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TRUE GEOTHERMAL ENERGY COMPANY

June 3, 1991

CENTRAL PACIFIC PLAZA

JUN 6 11:00

Telephone No.: 808-528-3496
FAX No.: 808-526-1772
220 South King Street
Suite 868
Honolulu, HI 96813

DIV. OF WATER &
LAND DEVELOPMENT

Mr. Manabu Tagomori
Deputy Director
Department of Land and
Natural Resources
Kalanimoku Building, Room 227
1151 Punchbowl Street
Honolulu, Hawaii 96809

**RE: Report on Weed Monitoring Program in Areas Which
have been Developed by True Geothermal Energy Co.
in BLNR Designated Geothermal Development Subzone
Middle East Rift Zone of Kilauea (Wa'O Kele O Puna)
by Charles H. Lamoureux - February, 1991
Legend for Symbols**

Dear Mr. Tagomori:

For your information, the following legend explains the symbols used in the above mentioned report.

"Biogeographic status of each species. The following symbols are used:

- E = endemic = native to the Hawaiian Islands only, not occurring naturally elsewhere.**
- I = indigenous = native to the Hawaiian Islands and also to one or more other geographic areas.**
- P = Polynesian = plants of Polynesian introduction; all those plants brought by the Polynesian immigrants prior to contact with the Western world.**
- X = exotic or introduced = not native to the Hawaiian Islands; brought here by man, accidentally or deliberately after Western contact."**

After your review should you have any questions, please call me.

Very truly yours,

TRUE GEOTHERMAL ENERGY COMPANY

BY 
Arian G. Kawada

✓ cc: Dean Nakano

AGK/reg



ARCHAEOLOGICAL CONSULTANTS of HAWAII

59-624 Pupukea Rd.
Haleiwa, Hawaii 96712
(808) 638-7442

JOSEPH KENNEDY
Archaeologist

Mr. Alan Kawada
True Mid Pacific Geothermal
Central Pacific Plaza Suite 868
220 South King
Honolulu, Hawaii 96813

September 6, 1990

Dear Mr. Kawada:

INTRODUCTION AND PHYSICAL SETTING

At the request of your office, Archaeological Consultants of Hawaii, Inc. has conducted an inventory survey at the site of the proposed Kilauea Middle East Rift Zone (KMERZ), Well Site #2, TMK: 1-2-10:3. This proposed well site is located in the Wao Kele O Puna Natural Area Reserve, Island of Hawaii (see maps #1 and 2).

