410
2/19/80

DR-778

MASTER

SAN-2121-6

**THE LEGAL AND INSTITUTIONAL PROBLEMS
FACING GEOTHERMAL DEVELOPMENT IN
HAWAII**

October 1, 1978

Work Performed Under Contract No. ET-78-C-03-2121

JM Energy Consultants, Inc.
Los Angeles, California

**U. S. DEPARTMENT OF ENERGY
Geothermal Energy**

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

This report has been reproduced directly from the best available copy.

Available from the National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161.

Price: Paper Copy \$4.50
Microfiche \$3.00

**THE LEGAL AND INSTITUTIONAL PROBLEMS
FACING GEOTHERMAL DEVELOPMENT IN HAWAII**

October 1, 1978

DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**A Report To The Pacific Region Team,
Division of Geothermal Energy, U.S.D.O.E.**

Pursuant To Contract No. ET-78-C-03-2121

Jack McNamara, President

**JM Energy Consultants, Inc.
Los Angeles, California**

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

EP

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

1	INTRODUCTION: THE ROCKY ROAD FROM DEMONSTRATION TO DEVELOPMENT
6	SECTION ONE: THE OWNERSHIP OF THE RESOURCE
14	SECTION TWO: THE WRATH OF PELE AND THE CLAIMS OF THE NATIVE HAWAIIAN PEOPLE
20	SECTION THREE: THE REGULATORY CLIMATE- "SELECTIVE GROWTH" AND FUTURE GEOTHERMAL DEVELOPMENT IN HAWAII
27	SECTION FOUR: THE ECONOMICS OF FUTURE INDUSTRIAL USE OF GEOTHERMAL RESOURCES IN HAWAII

**INTRODUCTION: THE ROCKY ROAD FROM
DEMONSTRATION TO DEVELOPMENT**

Of the five states currently making up the Division of Geothermal Energy's Pacific Region, Hawaii presents the greatest disparity between indigenous energy resource potential and prospective market development. The State is literally surrounded by energy — energy from abundant rainfall, spectacular sunlight, powerful ocean waves, fearfully high winds and, of course, from the heat of the earth itself. Nonetheless, Hawaii is dependent upon imported fuel oil for over 90% of its energy needs. To make matters worse, that dependence is magnified by the state's economic reliance upon energy-intensive industries. Moreso than many other states, Hawaii has a high degree of vulnerability to supply disruption.

It was the realization of this dilemma which finally led the Hawaiian State Legislature to set up the Hawaii Natural Energy Institute (HNEI) in 1974 to "further the research and development of alternate sources of energy."^{1/}

The University of Hawaii, home of the HNEI, had been active in both ocean thermal and geothermal investigations for several years prior to the legislative action. It formed the Hawaii Geothermal Project (HGP) in 1972, with both state and federal funding. With additional funds from the National Science Foundation, the State and Hawaii County, they began assessing Hawaii's geothermal potential with even more diligence. In 1975, the HGP's "Site Selection Committee" finally chose a drilling site on Big Island (Hawaii), in the Puna District near the eastern rift of Kilauea Volcano.

Drilling began on "HGP-A" late in 1975. Seven months later, the HGP had located the hottest geothermal resource in the world (676 C/358 C at bottom-hole) on their first try.

In addition to drawing the envy of numerous exploration managers in the private sector,^{2/} the Puna discovery put Hawaii in the "Big League" of geothermal states. After encouraging well tests for reservoir evaluation, the HGP immediately formed a consortium to develop this discovery — the "Hawaii Geothermal Project-A Development Group". The "Group" consists of the State (represented by its Department of Planning and Economic Development), the University (represented by the HGP), and Hawaii County (represented by the Mayor's office). Hawaiian Electric Company and Hawaii Electric Light Company, though not officially members of the consortium, are also active participants. The "Group" has recently signed an agreement with D.O.E. to build a 3½ Mw wellhead generator on the HGP-A site. This unit should be operative by 1980. Plans for further exploratory drilling at several other sites throughout the Islands have also been announced.

