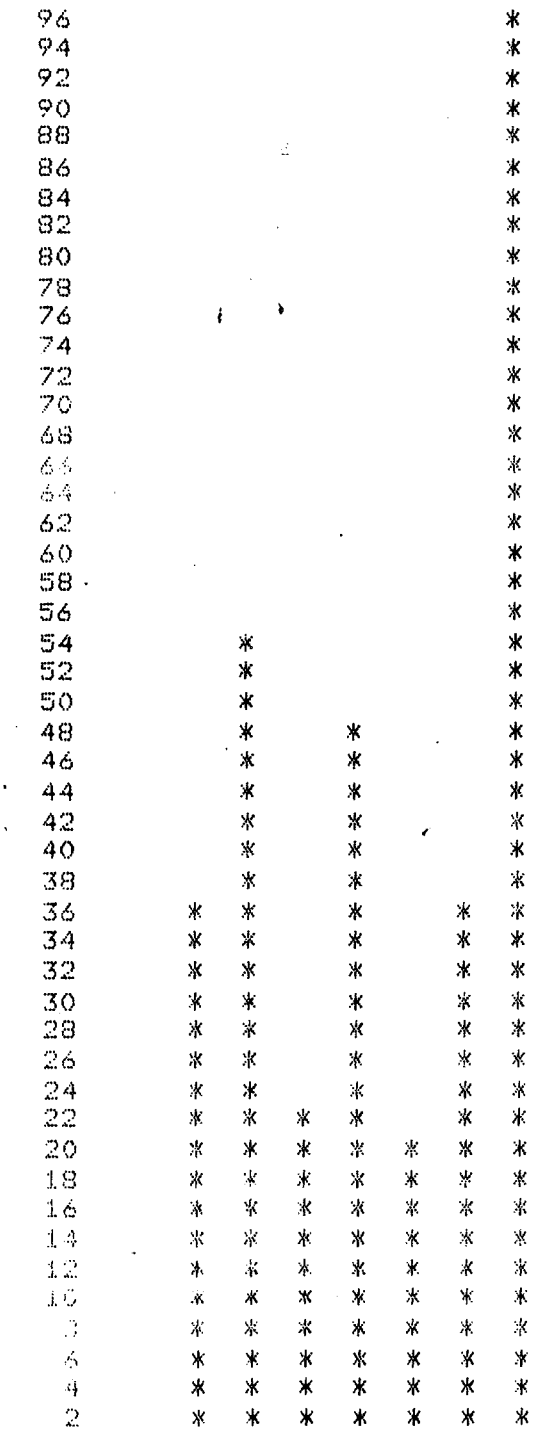
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ITEM 1 2 3 4 5 6 7