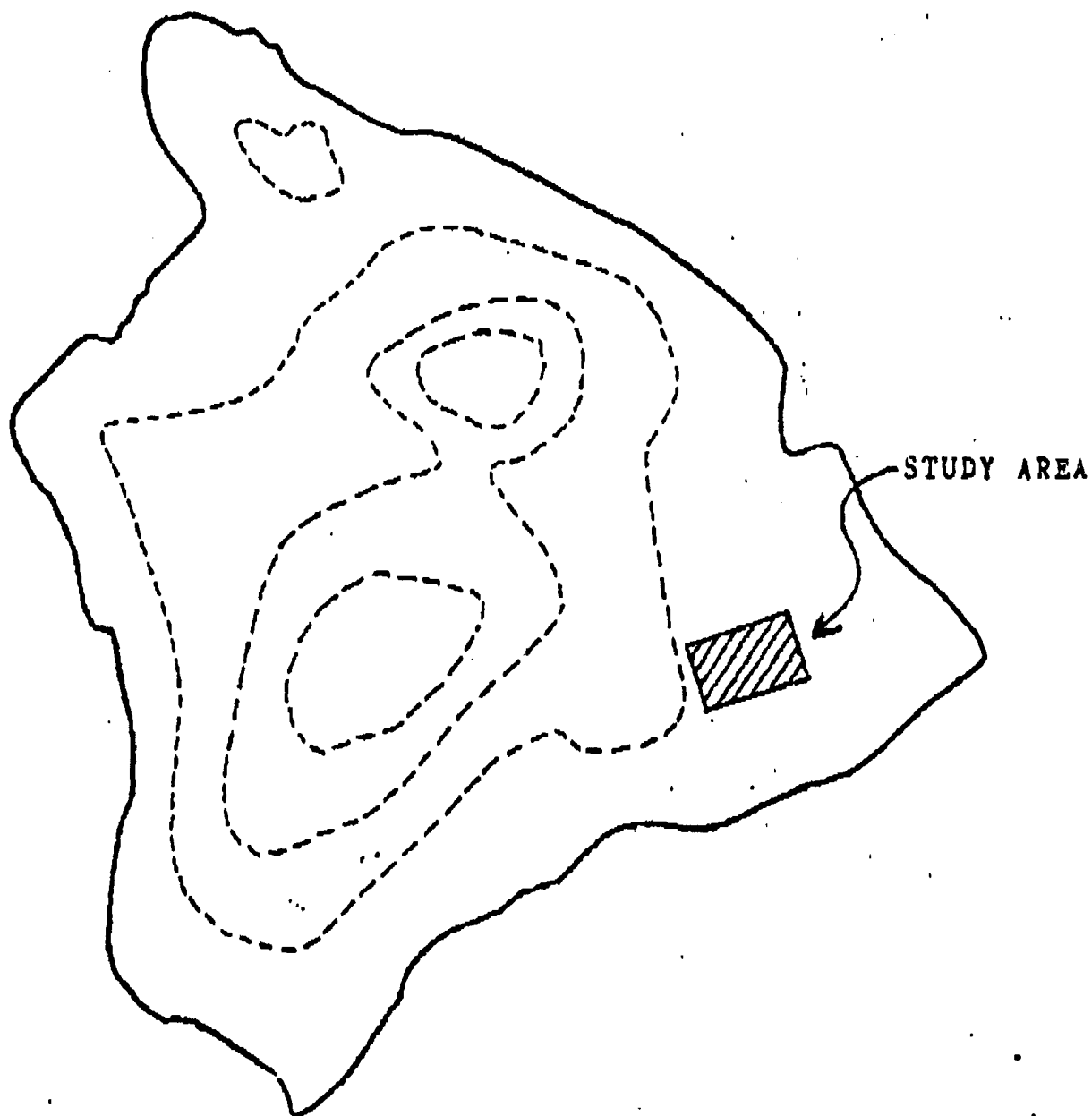
The subject property features an extremely rugged topography and an unusually thick vegetative profile which combine to present some of the most difficult survey areas in the state. A thick mat of stony muck rests on mostly recent a'a and is covered with very dense uluhe, 'ie'ie, hapu'u, guava, ohia and a number of additional plants, vines and grasses. The reader may wish to refer to the numerous and recently completed botanical studies of this area for a more complete listing.

PURPOSE OF WORK

A variety of archaeological sites may be expected in the vast forest lands where True/Mid-Pacific Geothermal Venture will be conducting its geothermal exploration activities. Although the sites' distribution generally will be sparse and although most project activities may well miss the sites, it is important to have adequate plans to identify historic sites, so the sites can be avoided or appropriately mitigated. Special identification problems exist in forest lands, and for this reason an archaeological research design for archaeological survey methods was required under CDUA HA-1830 as part of an archaeological plan.

Archaeological Consultants of Hawaii, Inc.
59-624 Pupukea Rd.
Haleiwa, Hawaii 96712

MAP 1



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PREHISTORIC AND EARLY HISTORIC LAND USE IN THE PROJECT AREA AND ANTICIPATED HISTORIC SITES

Historic and archaeological research in this area as well in other similar environmental zones on Hawaii Island, indicate that prehistorically such areas were used for:

1. Forest product exploitation. Bird feathers, timber, vines, etc. were collected in the forests at or near worksites, and campsites were nearby. These sites should be scattered around much of the project area, in low densities for any one point in prehistory.
2. Burial. These sites are expected to be focused in certain areas.
3. Major inland trails across many ahupua'a and associated campsites. These sites should be focused in linear corridors.
4. Agriculture in the seaward-most reaches. These sites may tend to be fairly dense but they will again be in a small part of the project area, in the seaward portions.