Underneath all of this rather startling success, however, there are several rather serious problems confronting future geothermal development in Hawaii. They include a seemingly insoluble mismatch of resource and market; the burgeoning land claims of the Native Hawaiian community; a potential

legal challenge to the State's claim to hegemony over all of Hawaii's geothermal resources, regardless of surface ownership; resistance to any sudden, large scale influx of Mainland industry, with its attendant "boom town" effects; and questionable economics for the largest potential industrial users.

The sections that follow will attempt to analyze these barriers and provide guidance to the Pacific Region Team and the various Hawaiian entities in dealing with them.

Footnotes

1/

Hawaii Natural Energy Institute Annual Report, (1977),
at P. v.

2/

See, e.g., the comments of AMAX's Bill Dolan in his remarks
on "Practical Utilization", in Proceedings-Geothermal Seminar
(Oct. 18-19, 1977, Hilo, HA), at pp. 9-16.

SECTION ONE: THE OWNERSHIP OF THE RESOURCE

Hawaii has one of the more unique land ownership regimes in the United States. There are two basic features of this system which must be borne in mind.

First of all, virtually all of the privately-owned land in the state was devised by the former Royal Kingdom of King Kamehameha or its sovereign successors — the Provisional Government, Republic, Territory and finally, the State of Hawaii. Whether by decree, statute or actual wording of the land patents themselves, these lands were transferred by instruments which included a "mineral reservation" in favor of the grantor. It is as if half of the land in California were Stock Raising Homestead lands,^{1/} and the federal government could assert a "reserved" claim to the geothermal resources in that vast area.

The second noteworthy aspect of the Hawaiian land picture is the high concentration of land ownership within the private sector itself. The State's Department of Planning and Economic Development reported as recently as 1973^{2/} that "major private landowners" (defined as owners of 1,000 or more acres) controlled 1,917,560 of the State's 4,128,263 acres, roughly 46% of the total land area.^{3/} "Other" private owners (those with less than 1,000 acres) held only 270,219 acres, or less than 7%. The federal government held roughly 10%, and the remaining lands — 1,584,715 acres or 38% — were owned by the State itself.^{4/}

In 1974, the Hawaii Legislature amended the statutory definition of "minerals" to include "geothermal resources"^{5/}. Clearly any state lands sold to private owners after that enactment will reserve to the State, rather than grant to the patentee, the rights to any geothermal resources contained therein. But what of the nearly two million acres previously transferred into private hands by the State or its predecessors? Are the geothermal resources underlying that vast expanse the property of the State? or the surface owners? It is precisely this type of unresolved legal situation which could seriously discourage private resource firms from investing heavily in Hawaiian land plays.

An analysis of relevant decisions by the Hawaiian Supreme Court leads to the conclusion that the "reserved" claim of the State would probably be upheld.

In the case of In re Title of Robinson,^{6/} the Hawaii Supreme Court held that the failure of the state's Land Commission to include a specific mineral reservation clause in an individual patent did not negate the State's claim, partly because the law at the time required its inclusion. Current law has a similar requirement.^{7/}

Later cases have also held for "public trust" ownership in a variety of natural resource and factual circumstances. McBryde Sugar Company v. Robinson^{8/} held that "the right to water was specifically and definitely reserved for the people

of Hawaii for their common good in all of the land grants and the King ought not, and . . . cannot surrender [it]."^{9/}

County of Hawaii v. Sotomura^{10/} interpreted state policy as favoring public ownership of the state's shoreline.

State of Hawaii v. Molly Zimring, et. al.^{11/} held that lava extensions vest in the people of Hawaii to be held in public trust.

From a programmatic and policy standpoint, of course, the eventual outcome of this purely legal struggle is irrelevant to both the developer segment of the geothermal industry and the Pacific Region Team. Their only concern is that there be certainty in the "ownership" schema. A litigated solution is hardly optimal, given the protracted time delays associated with the legal process. It took a full seven years for the federal courts to resolve an identical point that impacted only a few scattered parcels at The Geysers.^{12/} Given the concentrated land ownership pattern in the State, and the concomitant power of the largest landholders, a similar, perhaps more powerful challenge will likely be mounted in Hawaii. Even if, and when, the state courts have dealt with the question, there is always the possibility that the powerful private land interests will further pursue their claims in federal court.