FREQUENCY 36 55 22 48 20 37 97

EACH * EQUALS 2 POINTS

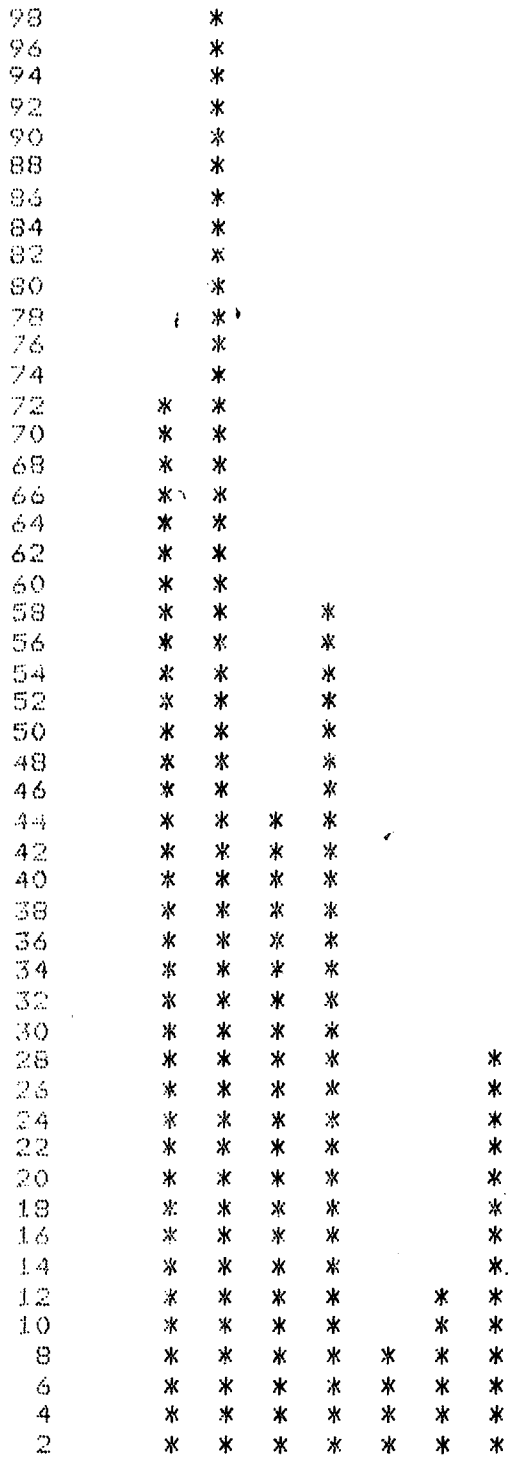


ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

FREQUENCY 73 98 45 59 9 12 29

EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

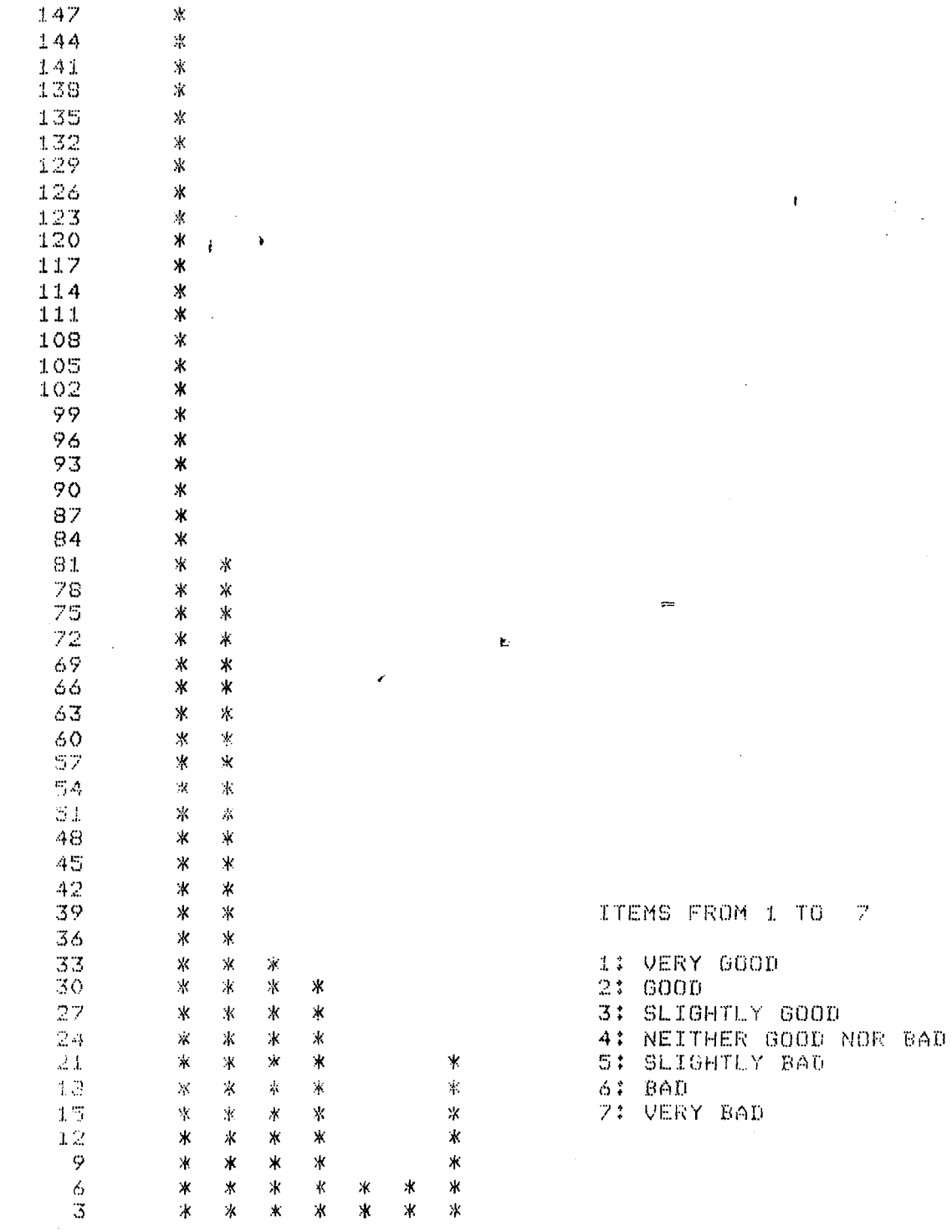
1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

ITEM	1	2	3	4	5	6	7

USE FOR BIG ISLAND ELECTRICAL POWER

FREQUENCY148 83 35 31 8 7 22

EACH * EQUALS 3 POINTS



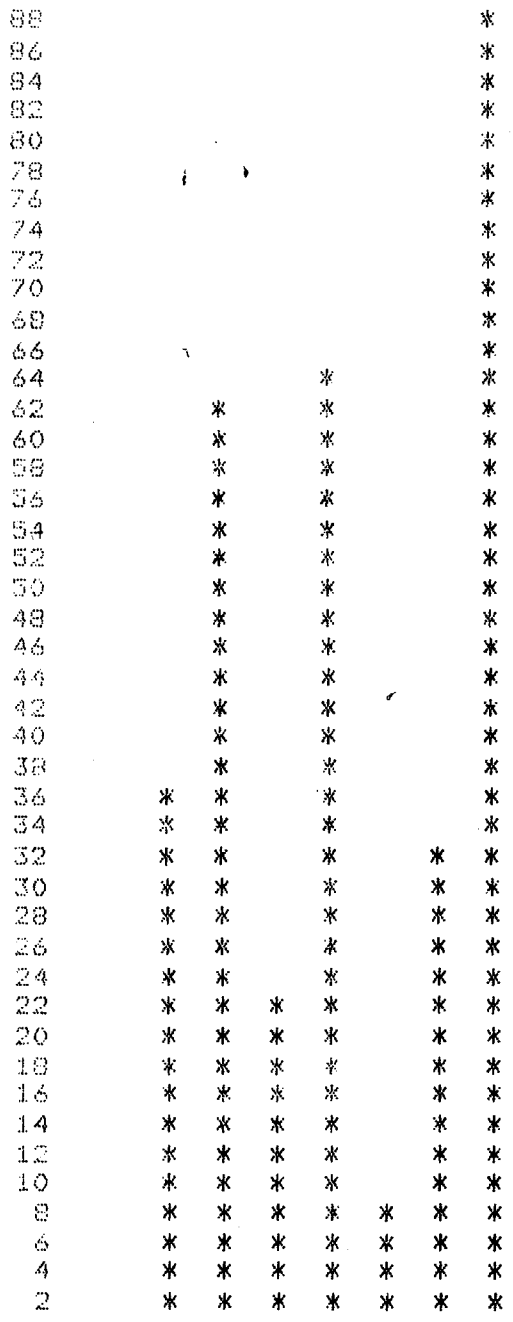
ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD

