

PROPOSAL  
for  
Designating  
the Kilauea Middle East Rift Zone (Puna Forest Reserve)  
and the Kilauea Southwest Rift Zone (Pahala)  
as Geothermal Resource Subzones  
by the  
Board of Land and Natural Resources



State of Hawaii  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
Division of Water and Land Development



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Division of Water and Land Development

Honolulu, Hawaii  
August 1985



GEORGE R. ARIYOSHI  
Governor

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## PREFACE

Pursuant to the Decision and Order on the proposed geothermal resource subzone at Kahaualea, Hawaii, rendered by the Board of Land and Natural Resources on December 28, 1984, the Department of Land and Natural Resources conducted an assessment of the Kilauea middle east rift zone for possible designation as a geothermal resource subzone.

In addition, the Department of Land and Natural Resources under the authority of Act 296, SLH 1983, and Act 151, SLH 1984, conducted a similar assessment of the Kilauea southwest rift zone.

This proposal for designating geothermal resource subzones by the Board of Land and Natural Resources summarizes the results of these assessments based on currently available public information and the criteria set forth in Act 296, SLH 1983.

The assessment was conducted by the staff of the Division of Water and Land Development with the participation of an interagency technical committee; federal, state, and county agencies; private industry; and the general public.

This proposal is published for review by the public and to receive comments at the public hearings scheduled at the following date, places, and time:

September 26, 1985    --Pahoa Neighborhood Center  
Pahoa, Hawaii - 1:30 pm

                          --Kau High & Pahala Elem. School Cafeteria  
Pahala, Hawaii - 6:30 pm

## ACKNOWLEDGMENTS

The following organizations are acknowledged for their contribution toward this proposal:

American Lung Association  
Hawaii County Department of Planning  
True Geothermal Energy Company, Inc.  
Mid-Pacific Geothermal, Inc.  
Hawaiian Electric Company, Inc.  
Department of Health  
Department of Planning & Economic Development  
Hawaii Institute of Geophysics  
University of Hawaii  
Hawaiian Volcano Observatory, USGS  
U.S. Department of Energy  
U.S. Fish and Wildlife Service  
Planning Office, DLNR  
Division of Land Management, DLNR  
Division of State Parks, DLNR  
Division of Forestry and Wildlife, DLNR

The following community organizations are also acknowledged for their participation and contributions provided at public hearings held on the proposed geothermal resource subzones:

Volcano Community Association  
Fern Forest Community Association  
Kapoho Beach Community  
Kalapana Community Organization  
Hawaiian Beaches Puna Council  
Puna Community Council  
Puna Speaks Organization  
Puna Hui Ohana  
Puna Geothermal Committee  
Sierra Club  
Hawaiian Audubon Society  
Kau Sugar Company  
Ka Ohana O Ka'La'e  
Hawaiian Civic Club of Kau  
Office of Hawaiian Affairs

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## PUBLIC INFORMATION MEETINGS

During the course of these assessments, several public information and participation meetings were held by the Department of Land and Natural Resources. The dates and places of these meetings are listed below:

- March 13, 1985 - Keeau, Hawaii
- March 14, 1985 - Pahala, Hawaii
- May 15, 1985 - Pahoa, Hawaii
- May 16, 1985 - Pahala, Hawaii

In addition, on July 29, 1985, the Department of Land and Natural Resources mailed letters to concerned parties requesting written comments and information on the proposed geothermal resource subzones.

The Board acknowledges all the persons who participated in the public information and participation meetings and who contributed information by way of correspondence.



## INTRODUCTION

Act 296, SLH 1983, relating to geothermal energy was signed into law on June 14, 1983 by Governor George R. Ariyoshi. The legislature found that the development and exploration of Hawaii's geothermal resources is of statewide concern, and that this interest must be balanced with interests in preserving Hawaii's unique social and natural environment.

The purpose of this Act is to provide a land use designation that will assist in the location of geothermal resources development in areas which demonstrate an acceptable balance between the factors set forth in Act 296. Act 296 specifically states that an environmental impact statement shall not be required and that the method for assessing these factors shall be at the discretion of the Board and may be based on currently available public information.