Given the clout of the big, land holding estates in particular, one should not even rule out mid-stream action by

the Legislature, in response to various judicial rulings. In this light, the history of Hawaiian Legislative responses to this problem are instructive.

The State's "mining lease" regime has, since 1963, allowed the surface owner to have first crack at leasing the state's reserved mineral rights.^{13/} Only if they or their assignee fail to apply within six months are other parties^{14/} allowed to apply.

In addition, all lessees must post a bond to compensate the "occupier" for "the full extent of the damages caused"^{15/} The statute specifically invites occupiers to request surface rentals from the state's mineral lessees as well.^{16/} To further protect occupier interests, an arbitration procedure is set up in the event the mineral lessee and the occupier can not agree on said rentals or the estimated amount of damages to be covered.^{17/}

To date, Hawaii's experience with mineral extraction processes is scant indeed. The statutory scheme in question was enacted with an eye towards the lucrative bauxite mining industry, which failed to materialize. If "problems" should arise during the initial period of geothermal development, there will no doubt be cries for further protection of the surface owners, as well as a spate of lawsuits. The fury that engulfed Congress in the early 70's due to extensive strip-mining of coal on mineral-reserved lands in Montana and

Wyoming is a precedent on this score. Eventually, Congress required the consent of surface owners to any mining.^{18/} Such a solution should be considered by Hawaii.

The National Conference of State Legislatures (NCSL) has targeted Hawaii as a prime focus of its efforts on behalf of DGE. The Pacific Region Team must coordinate with NCSL and Hawaii officials to resolve this problem.

Footnotes

1/

Said lands being subject to a "mineral" reservation to the grantor, the Federal Government, and the cause of the nearly seven year long U.S. v. Union Oil litigation.

2/

Statistical Report No. 98, "Land Use and Ownership Trends In Hawaii" (Dec. 1973). The data was based on 1968 figures.

3/

At p. 25, Table 11. Figures reprinted in Preliminary Report on Legal and Public Policy Setting For Geothermal Resource Development In Hawaii, G. Sheets, D. Kornreich & R. Kamins, (HGP, Feb. 1974) at p. 24.

4/

id.

5/

Act 241, Session Laws of Hawaii, 1974, H.B. No. 2197-74, amending H.R.S. §182-1.

6/

49 Haw. 429 (1966).

7/

H.R.S. §182-2 claims all "minerals . . . in, on or under state lands" (L. 1963, c. 11, pt. of §1, Supp. §99-A-2).

8/

54 Haw. 174 (1963).

9/

Johnson Wong, Atty. Gen., in "Ownership of Resources", in Proceedings, op. cit., at pp. 77-78.

10/

55 Haw. 176, 182 (1973).

11/

Supreme Court No. 5522 (June 22, 1977).

12/

The above-noted Stock Raising Homestead Act lands. See U.S. v. Union Oil, 369 F. Supp. 1289 (N.D. CAL. 1972); U.S. v. Union Oil, 549 F. 2d 1271 (9th Cir. 1977); reh. den. sub. nom. Ottoboni v. United States, 98 S. Ct. 121 (1977).

13/ H.R.S. §182-5 (L. 1963, c. 11, pt. of §1; Supp. §99A-5).

14/ H.R.S. §182-4 (L. 1963, c. 11, pt. of §1; Supp. §99-A-4).

15/ H.R.S. §182-3 (L. 1963, c. 11, pt. of §1; Supp. §99-A-3).

16/ id.

17/ id.

18/ Surface Mining Control and Reclamation Act of 1977,
P.L. 95-87 (H.R. 2) (Aug. 3, 1977).

**SECTION TWO: THE WRATH OF PELE AND THE CLAIMS
OF THE NATIVE HAWAIIAN PEOPLE**

Related to and complicating the mineral ownership question is the explosive issue of Native Hawaiian rights. At the recent Geothermal Resources Council Annual Meeting in Hilo, attendees were handed a mimeographed sheet which read as follows:

Be it known to all of you:

- 1) The Nation of Hawaiian people will not tolerate the rape of our lands or waters.
- 2) The Island of Hawaii is ready for an onslaught of all kinds of powers, (such as yourselves - the Geothermal Resource Council). You are preparing to delve into the Aina to procure this fantastic monster which we know of as "Energy."
- 3) Hawaiians demand Royalties for any minerals taken from their midst - for the Nation of Hawaiian people. We want a full report of goals before you start your projects. At the end of each project we request a report of your accomplishments. We would also like a fiscal report of each project.
- 4) Pele's Domain is sacred land. We demand that any tampering with her properties be considered by our Kupunas who have the knowledge of her sacred presence.
- 5) We ask for Respect for our people, our land and our culture.