'SL FOR OAHU ELECTRICAL POWER

FREQUENCY 37 63 23 64 8 32 89

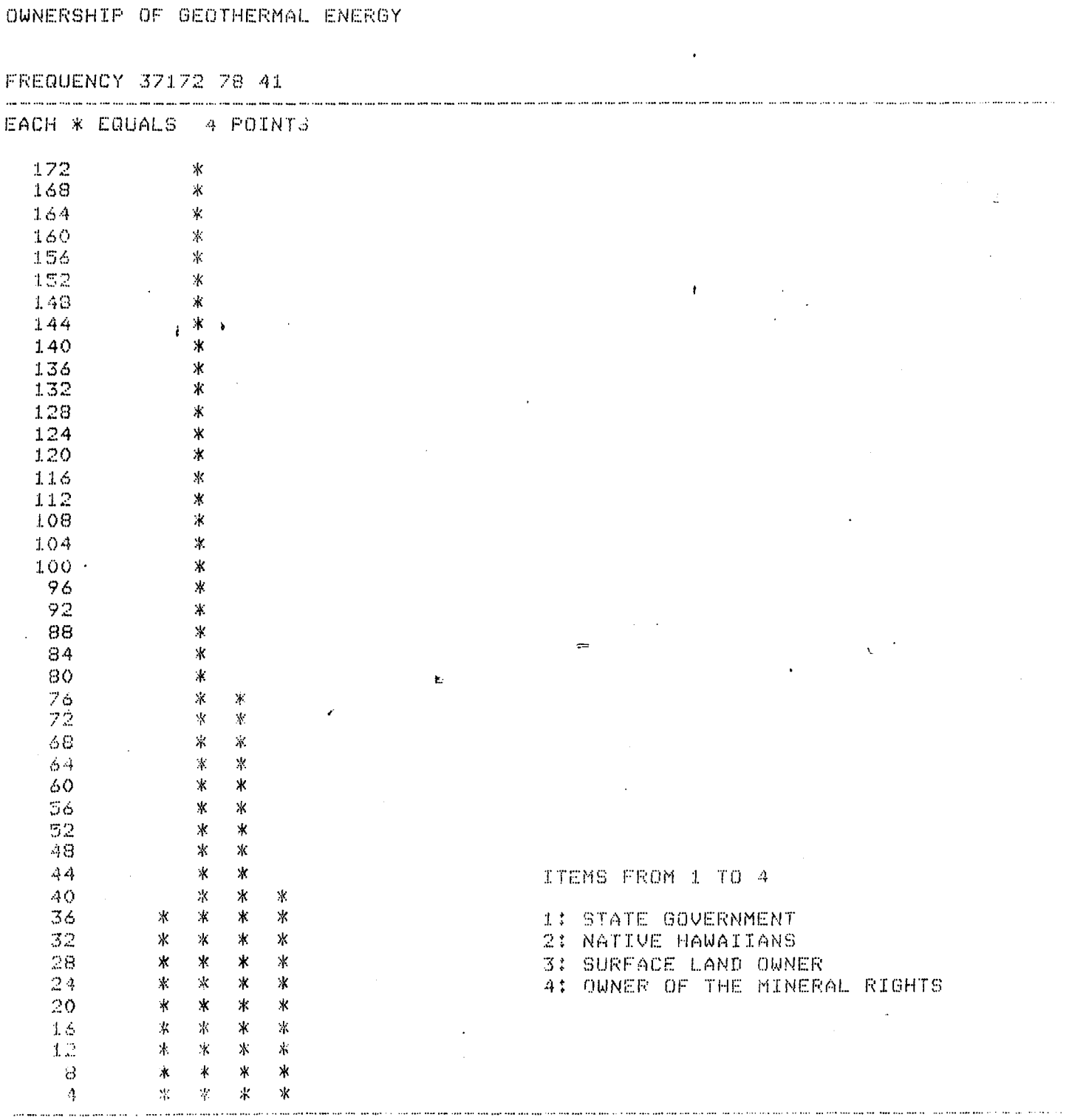
EACH * EQUALS 2 POINTS



ITEMS FROM 1 TO 7

1: VERY GOOD
2: GOOD
3: SLIGHTLY GOOD
4: NEITHER GOOD NOR BAD
5: SLIGHTLY BAD
6: BAD
7: VERY BAD.

ATTACHMENT 10-6: HISTOGRAM: OWNERSHIP OF THE GEOTHERMAL RESOURCE



ATTACHMENT 10-7: HISTOGRAM: QUALITY OF LIFE IN PUNA

SATISFACTION WITH PRESENT QUALITY OF LIFE IN PUNA

FREQUENCY 139 84 44 28 12 11 6

EACH * EQUALS 3 POINTS

```
 138      *
 135      *
 132      *
 129      *
 126      *
 123      *
 120      *
 117      *
 114      *
 111      *
 108      *
 105      *
 102      *
  99      *
  96      *
  93      *
  90      *
  87      *
  84      *  *
  81      *  *
  78      *  *
  75      *  *
  72      *  *
  69      *  *
  66      *  *
  63      *  *
  60      *  *
  57      *  *
  54      *  *
  51      *  *
  48      *  *
  45      *  *
  42      *  *  *
  39      *  *  *
  36      *  *  *
  33      *  *  *
  30      *  *  *
  27      *  *  *  *
  24      *  *  *  *
  21      *  *  *  *
  18      *  *  *  *
  15      *  *  *  *
  12      *  *  *  *  *
   9      *  *  *  *  *  *
   6      *  *  *  *  *  *  *
   3      *  *  *  *  *  *  *
    ITEM  1  2  3  4  5  6  7
```

ITEMS FROM 1 TO 7

1: VERY HAPPY
2: HAPPY
3: SOMEWHAT HAPPY
4: NEITHER HAPPY NOR UNHAPPY
5: SOMEWHAT UNHAPPY
6: UNHAPPY
7: VERY UNHAPPY

SECTION VI

EVALUATION

The final section of the report presents a discussion of some of the strengths and weaknesses of utilizing a community-based model for social and cultural impact assessment. Using the present study as a model, suggested issues that should be addressed by other communities considering similar activities are described.