The Board of Land and Natural Resources is charged with the responsibility of designating geothermal resource subzones in the State. Once the subzones are established, all geothermal development activities may be conducted only in these designated subzones. Since the designation of a geothermal resource subzone is a land use designation, subzoning itself does not automatically permit any geothermal development or convey any right beyond application for subsequent required permits.

## LEGAL AUTHORITY

Act 296, SLH 1983, relating to geothermal energy, provides the legal basis for this assessment. The Act requires the Board of Land and Natural Resources to designate geothermal resource subzones. Section 3 of the Act requires the Board to "adopt, amend, or repeal rules related to its authority to designate and regulate the use of geothermal resource subzones in the manner provided under Chapter 91." This mandate is provided for under Title 13, Chapter 184,

"Designation and Regulation of Geothermal Resource Subzones" of the Department of Land and Natural Resources' Rules and Regulations. Act 151, SLH 1984, clarified various aspects of existing geothermal development activities within the State and the roles of State and County governments.

### CONCLUSIONS AND RECOMMENDATIONS

Based upon currently available information on geothermal resources, twenty separate areas in the State of Hawaii were identified as having potential geothermal resources. Of these, five sites on the island of Hawaii and two on the island of Maui were determined to have sufficient probability of locating high temperature geothermal resources with the potential of producing electrical energy. High temperature is defined to be greater than 125 degree celsius or 257 degree fahrenheit at depths less than 3 kilometers or 9,840 feet.

These areas were subjected to impact analysis by examining factors on geologic hazards, social and environmental impacts, compatibility with present uses of surrounding land, potential economic benefits, and compatibility with conservation areas.

Of the seven sites identified, the Board of Land and Natural Resources approved the designation of the Haleakala Southwest Rift, Island of Maui, and the Kilauea Lower East Rift, Island of Hawaii, as geothermal resource subzones.

On December 28, 1984, the Board of Land and Natural Resources rendered a Decision and Order (D/O) on the proposed geothermal resource subzone at Kahaualea, Hawaii. The D/O directed the Department of Land and Natural Resources to evaluate the Kilauea middle east rift zone as a potential geothermal resource subzone. The Department also evaluated the Kilauea southwest rift zone under the authority of Act 296, SLH 1983, and Act 151, SLH 1984.

It was concluded that these two areas warrant consideration for designation as geothermal resource subzones by the Board of Land and Natural Resources.

## Kilauea Middle East Rift (Puna Forest Reserve), Island of Hawaii

The Department of Land and Natural Resources pursuant to the Decision and Order conducted an assessment of the Kilauea middle east rift zone in and adjacent to the Puna Forest and Wao Kele 'O Puna Natural Area Reserve.

This land area located between the western boundary of the Kamaili geothermal resource subzone and the eastern boundary of Kahaualea was examined for resource potential and evaluations were made on geological hazards, social, economic, and environmental impacts and compatibility of geothermal development. The potential geothermal resource area was evaluated on the basis of potential and real impacts which may occur within the identified area and consideration of statutory state energy objectives and policies.

The potential geothermal resource area was assessed to have a greater than 90% probability of locating a high temperature resource. Potential impacts were identified and considerations given to mitigation measures and other requirements that may be imposed on a site-specific, case-by-case basis during subsequent State and County permitting.

Geologic hazards are present throughout the entire Kilauea east rift zone. Decentralization of facilities, strategic siting, and lava diversion platforms and barriers may mitigate damage from future lava flows. Development permits should require that all potential economic losses are to be assumed by developers.

The State Department of Health has proposed air quality standards and promulgated underground injection control regulations which will control geothermal emissions and effluent injections. Development permits should either prohibit or control surface water disposals. Geothermal noise levels have been regulated in exploration permits and such noise regulation is expected to continue throughout the development process.