- 6) Regarding the harvesting of Manganese Nodules:
Any ships coming into our harbors (Hilo Harbor or Kawaihae Harbor, both located on Hawaiian Home Lands — for which Hawaiians are not being compensated) will be coming in on their own risk.
- 7) Persons, organizations or companies coming to Hawaii for the purpose of procuring minerals will have to be on their guard because our Hawaiian people will not tolerate a continuance of ripoffs of our lands and waters, which means a denigration of our people and our culture.
- 8) The Aloha spirit has been tried to its last, and a new generation of young Hawaiians who have experienced Vietnam and lived through Hiroshima and Korea are very conscious of the rights of our people and the need to defend those rights. Many are ready to die defending those rights, just as they were when they went to Vietnam in defense of America.

- Be Ye So Warned -

DOE representatives at the gathering were questioned closely as to their future "plans" for the Puna discovery and other geothermal resources in the Islands. The tone was one of hostility and confrontation. Though the DOE people acquitted themselves well, it is clear that the issue will not go away.

While the individuals who rose from various audiences to complain about the Hawaii Geothermal Project's alleged failure to include the "Native" community in its activities probably "represent" only a few people, conversations with various Hawaiian officials point to a widespread belief that they do represent the tip of an emotional iceberg. Pele is the Native Goddess of Volcanoes, who, legend has it, has lived in the mists near the crest of Kilauea since prehistoric times. When a road built across that volcano's Eastern Rift was repeatedly disrupted by eruptions, some locals said "Pele doesn't want the road there".^{1/} The HGP Puna site rests beneath Pele's gaze as well.

If further proof be needed, one should take note of "Senate Joint Resolution 4, which would grant to Native Hawaiians a one-time, lump sum reparation or settlement payment" for the lands, etc..^{2/}

Though it wasn't passed, its mere existence speaks volumes. DGE must not ignore these signals. There is precedent for such an approach in the Alaskan Native Claims Settlement Act.^{3/} The Natives of Alaska were given the opportunity to select several million acres of that vast expanse as their own.

The Pacific Region Team has made a sincere effort to understand these demands and incorporate them into overall

regional development. It has funded the United Indian Planners Association (UIPA) to investigate Native and Indian claims throughout the Region and also pinpoint opportunities for geothermal development and utilization by these groups. In many instances, reservations may border or even overlay geothermal anomalies. This presents an economically attractive potential for both direct and electric uses. The UIPA is thus serving a two-way educational purpose in the Pacific Region. It brings Native Americans an understanding of how geothermal resources can benefit them. To the Pacific Region Team it brings an awareness of and sensitivity to Native concerns.

In order to accomplish this task in the Islands it has engaged ALU LIKE a Native Hawaiian organization which was set up to pursue the reparations issue. Hardy Spoehr of ALU LIKE has been active in Pacific Region deliberations, attempting to bring together its officials and the more militant, grass roots organizations based on Big Island.^{4/}

At this stage, the Regional Team must insure that it is dealing with these local groups. ALU LIKE and the Team's other contractors must seek out all of the opposition groups and leaders and attempt to find out just what, beneath the rhetoric and emotion, they are seeking. At the same time, they must educate these groups to the possible benefits of geothermal development and create legal and institutional vehicles to insure that those benefits inure to the Native community in terms of better housing, schools, health services and jobs.

Footnotes

1/

"Hawaii Seeks Electric Power From Volcanoes, Hopes To Reduce Dependence on Imported Oil", Wall St. J., 7/8/75, p. 28, cos. 1, 2, 3.

2/

S. J. Res. 4. For a full discussion, see Neil Levy, "Native Hawaiian Land Rights," 63 Cal. L. Rev. 848 (1975).

3/

43 USC §1601 et. seq..

4/

These organizations led a Labor Day demonstration which blocked Hilo Airport runways. National Guard troops had to be called in and 50 people were arrested. The demand was that land taken for tourism be returned to the Native residents.