Archaeologically, the sites should have the following characteristics:

1. Forest exploitation sites. Probably there will be no surface stone architecture (huts and shelters likely were simply pole and thatch). Some campsites will be in caves. Each site may be a small scatter of flaked stone, broken tools, food remains (bone, shell), and firepits. If repeated use occurred, then the density of remains would be greater. Such campsites are documented in caves in forest areas. Such cave campsites have yielded a great deal of important information on the age of use of an area, on birds and plants collected, etc. Campsites and exploitation sites have yet to be documented in open-air context, and in such cases, they are expected to primarily be subsurface, buried sites.
2. Burials. Burials in forest areas have been identified in two forms --burials in caves (often caves also used as campsites) and in stone platforms and pavings on cinder cones. These sites contain important information on age of permanent occupation in an area, on social organization, on health, on demography. Additionally, they are highly significant sites culturally for native Hawaiians.

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3. Trails. Trails in forest areas are expected to be extremely difficult to identify, as worn paths and cuts through the forest will have been covered over by later sediments and by forest regrowth. On bare a'a flows, there will be some visible features -- e.g., crushed paths, stepping stones. Campsites along the trails should have firepits, food remains, and some scattered artifacts. Some campsites may have been in caves, but others will have been open-air camps, and may have no surface architecture and be buried like the forest exploitation camps. Trails and their associated campsites can tell us a great deal about the nature of different time periods of travel across regions. Trails also provide information on items being carried or exchanged.
4. Agricultural sites. These sites commonly have some kind of stone-work -- small oval clearings lined with stones, small terrace lines, walls, etc. These sites contain important chronological information on permanent settlement of an area, population expansion, and agricultural expansion.

SITE IDENTIFICATION PROBLEMS

Common archaeological surface survey (labelled reconnaissance survey, intensive survey, etc.) can identify cave sites used for forest exploitation and/or burial, can identify agricultural sites, and can identify trails on bare a'a flows. However, cave sites are only expected in older pahoehoe areas, not on a'a flows and not in recent pahoehoe areas. Platform and paving burial sites are expected to be restricted to cinder cones. Agricultural sites will be at lower, seaward elevations in areas with soil. This means that a'a flows and recent pahoehoe flows are not expected to include sites unless there is a visible trail remnant.

The open-air sites in forest areas -- trail sites (and their associated camps) and forest exploitation sites () not in caves -- will likely be subsurface. They will also be small. Common surface survey will not be able to identify these sites when they are subsurface. These sites are expected in soil areas within kipuka, and on old pahoehoe flows, and on older a'a flows lacking rough surfaces.

These sites may be surface remains on bare lava in kipuka, on old pahoehoe flows and on older a'a flows lacking rough surfaces and in such a case common surface survey could identify them; but it appears unlikely that these sites will be found on the surface.

They are not anticipated on rough a'a flows (except rare trails) or on recent pahoehoe or a'a flows. The above problems indicate two special conditions for site identification;

1. Some areas appear not to need survey. - - e.g., rough a'a flows and recent lava flows (post 1880 flows whether pahoehoe or a'a) these areas need to be identified and be clearly marked off as areas needing no archaeological work.

2. Soil areas may contain subsurface exploitation and trail related sites. Special archaeological approaches need to be devised for these areas to try and identify these sites.

BACKGROUND PREPARATION; FINDINGS

1. Check of historic and archaeological literature. The historic literature (Holmes 1985) shows no recorded trails in the project area. The Wilkes route of 1840 (see map number 3) passes to the south of the project area and the Kaimu Trail, approximately .75km to the south skirts south of Heiheiahulu. The existence of the existing Kaimu Trail lowers the probability of an additional trail passing through the study area but increases the possibility that the area was accessed prehistorically.

Previous archaeological surveys done in the general area include Bonk (1990) Haun and Rosendahl (1985). Bonk did not located cultural materials, Haun and Rosendahl identified possible prehistoric Hawaiian burial structures and remnant cultigens of ki, and kukui. The structures were located on the southeast summit of Heiheiahulu located to the southeast of the project area.

2. Identification of older bare pahoehoe flows, soil covered pahoehoe and a'a flows, kipuka and cinder cones and the project area. Holmes' (1985) map of lava flows (see map #4) indicates that the project area is at the north extreme of an 1800's flow with a 750 to 1,000 BP flow north of the site. A recent 1961 flow occurred approximately 1 km to the west of the site. There is just one cinder cone in the vicinity which is located well outside the project area to the north.