Assuming the exchange of State and Campbell Estate lands is feasible and that Kahaualea is redesignated as a Natural Area Reserve, the proposed Kilauea middle east rift GRS will provide a 2000-foot

buffer between the GRS and Kahaualea to mitigate any possible effects on the substantial prime native forest and wildlife at Kahaualea. Those scattered areas of prime native forest which are contained within the proposed GRS can be protected throughout the permitting process by requiring that development activities avoid these sensitive areas and that developers utilize directional drilling of potential underground reservoirs.

The State has established an objective of energy self-sufficiency and geothermal energy is viewed as a key to attaining this objective. Protection of the environment is also an area of high priority. The Division of Water and Land Development believes that both goals of geothermal development and environmental protection can be attained by permitting controlled development within the proposed Kilauea middle east rift GRS. This assessment has resulted in the identification of approximately 11,745 acres of the Kilauea middle east rift zone as a potential geothermal resource area and recommends that it be considered for designation as a geothermal resource subzone by the Board of Land and Natural Resources under authority of Act 296, SLH 1983 and Act 151, SLH 1984.

#### Kilauea Southwest Rift (Pahala), Island of Hawaii

The Department of Land and Natural Resources under the authority of Act 296, SLH 1983, and Act 151, SLH 1984, conducted an assessment of the Kilauea southwest rift zone, island of Hawaii

This land area located between the western boundary of the Hawaii Volcanoes National Park and Highway 11 was examined for resource potential and evaluations were made on geologic hazards, social, economic, and environmental impacts and compatibility of geothermal development. The potential geothermal resource area was evaluated on the basis of potential and real impacts which may occur within the identified area and considered the statutory state energy objectives and policies.

The potential geothermal resource area was assessed to have a 25% to 90% probability of locating a high temperature resource.

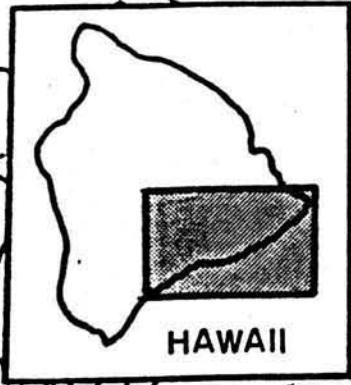
Potential impacts were identified and considerations given to mitigation measures and other requirements that may be imposed on a site-specific, case-by-case basis during subsequent State and County permitting.

Geologic hazards are evident throughout the entire Kilauea southwest rift zone. Decentralization of facilities, strategic siting, and lava diversion platforms and barriers may mitigate damage from lava flows. Development permits should require that all potential economic losses are to be assumed by developers.