CHAPTER 11

EVALUATION OF THE COMMUNITY-BASED MODEL OF SOCIAL AND CULTURAL IMPACT ASSESSMENT

Jerry L. Johnson, Ph.D.
University of Hawaii at Hilo Psychology
Project Consultant

As has been indicated, the present study reversed the usual relationship between researcher and target community by having the community direct the research, with professional expertise hired when it was needed. It should be clear that the model did not call for the community to replace the researcher, but rather for it to set the direction for the activities of the consultants and monitor the progress of the work. This sort of relationship requires close cooperation between the leadership of the community organization and the consultants. This is particularly important in the coordination and interpretation of data from the two sources. A second requirement of such a model is that the funding level for the project be sufficient for the community organization to obtain the necessary professional help. The present project clearly suffered in this regard, as was indicated in the preface.

The experience with the Puna Hui Ohana Project suggests a number of potential strengths and weaknesses of the community-based assessment model from the point of view of both the research effort and community needs. As the final topic of the report some of these strengths and weaknesses will be described.

Positive Features of the Model for the Community

1. From the viewpoint of the community, the model assures that community members have input into the assessment effort and that their concerns are accurately represented. Thus, it is possible to minimize the problem of an "outsider" misperceiving community needs and concerns, and the priorities among them.

2. There is a direct benefit to the community in the training and experience in project-related research skills that the resident project staff receives. In addition to growing in their own career development, these people become an increasingly valuable community resource.

3. To the extent that a goal of the project is to educate the community members about the development project and its possible consequences, having project staff who are established residents can facilitate this educational process through the informal communication networks of the staff. While this suggestion is intuitively reasonable, there is no systematic data from the present project to document the extent to which this process occurs. It would seem to be a suitable topic for future research.

4. A final benefit to the community is the cohesiveness it generates among those participating in the project. For a community group with the commitment and initiative to create and submit a proposal for funding, the many tasks requiring joint effort can solidify the interpersonal relationships in the group and strengthen the community as a whole.

Positive Features of the Model for the Research Effort

1. The research will benefit from a high level of cooperation from the target community members. In addition to the community-based sponsorship and control of the research, the rapport of the resident project staff can make the data collection process much smoother.

2. The local knowledge of the staff can lead to increased validity of the data collected, and can help the researchers anticipate potential problems that might not be apparent to someone from outside the community.

3. The experience from the present Project makes it clear that in an assessment project conducted by a community on itself, the return rate on such things as attitude surveys is unusually high. Representativeness of the data is thus increased.

Negative Features of the Model for the Community

1. The research effort can demand a great deal of volunteer time and can thus disrupt the normal routines of the project participants. Care should be taken not to overstate the resources of the community organization in either volunteer time or matching funds available. Very often insufficient matching funds translate to increased volunteer time to conduct fund raising activities which can compete with time needed to meet the project objectives.

2. It can be difficult not to let the scope of the project get too large to manage if the target of study is a single public in the larger community. Examples of this problem in the present study include a geothermal symposium requiring much time

and energy which was attended largely by non-Hawaiians and people residing outside the Puna District; and pressure from non-Hawaiian residents of Puna to be included in the Hui survey of Aboriginal Hawaiian attitudes toward geothermal development.

3. Finally, the community organization must have reasonable expectations about the effect that the results and recommendations of its study will have on relevant decision-making bodies. A great deal of frustration can result if immediate and dramatic changes are expected and the results of months of hard work appear to be ignored. There is, for example, little evidence that all of the efforts of the Puna Hui Ohana to present community concerns about geothermal development have influenced the process of development in any substantial way.

Negative Features of the Model for the Research Effort

1. It can be difficult to locate people from within the community who have the skills necessary to complete the project tasks. This can sometimes lead to either considerable additional training time, or inadequate work products.

2. Because of the larger number of people involved in the research, progress can be slowed. Progress can also be slowed because of competing community activities which make demands on the time and energy of resident staff, both paid and volunteer. This can be a particularly touchy problem because a refusal of the staff to participate in such activities can undermine their rapport with others in the community and thus hurt the project indirectly.

3. There is the potential for inaccuracy and bias in the data collected due to a relative lack of staff training or the influence of social or familial relationships between the staff person and respondent.

Conclusion

It is likely that neither all of the benefits nor all of the limitations of the community-based assessment approach described above will appear in any particular project. It is hoped that this summary of some of the positive and negative features of the model will help other communities anticipate potential problems and prevent or prepare for them if they attempt to assess the impact of development projects on themselves. It is the process of one community learning from another that will create a methodology of impact assessment that is more in tune with the needs of the community residents most directly affected by large-scale development projects. In the present case the process has been an interesting and rewarding one for the Puna Hui Ohana and its members, as well as the Project consultants.

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LIST OF APPENDICES

APPENDIX 1

MEETINGS AND CONFERENCES

ATTENDED

MEETINGS AND CONFERENCES

Sponsor Organization	Purpose of Meeting
Barnwell Corporation	Seek employment opportunities for Young Hawaiians-discuss economic partnership and investment in Barnwell-connected or sponsored geothermal enterprises.
Geothermal Resource Council (California)	Technological: Engineering, Exploration, Drilling.
Geothermal Resource Council (California)	Technological: Engineering, Exploration, Drilling, Financial Impacts.
Geothermal Resource Council (Idaho)	Conference on direct use application of geothermal energy in processes utilization; observing space heating greenhouse, agricultural and conservation activities in Boise.
Geysers (California)	Two visited the Geysers complex to examine environmental conditions comparable to extent of geothermal activity in Lake County in connection with early stage development in Puna. Conference and discussion with Chairman of Lake County Supervisors and members of Lake County Planning Commission Mary Jadiker and Commission Chairman Volker.
G.R.I.P.S. (California)	Geothermal research with information and planning system among the communities of Sonoma, Mendecino, Napa and Lake Counties; exchanged information; picked up film documents.
Hirai Associates	Sponsored small-scale hydro energy program for feasibility of refrigeration/cold storage facility in Pohoiki or Pahoa using wind power or geothermal waste heat. Social proposal filed with Alu Like and Bishop Estate.