3. Identification of cultigens. No aerial photographs were made available to us and hence we cannot offer any aerial interpretations of vegetation areas. However, we did not observe any cultivated plants such as banana, ti, or kukui in the research area.

ARCHAEOLOGICAL SURFACE SURVEY: FINDINGS

1. Caves. The pahoehoe portions of the subject property featured numerous inflated dome type caves - in every case, these were found to be very shallow and devoid of any cultural indications. The property also features a number of cracks. The smallest being one foot wide, three feet long and two feet deep. The largest is roughly 100 feet long, twenty feet wide with depths ranging between 25 and 40 feet. There is a cave entrance at the bottom of the largest crack, however, the area is very unstable, with loose, rotting, rock and debris making even a rappelling exercise treacherous to the point of foolishness. There were no cinder cones within the project area.

2. Kipuka Pahoehoe. There are no kipuka included within the boundaries of the subject property.

3. Trails. The Kaimu trail and the Wilkes expedition trail passed east-west approximately 3/4 to 1km to the south of the project area. The proximity of the Hawaiian trail suggests that an additional trail paralleling this one would be unlikely. However, the proximity may have increased the likelihood of prehistoric access to the project area.

4. Reconnaissance Survey: Methodology. A walkthrough reconnaissance survey was completed for the proposed well site #2. Survey control was provided by Island Survey, Hilo, Hawaii. Control points to which mapping data might be directly referenced were in place along the approximately 3,022 feet of proposed roadway, as well as at the four corners of the proposed well site. A survey team consisting of two individuals made a series of controlled mauka/makai sweeps across the subject property and added a 200 buffer along the south, east and west borders (the northern border is the existing roadway).

FINDINGS

No cultural indicators were located within the boundaries or surveyed buffer zone around the proposed Well Site #2. Survey crew encountered a forest of relatively young Hapu'u, Ohia, Waiwi, on both pahoehoe and a'a flows. Ground visibility was limited by thick fern and root accumulations as well as the remaining uncleared vegetation. Visible ground areas occurred at outcrops of a'a and areas of poorly drained black humus kept free of vegetation by frequent disturbances of feral pigs. Within the well site and buffer zone, direct visual contact with the ground surface or any existing archaeological site features might have been possible only with extensive disturbances of the overlying vegetative and humic layer. Denudation of this sort is not a viable option during the initial stage of research. The sweep method where team members methodically walk in formation from one side of the study area to another, was utilized for all areas where visual contact could be maintained with at least some of the ground surface. The remaining 90% of the study area was completely covered with a thick, matted layer of uluhe roots (staghorn fern), and humus material up to three feet thick, overlain by .5 to 2 meters of active ulele growth. In this area a series of transects were pushed through the cover in an attempt to identify any evidence of human modification of the landscape. Transects extended in a northsouth direction and an eastwest direction.

FINDINGS

No cultural indicators were located within the well site impact area. There were no sightings of any cultigens such as ki, banana, kukui, within the well site area.

DISCUSSION AND RECOMMENDATIONS

The prediction and identification of temporary forest shelter sites used hundreds of years ago by small groups such as bird feather collectors will be extremely difficult. The illusive temporary camp sites in this upland forest area can be expected to be either buried, random, or so lacking in diagnostic materials that archaeological identification and data recovery may be impossible or impractical unless camp sites used seasonally over many years are encountered. Hypothetically, two types of campsites may be possible in this area, a short term, one-time-used camp site or campsites which were set up along established travel routes and used year after year.

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Because no campsites have been identified to date in upland forests, our predictive model continues to be based on a shallow data base.

Archaeological monitoring of soil covered areas after initial grading and grubbing. As a special effort to try and identify subsurface remains of trail and forest exploitation campsites and forest exploitation working areas, this monitoring shall occur. It shall only be done in soil areas. The cuts made during grubbing and grading will be inspected to see if these sites can be identified.

The highest likelihood for locating and identifying campsites in the project area will be during the monitoring of vegetation clearing and earth moving. The presence of features such as developed stratigraphic layers, perishable midden accumulations (charcoal and lithic debris) and foundation outlines, should they exist within the project area, will best be tested during this next phase. In this case, standard excavation methods will be applied.