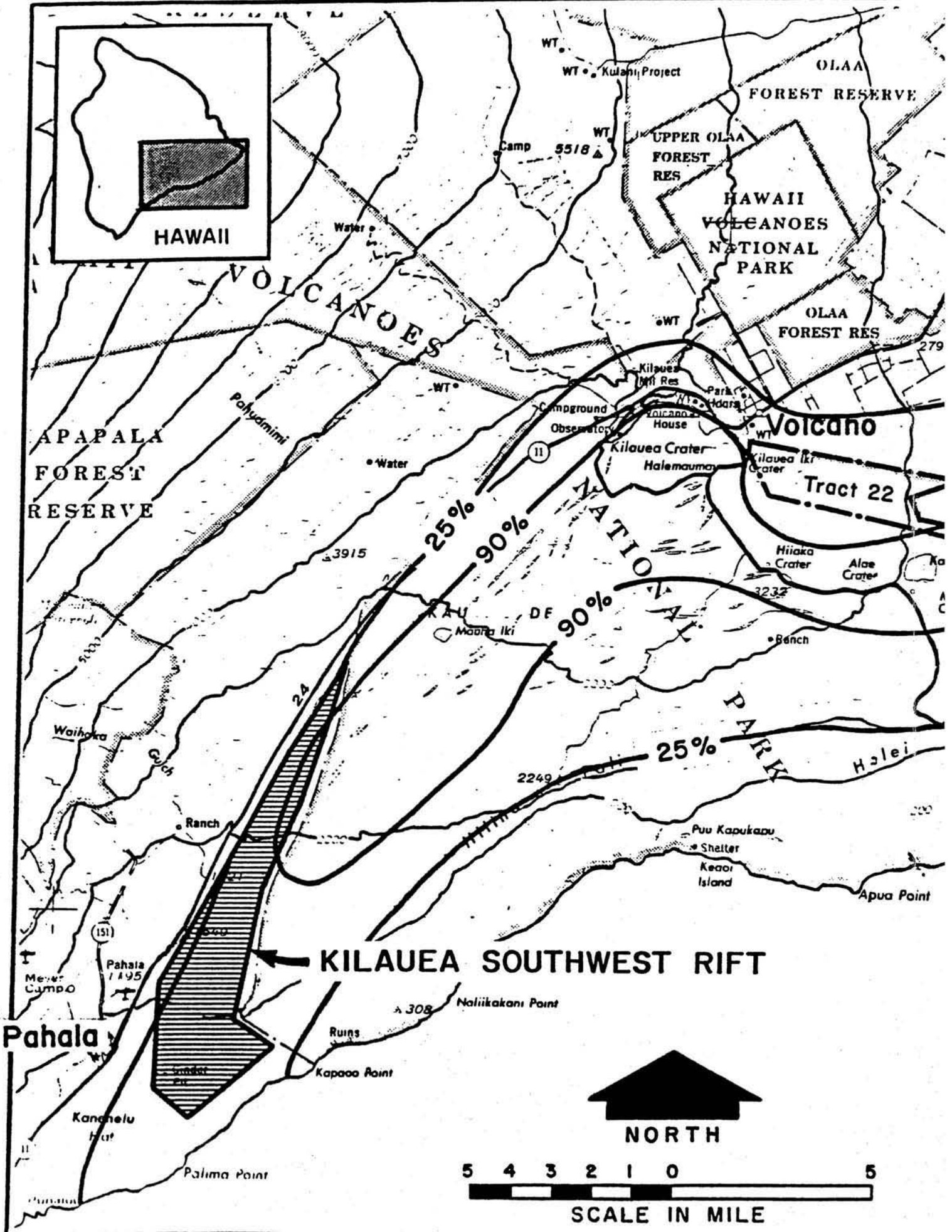
The State Department of Health has proposed air quality standards and promulgated underground injection control regulations which will control geothermal emissions and effluent injections. Development permits should either prohibit or control surface water disposals. Geothermal noise levels have been regulated in exploration permits and such noise regulation is expected to continue throughout the development process.

The proposed Kilauea southwest rift GRS will provide a 1000-foot buffer between the GRS and the Hawaii Volcanoes National Park to mitigate any possible effects on the existing flora and fauna in the National Park. Scenic view corridors along Highway 11 should be protected throughout the permitting process by requiring tasteful development, design, landscaping, and painting of structures.

The State has established an objective of energy self-sufficiency and geothermal energy is viewed as a key to attaining this goal. Protection of the environment is also an area of high priority. The Division of Water and Land Development believes that both goals of geothermal development and environmental protection can be attained by permitting controlled development within the proposed Kilauea southwest GRS. This assessment has resulted in the identification of approximately 8,090 acres of the Kilauea southwest rift zone as a potential geothermal resource area and recommends that the proposed Kilauea southwest rift GRS be considered for designation by the Board of Land and Natural Resources under authority of Act 296, SLH 1983, and Act 151, SLH 1984.