Sponsor Organization	Purpose of Meeting
Honua Hawaii/ Senior Hostel	Discuss status of geothermal, Hui Ohana concerns for the future in State/University program with Senior Citizen experts.
Life of the Land	1979 Conference discussed manganese refining and impact on Puna environment.
Life of the Land Job trade-off	Honolulu, conference/workshops discussing environmental trade-off for jobs with respect to geothermal construction, tourism and labor unions.
National Ocean and Atmospheric Ad. Hilo, Hawaii	Closed meeting/workshop to discuss over-all economic and social impacts of the manganese processing industry using the Puna, Kawaihae, and Kohala/Waimea scenario. Opposed methodology for determining social impacts; proposed setting new guidelines for social impact analysis.
New Zealand Rotorua Waikato University Kawerau Ohaki Waahi Wariakei	Visited geothermal development. Observed utilization projects and examined possible cultural/economic impacts resulting from geothermal development near Maori communities. Studied Maori resistance to thermal/developmental abuse.
Puu Honua Hawaii	Advisory Board: Small-scale Community Energy Conservation program.
State Department of Planning - Hilo	Called attention to need for early planning by State and County to consider basic philosophies in geothermal planning with regard to the State's Energy Integration Assessment programs.

Sponsor Organization	Purpose of Meeting
State Department of Planning and Economic Development - Commercialization - Honolulu	Discuss lack of developer's concern for community interests and social acceptability. Begin to make demands for up-front representation by community organization; proposed improved planning approaches with DPED. Invited to participate on the GAC.
Thermal Power	Discuss Thermal Power, role with Dillingham, Kapoho Land, Bishop Estate interests in geothermal development. Seek Thermal Power sponsorship of Hui research project for "action" programming of geothermal involvement by the Hui.
University of Hawaii	Group discussion leader in energy courses for credit; examined phases of energy use: Applied Sciences 326.
University of Hawaii (Honolulu)	Technological Conference - New Methods, exploration; drilling, chemical analysis.
University of Hawaii Dept. of Education	Workshop Ed. 600 course, discuss methods of public education and awareness of energy problems at State and County levels.
University of Hawaii Geography/Psychology Department	Discuss implication of geothermal development, update or status of development in Hawaii, discuss need to plan on fundamental issues.
Volcano Institute	Participate on panel; discuss social management resource application regarding geothermal development.

APPENDIX 2

GEOTHERMAL SYMPOSIUM PROGRAM

A GEOTHERMAL SYMPOSIUM
Sponsored by the Puna Hui Ohana

****

Title: HAWAII AND THE GEOTHERMAL FUTURE:
Problems and possible uses; Impacts and predictions

Date: June 28, 1980 (Saturday)

Where: Pahoa School Cafeteria

Time: 8:30 a.m. - 4:30 p.m.

Theme: What is the Geothermal Future?

Format: Symposium/Panel Discussion

Structure: Four Panels/Four Discussion Areas
a. Resource Assessment/Description
b. Exploration/Engineering
c. Utilization; Energy-Conversion/Direct Use
d. Impacts; The Environment, Eco/Political

TENTATIVE PROGRAM	TIME	
1. Call to Order (Ho'omaka)	8:30-8:32	
2. Pule (Opening prayer for guidance)	8:32-8:35	M. Ka'awaloa
3. Puna songs	8:35-8:40	N.Z. Group
4. Moderator, Symposium (explain format)	8:40-8:43	S. Kinney
5. Welcome (Hui President)	8:43-8:48	P. Hauanio
6. The Federal Interests	8:48-8:53	T. Yoshihara
7. The State Interests	8:53-9:00	H. Kono
8. The County Interests	9:00-9:05	H. Matayoshi

First Panel

Assessment, Resource, and Exploration
Panel Moderator: P. Hauanio — 9:05-9:07

Panelists:
Dr. John Shupe: Chrmn, Energy Research, UHM — 9:07-9:22
Nature and Occurence
Dr. Charles Hellesley: HI Inst. of Geophysic, UHM — 9:22-9:37
Exploration, Techniques and Strategies

Questions/Discussion — 9:37-9:57

Break: New Zealand Geothermal Slide Show — 9:57-10:22

Second Panel

Exploration/Engineering
Panel Moderator: Pearl Kajiyama — 10:22-10:24

Panelists:	
Mr. Louis Lopez: Project Manager, HGP-A	10:24-10:39
Project Status-Generating Plants	
Dr. William Chen: Professor, Engineering, UHH	10:39-10:54
Engineering and Field Development	
Mr. Edward Craddick: GEDCO, President	10:54-11:04
Drill and Well Completion	
Questions/Discussion	11:04-11:24
Break: Lunch	11:24-12:24
Third Panel:	
Utilization	
Panel Moderator: Kini Pe'a	12:24-12:26
Panelists:	
Mr. James Ditmar: Business Development Manager, Parsons Engineering	
Underwater Cable Technology	12:26-12:36
Mr. Lloyd Jones: Manager, Energy Products, HD&C	
Direct Use Application, Industrial Park in Pahoa	12:36-12:46
Mr. James Moreau: Project Manager, HD&C	
Wood Ethanol Project in Pahoa	12:46-12:56
Mr. Chip Higgins: Director, Energy Supply, HECO	
Energy Transfer-Honolulu	12:56-1:06
Mr. Ed Nakamura: Bishop Estates	
Land Planning/Deveopment	1:06-1:16
Mr. John Humme: Manager, Puna Sugar	
Sugar & Future Land Use	1:16-1:26
Questions/Discussion	1:26-1:46
Break: New Zealand Dance Group	1:46-2:06
Fourth Panel:	
Impacts:	
Panel Moderator: Sarah Hauanio	2:06-2:08
Panelists:	
Dr. Sanford Siegel: Environmentalist, UHM	
Environmental Interruptions	2:08-2:18
Dr. Jerry Johnson: Social Psychologist, UHM	
Hui Research Update	2:18-2:28
Mr. Tim Lui-Kwan: Native Hawaiian Legal Corp.	
Ownership Aspects, Geothermal Resource	2:28-2:38
Mr. Jack Keppler: Managing Director, Hawaii County	
County wide Impacts	2:38-2:48
Dr. James Kent: FUND Executive Director	
Social Impact Analysis	2:48-2:58
Questions/Discussion	2:58-3:18
Closing Remarks: Symposium Moderator - S. Kinney	3:18-3:28
Mahalo/Aloha: Hui President - P. Hauanio	3:28-3:33
Closing Pule: (Blessing of the Future) - H. LeeHong	3:33-3:36