SECTION THREE: THE REGULATORY CLIMATE
"SELECTIVE GROWTH" AND FUTURE
GEOTHERMAL DEVELOPMENT IN HAWAII

At this stage, the political and regulatory climate for geothermal in Hawaii must be rated as mixed. The dawn of geothermal development in Hawaii has arrived simultaneously with the rise of a public mood that is focusing on the quality of life, rather than upon growth for its own sake. In some respects it is an extension of the sensitivity that has made geothermal development in many areas of California such a tortuous exercise. There are several other factors to be taken into account as well.

Environmental concerns are strong in Hawaii, partly due to the Islands' spectacular natural setting, partly due to the economic importance of the tourist industry dependent upon that unspoiled beauty. Hawaii, like California, followed in NEPA's footsteps very closely. In 1973 it passed its own Environmental Protection Act.^{1/} An EIS is required in any of five separate situations: (1) for any proposed action within a "conservation district" (discussed below); (2) for a site listed on the State Register of Historic Sites; (3) within 40 feet of a shoreline; (4) for any action requiring an amendment to a county general plan; (5) for any proposal requiring the use of state or county funds or lands.^{2/}

Hawaii also has a very sophisticated land use regulatory scheme, another expression of its conservationist ethic. The State Land Use Law^{3/} classifies all lands into one of four use districts. These are: conservation, agricultural, rural and

urban. Nor is the administration of these regimes without duplication and, to the developer, confusion.

The last named (urban) is under the exclusive control of the County. Within Hawaii County, geothermal development is allowed only within the "industrial" zone, according to that County's current zoning ordinance.^{4/}

On two of the other three land use classifications — agricultural and rural — there is the now familiar two-tiered regulatory set up. The relevant county Planning Commission must first consent to a "special permit" for all activities (including geothermal) not specifically allowed by current law. The State Land Use Commission must then concur in that action before the proposed activity may take place.

Conservation District lands, by contrast, are the exclusive purview of the State Board of Land and Natural Resources. It is this agency which will also issue geothermal leases on both state and mineral-severed land and regulate that development.^{5/} As noted above, an EIS is automatically required for all actions within a Conservation District. Both The State Board of Land and Natural Resources (an appointed body) and the Department of Land and Natural Resources (its administrative arm) have shown themselves to be positive towards geothermal development. But the EIS requirement will open the door for environmentalist and Native challenges.

Similarly, the HGP-A well was drilled without a permit

from the County of Hawaii Planning Department. Now that that group is proceeding toward development, they have stated that they will comply. While the Mayor (Herbert Matayoshi) is positive towards geothermal, there are voices on the County Council who have heard the complaints of their constituents about HGP's action and may oppose a move to amend the county's zoning ordinance to allow geothermal work in zones not classified as "industrial". Again, an attempt to so enlarge the allowable scope of geothermal activity will allow opposing groups a forum.

The bottom line here is that while neither the abstract legal/regulatory climate or its practical application pose serious obstacles to future geothermal growth, they are complex enough to give forces opposed to that growth a good opportunity to block it.

As we mentioned at the beginning of this section, Hawaii has recently exhibited an increasing sensitivity to expansion and its accompanying in migration from the Mainland. It is this sentiment which implicitly supports the Native population in its reparation claims.

The factual basis for it, however, lies in the incredible energy source and market mismatch that is Hawaii. For example, the Big Island (County of Hawaii) has a total peak electric demand of roughly 70 megawatts. If the Puna discovery and the proposed exploratory work on the Kona coast unearth a

steam/hot water resource equal to, say, 500 megawatts, most of it will be, literally, unusable. Even assuming arguing that both utility and industrial users could be persuaded to completely switch to geothermal as a base fuel, the only other distribution alternatives are: microwave broadcast of the excess to the other islands; underground cable transmission of same; or a large influx of industry and supporting infrastructure into a rather sparsely populated area.