If there are any questions regarding this report, please feel free to contact us.

Aloha,


Joseph Kennedy
Consulting Archaeologist

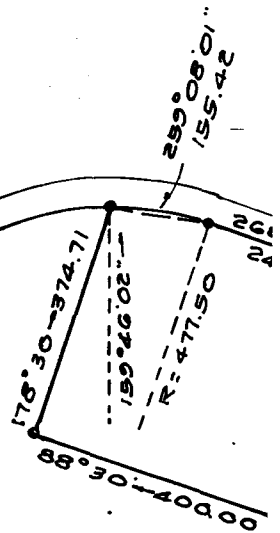
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EXISTING
WELL SITE
NO. 1

WATER
CATCHMENT

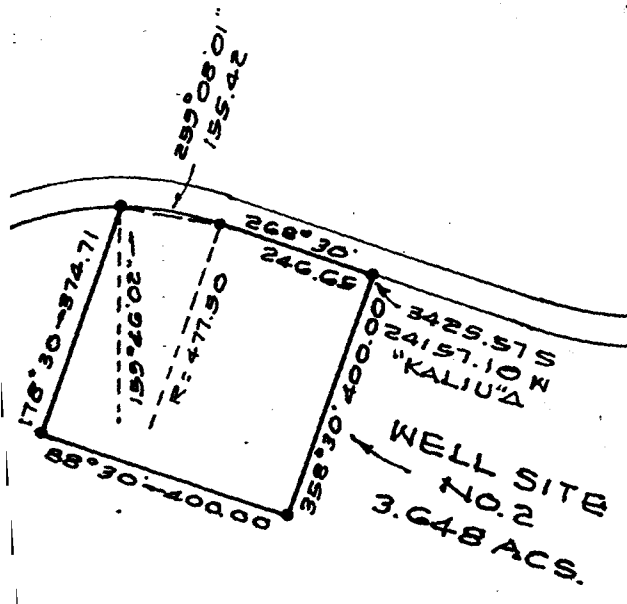
ROADWAY



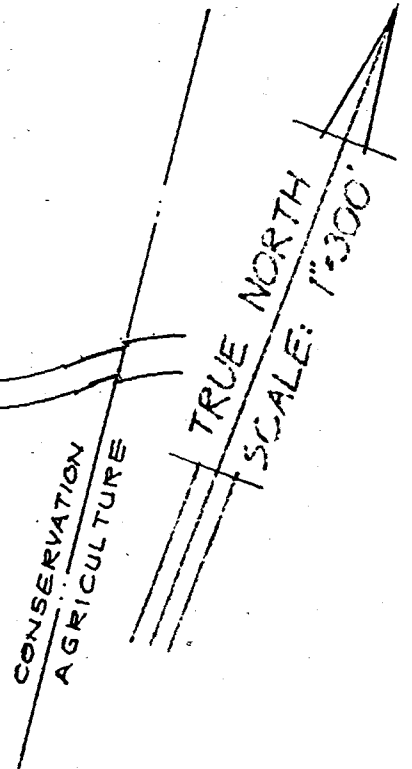
SURVEY AND PLAN BY ISLAND SURVEY, INC.
P.O. BOX 337, HILS, HAWAII

AUGUST 29, 1990

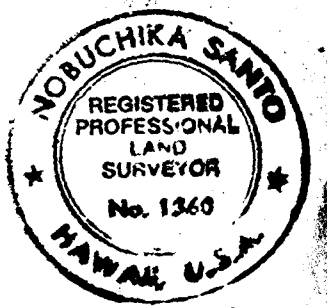
PLAN SHOWING
WELL SITE 2
BEING PORTIONS OF PARC
PORTION OF GRANT 15,666 TO TRUSTEES UNDE
OF JAMES CAMPBELL, DEC:
MAKUU, KAOHE, KAIMU, KEHENA, KAAPA
PUNA, ISLAND OF HAWAII.



ROADWAY



SHOWING
 SITE 2
 OF PARCEL B
 AS UNDER THE WILL OF THE ESTATE
 OF THE DECEASED
 KAAPAHU AND KAMAILI
 MAUI, HAWAII



Nobuchika Santo