PAU

GAC MEMBERSHIP AND OTHER ASSIGNMENTS

Dr. John Shupe- Nature and Occurence:

What the resource is, its various forms, classification, where it occurs in Puna, the State, why? Any other likely places in Puna, offshore? The heat source and steam generation, renewability.

Dr. Charles Hellesley- Exploration Techniques and Strategies:

Exploration methodology now in use, their value and limitation; assessing the resource, reservoir characteristics and future demand, analyzing well test data; chemical, fluid content.

Dr. William Chen- Engineering and Field Development:

Well and field preferences, plant upset conditions, valve blow-out prevention, handling waste fluids by injection? Well future in terms of earthquakes, lava inundation.

Mr. Lou Lopez- HGP-A Status:

Type of generating plant, size option, sulfur dioxide content, MWe capacities, exhaust system, facilities for the future using geothermal.

Mr. Ed Craddick- GEDCO/WRI Drill Site Construction, Drill and Well Completion:

Drilling mediums, types of rigs, site problems, costs per depth, blow-out prevention equipment; labor demands, water requirements.

Mr. James Ditmar- Parsons Engineering: Underwater Cable Technology:

Feasibility, major submarine technology problems, cable construction; transfer problem in Alenuihaha Channel (depth; current,etc) what is cable role for Honolulu future: w/o cable? For Puna?

Mr. Lloyd Jones- The Industrial Park in Pahoa; Direct Use Applications:

Over-all industrial park concepts; why we need it? Is it more efficient (agglomeration). Is geothermal source in the park? Future for moderate temp/pressure resource in Hawaii County.

Mr. James Moreau- Wood Ethanol Project in Pahoa:

Describe process and product; the feed stock; equity distribution; environmental concern; the anchor industry as an attraction-what will it attract; mobile demands for the future.

Mr. Chip Higgins- Energy Demands and Self-Sufficiency:

Honolulu's energy needs; how does HECO see the Puna role in supplying energy to Honolulu; the full and baseload condition; over and underground energy transfer-probable routes, future needs and the depletion problems.

Mr. Ed Nakamura- Bishop Estate's Development Plants:

Describe general Puna holdings and location; leasing plans regarding geothermal possibilities; direct developmental invoronment; any place for Hawaiians; future in Puna.

Mr. John Humme- AMFAC, its Land and Sugar:

Can sugar be saved? Geothermal and sugar refining role in Industrial Park; innovative sugar uses; Puna sugar in the Keaau setting with geothermal energy-can geothermal save sugar?

Dr. Sanford Siegel- Environmental Interruptions, Mitigation Processes:

Ecological rythms under stress; stress factors; noise, air and visual pollutions; endangered plant and animal species; health safety; chemical danger; environmental reporting. Will NEPA standard be reduced? What is its role in future of alternate energy and conservation?

Dr. Jerry Johnson- Research Design Consultant:

Overview of Hui Project to date-objectives; issues being examined; the New Zealand experience-cultural concerns; future implication for lower Puna.

Mr. Tim Lui Kwan- Legal Aspects of Geothermal Development:

Ownership issue; Hawaiian issue, water rights, various laws governing geothermal in permitting, regulatory process; future legal issues; extention of ownership to submarine and air rights.

Mr. Jack Keppler- Political, County-Wide Implications:

Hawaii County and self-sufficiency what does it mean? How soon; political leverage and the community vote; community participation in planning input and policy decisions. How County sees geothermal as enhancing economic development.

Dr. James Kent- Social Resource Management:

Citizens perception of a changing environment; community perception of geothermal development, ideology and culture in conflict; monitoring social change; the FUND Methodology-role of a social impact analysis.

Mr. Sonny Kinney- Research Project Director, Puna Hui Ohana:

Closing Remarks.

APPENDIX 3

SAMPLE NEWSLETTER

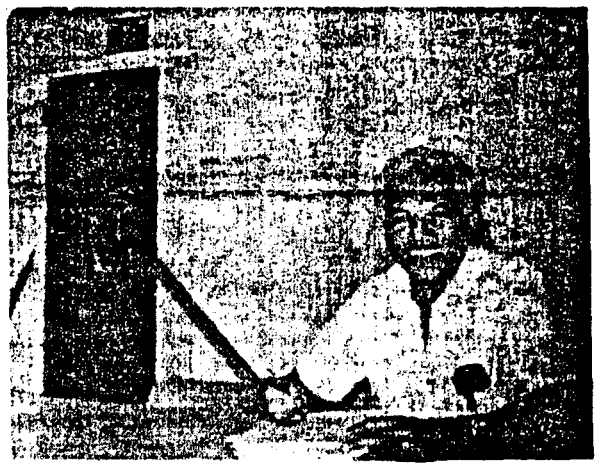
PUNA HUI OHANA
A Non-Profit Tax Exempt Organization
P.O. BOX 611
PAHOA, HAWAII 96778
PHONE: 965-9140

DECEMBER-MARCH | Puna paia ala ika ala o ka hala | STATEWIDE ISSUE NO. 1

ALOHA MAI!