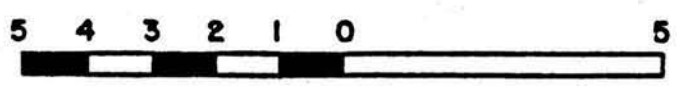
HAWAII



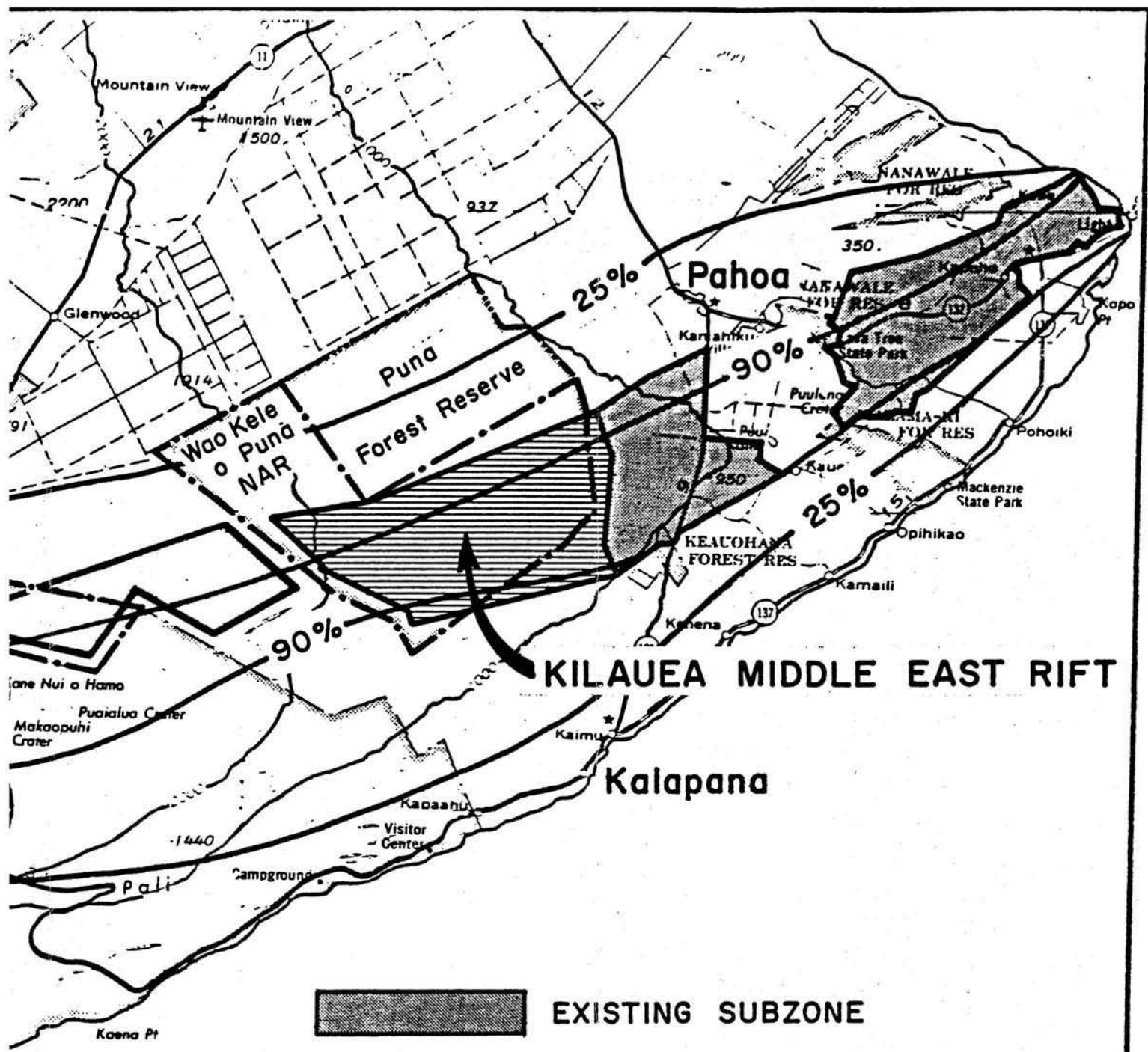
KILAUEA SOUTHWEST RIFT



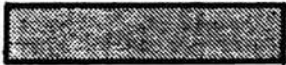


NORTH



SCALE IN MILE



**KILAUEA MIDDLE EAST RIFT**

-  EXISTING SUBZONE
-  PROPOSED SUBZONE
-  90% PERCENT PROBABILITY OF GEOTHERMAL POTENTIAL

**POTENTIAL**  
**GEOTHERMAL RESOURCE AREA**  
 Island of Hawaii