MOVING INTO THE GEOTHERMAL ERA

Four years ago lower Puna-Makai lying on the south-eastern coast of the Puna district on the Big Island, in the shadow of Kilauea Volcano, quietly watched its many residential subdivisions slowly grow. Twenty-two miles from the island's major urban center, the seaport city of Hilo, the area appeared destined to become the city's major bedroom community.



Peter Hauanio, President

In addition, a basic rural agricultural economy of sugar, anthuriums, papaya, citrus fruit, orchids, macadamia nuts, vegetables and the lucrative but illegal pakalolo, provided employment and a rural lifestyle in the communities of Kapoho, Pohoiki, Pahoa, Kalapana, Kaimu and Opihikao. Only one road led in and out of lower Puna-Makai; Pele had earlier sealed off the southern access.

Today this very same place is on the threshold of potentially enormous geothermal and economic development certain to change the physical and cultural landscape, of the Hawaiians in this ancient settlement. A recent bore into the heart of the Kapoho rift zone by the HGP-A (Hawaii Geothermal Program-Abbott) produced an extremely hot, high steam content and high pressure well. An experimental 3-megawatt electrical generating plant is under construction on the site for on-line use by the Hawaii Electric Light Company by April 1981. The two-year project is expected to examine the geothermal and economic feasibility of large-scale development. Scientists theorize a potential of over 1000 megawatts (enough to satisfy the electrical needs of a city of more than one million people!) in the Puna geothermal resevoir. What lies in store for Puna; for the Big Island?

Geothermal development as a relatively new power/energy source is certain to generate new social, economic, and cultural aesthetic forces, much of which are unknown or inadequately understood. Potential impacts resulting from geothermal/economic development on the aboriginal social, economic and cultural systems in connection with the widespread possibility of future exploration of geothermal site has accelerated the need for an objective research program identifying and quantifying changes certain to occur.

Uncertain about the effects of geothermal development the Puna Hui Ohana, an aboriginal Hawaiian community organization sought funding from the U.S. Department of Energy for a research proposal assessing potential changes in the social and cultural fabric of the aboriginal Hawaiian community. The proposal was approved and the project became operational October 10, 1979. One of the study objective calls for expansion of the regular Puna Hui Ohana Newsletter to include Statewide mailing to aboriginal Hawaiians and public planning and decision making groups. Many of the concerns are relevant for Hawaiians throughout the State and this mechanism will provide input for Hawaiians outside the Puna Hawaiian community.

APPENDIX 4

INFORMATIONAL MEETINGS AND PRESENTATIONS BY THE PUNA HUI OHANA

INFORMATIONAL MEETINGS AND PRESENTATIONS BY PUNA HUI OHANA

ORGANIZATION	PURPOSE
Community Groups	
Hui Hanalike (Community Organization)	Provide objective information using slides, and Hui data.
Kalapana Community Organization	Speak several times on status of geothermal, economics, cable technology, exploration methods; future of geothermal.
Puna Community Council (Umbrella Group)	Provide update information on geothermal process to fourteen group organization.
Puna Lions Club	Speaks on status of geothermal development, focusing on community economic impacts.
Puna Speaks (A non-Hawaiian Community Organization)	Provide background on geothermal development including economic probabilities.
Native Hawaiian Groups	
Alu Like	Brief Board of Director/ Hilo staff on geothermal development in Hawaii County - apply for research grant.
Bishop Estate	Invite trustees, discuss issues regarding development of estate lands in Puna-seek funding for Hui.
Hawaiian Homes Committee	Discuss relevant ideas on economic development assistance to Hui members with some relevance to geothermal energy use.
Kaho'olawe Ohana	Advice on Hawaiian status on geothermal in Puna. Pledge assistance on Native resurgency.

Office of Hawaiian Affairs	Brief Hawaii County Trustee on geothermal development status - speak on Hawaiian issues regarding geothermal uses.

APPENDIX 5

GEOTHERMAL REFERENCES IN THE PUNA HUI OHANA LIBRARY

GEOTHERMAL REFERENCES IN THE PUNA HUI OHANA LIBRARY

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Anspaugh, L.R. & Phelps, P.L. Environmental Assessment Report for Geothermal Energy Systems.

Bauer, H.E. Environmental Impact Report for the Brøadlands, Geothermal Power Development.

Blackwood, J.G. & Carter. A.C. Utilization of Geothermal Energy at the Tasman Pulp and Paper Company Ltd. Mill at Kawerau.

Burgess, J.C., Feldman, C. & Siegel, B., Siegel, S., Siegel, S. & Siegel, B., Canaan, P., Kamins, R., & Siegel, B. Hawaii Energy Resource Overviews Volumes 1-6 (Noise, Hydrology-Geology, Geo-biology, Impact, Socio-Economic, Legal, Summary). U.S. Department of Energy with Lawrence Livermore Laboratory, Contract No. 3415609, Honolulu, 1980

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Leitner, P. An Environmental Overview of Geothermal Development: The Geysers Calistoga KGRA.

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Oregon Institute of Technology. Multi-Purpose Use of Geothermal.

PNOC Energy Development Corporation, Philippine National Power Corporation. Tongonan Geothermal Power Project Leyte, Philippines/New Zealand Development (Environmental Impact Report Main Report:2).

Shinn, J.H. (Editor). Potential Effects of Geothermal Energy Conversion on Imperial Valley Ecosystems.

Snoeberger, D.F. & Hill, J.H. Identification of Environmental Control Technologies for Geothermal Development in the Imperial Valley of California.

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APPENDIX 6

INDIVIDUALS OR GROUPS USING PUNA HUI OHANA RESOURCES

APPENDIX

LIST OF INDIVIDUALS OR GROUPS USING PUNA HUI OHANA RESOURCES

Name	Organization/ Association	Data of Interest
Anspaugh, Lynn	Lawrence Livermore Lab	Hawaiian Community Issues, Maps
Baker, Byron	State Legislator	Community Issues, Ownership
Beemer, Rebecca, Dr.	Thermal Power	List of Community Concerns
Burgess, Rod	Trustee, O.H.A.	Economic Planning
Canaan, Penelope, Dr.	UHH, Visiting Professor Sociology	Social Overview
Carpenter, Dante	State Legislator	Community Issues
Chambers, Marilyn	Puna Speaks	Air/Noise Pollution Data
Chen, William	Professor, UHH	Participant Direct use Applications
Enriques, Simeon, Jr.	Puna Jaycees	Ethanol Production Data
Hess, Dave	Puna Community Council	Geothermal Status, Update
Hirae, Wally Assoc.	Engineer	Needs Assessment, Cold storage Plant
Kajiyama, Pearl	Pres. Young Hawaiians	General Geothermal, Job's Planning
Kalei, William	Information Specialist OHA	General Geothermal Information
Kauhane, Francis	Government Affairs, OHA	Legislative Needs and Attitudes

Name	Organization/ Association	Data of Interest
Kuroda, Joseph	State Legislator	Community Concerns
Levin, Andy	State Legislator	Economic Development, Jobs
Lew, Allan	Student, UHH	Geography, Senior Thesis
Matteson/Rae	Consultants	Social, Non-technical Barriers
Mocencamp, T.	National Conference of State Legislators	Geothermal Legislation Ownership
Moreau, James	Dillingham	Social Barriers
Murphy, Tony	Hui Hanalike	Geothermal Information, Update
Nakano, Rodney	County of Hawaii Planning Department	Community Concerns, Manganese Nodules
Nakashima, Carol	Student, UHM	Social Concerns for Sociology Paper
Nimmons, John	Earl Warren Legal Institute	Ownership
Nishimuta, Gary	Publication "Geothermal Energy", California	HGP-A, Community Reaction
Phelps, Paul	Lawrence Livermore Lab	Community Issues
Severance, Carol	Hawaii Tribune Herald	New Zealand Trip
Siegel, Barbara, Dr.	Professor, UHM	Social Concerns
Smith, Hazel	Claremont, California	Urbanization & Transcultural Behaviours

Name	Organization/ Association	Data of Interest
Solomon, Malama, Dr.	Trustee, OHA	Geothermal & the Hawaiians
Stapleton, Frankie	Hawaii Tribune Herald	Planning Concerns
Stout, Dennis	Pres. Puna Speaks	Geothermal Information
Strong, Susan	Citizen	Maps, Permit Records
Victor, John	Publication "Honolulu"	Community Attitudes
Groups		
Alu Like	Staff Orientation	Geothermal Future & Hawaiians General Geothermal Information
Office of Hawaiian Affairs	Staff Orientation	Geothermal Future & Hawaiians General Geothermal Information
Puna Lions Club Group	Staff Orientation	Geothermal Future & Hawaiians General Geothermal Information
Kalapana Comm. Org.	Staff Orientation	Geothermal Future & Hawaiians General Geothermal Information
Echostel (2)	Staff Orientation	Geothermal Future & Hawaiians General Geothermal Information
Young Farmers	Staff Orientation	Geothermal Impact on Farming
Energy Class/Seminar	CCECS	Geothermal in Puna
Graduate Students	UHM Geography	Geothermal in Puna
Geography Club	UHH	Geothermal in Puna

APPENDIX 7

GLOSSARY OF HAWAIIAN WORDS

GLOSSARY OF HAWAIIAN WORDS

'aha'aina feast, meal gathering, give a feast

'ahi yellow-fin Hawaiian tuna, prized for eating raw

ali'i chief, chiefess, king, queen, noble, royal, kingly, to rule or act as chief, govern, reign

aloha love, affection, compassion, mercy, pity, kindness, charity, greeting, regards, sweetheart, loved one, loving, to love, beloved

aloha 'aina love of the land

hanai foster child, adopted child, to foster or adopt

haole white person, American, Englishman, Caucasian; formerly any foreigner, something foreign, introduced, of foreign origin

ho'okama to adopt a child or adult one loves, but for whom one might not have exclusive care

ho'omaka call to order

ho'oponopono to put to rights, correct, revise, regulate, rectify, reorganize, tidy, make orderly or neat; mental cleansing; the old Hawaiian method of clearing the mind of a sick person by family discussion, examination and prayer

hui club, association, society, corporation, firm, partnership, union, to form an organization, to meet

hukihuki to pull or draw frequently; or by many persons, to disagree, quarrel; not cooperative, headstrong, obstinate

kahuna priest, minister, sorcerer; expert in any profession; to act as priest or expert

kapu taboo, prohibition, special privilege, exemption from ordinary, sacredness, to make sacred, prohibitive, holy

kauwā untouchable, outcast, a caste which lived apart and was drawn on for sacrifice, slave-servant

kokua help

kupuna grandparent, ancestor, relative of the grandparents' generation, grandaunt granduncle

laulima corporation or group of people working together

maha oe bold, impertinent, nervy, forward, presumptuous, brazen

maile native twining shrub with shiny fragrant leaves used for decoration and leis

mahalo thank you

maka'ainana commoner, populace, people in general, citizen, people that attend the land

mana supernatural or divine power, miraculous power, authority, to give power and authority

mele song, chant of any kind, poem; to sing, chant

mo'opuna grandchild, great niece or nephew, relatives two generations later whether blood related or adopted

niele inquisitive, nosy

'ohana family, relative, kin group, extended family

opio youth, juvenile young; to make young

pakalolo Hawaiian slang for marijuana, "stupid crazy smoke"

Pele volcano goddess, lava flow, eruption, volcano

pule prayer, to pray, grace, blessing