It is the last-named — the prospect of becoming the "Pittsburgh of the Pacific", as one local official put it — that will bring out all the anti-growth, anti-pollution and anti-mainland feelings of the citizenry and, more to the point, lead them to an EIS or proposed land use change as the focal point of their feelings.

Governor George Ariyoshi has attempted to ameliorate these feelings while still bringing in the new industry and jobs he knows his state will need in the future. He calls his concept a "preferred future for Hawaii" and the progress of his re-election bid will go far towards setting the tone for future geothermal growth.

Officially, the Governor proposes "selective growth." He set up a "Growth Management Task Force," to chart a course for such "selective growth". As the Governor's aide put it, "It is not an anti-growth or a no-growth program, but rather one that seeks to guide and direct growth by encouraging the

right kind of growth at the proper place and pace."^{6/}

In order to placate the more hostile elements of his constituency, however, he, too, has been forced to take anti-mainlander actions. Last year, e.g., he backed two such bills in the Legislature, both of which were passed into law.

The first required a one-year residency period before a person could qualify for certain public jobs.^{7/} A federal judge quickly declared it unconstitutional.^{8/} The second forbids able-bodied persons under age 55 without minor children from receiving public assistance.^{9/} Not passed but expected to rise again is a bill to limit the number of hotel rooms that could be built in the state.^{10/}

Behind these actions is a state only slightly larger than Los Angeles County. It's growth rate, however, equals that of the State of California, with immigration accounting for 55% of that growth.

It is therefore not surprising that, as one recent visitor put it, "A trench of ill will lives under Hawaii's multi-racial rainbow. Islanders resent — and sometimes resist — mainland Americans who move in to new housing or good jobs, sometimes displacing the locals. . . . The ugliest sign of racism is "kill a haole [Caucasian] day", . . .; many haole children stay home from school on that last day of each school year. . . . Others are escorted by parents or school administrators . . . rather than test

the ill will."^{11/}

The bottom line for geothermal, and the PRT, is that the bulk of the remaining land in the state is on Big Island, where this resentment, and manifestations like the Labor Day sit-in on Hilo Airport runways are strongest. Even aside from the question of reparations, which will surely be reintroduced in Congress, the next state administration--whether it be that of Governor Ariyoshi or Honolulu Mayor Frank Fasi -- will be under strong pressure to limit geothermal development to a level which replaces fuel oil but does not attract a large influx of mainland industry, with even greater population growth rates.

But even if the total climatic equation for Hawaii was a plus, and outside industry were being encouraged to flow into the state in much the same way that it scurried to the Sunbelt states in the 50's and 60's in search of cheap energy and abundant labor, the economics of locating in Hawaii remain questionable.

Footnotes

1/

H.R.S., Ch. 343.

2/

Taken from "Land Use Regulations", Sidney Fuke (Planning Director, Hawaii County) in Proceedings - Geothermal Seminar (Oct. 18-19, 1977) at pp. 70-74.

3/

H.R.S., Ch. 205 (L. 1961).

4/

Fuke, op. cit., at pp. 70-71.

5/

See H.R.S., Ch. 182, §§ 182-1 et. seq., and "Regulations On Leasing of Geothermal Resources and Drilling For Geothermal Resources In Hawaii", Regulation 8 (Dept. of Land and Natural Resources, June, 1978). A lease form is in preparation.

6/

"Population Explosion Threatens Hawaii", L.A. Times, 9/17/78, pt. VII, pg. 1, cl. 1.

7/

Act 101, 1978.

8/

9/

Act 103, 1978.

10/

This latter bill was requested by the Department of Planning and Economic Development, the same agency which heads the HGP.

11/

Art Seidenbaum, "Hawaiian Plight - No Land Is An Island." L.A. Times, 9/19/78, pt. IV, pg. 1, col. 6.

SECTION FOUR: THE ECONOMICS OF FUTURE INDUSTRIAL
USE OF GEOTHERMAL RESOURCES IN
HAWAII

Governor Ariyoshi's attempt to placate the hostility of his constituents towards further immigration of mainland industry is based on his understanding of the state's future job needs. Hawaii never became a center of the bauxite mining-aluminum processing industry, as it had hoped for in the early 60's. With the onset of the 70's, its sugar refining industry experienced some setbacks as well. The defense industry slipped also. The net result is an unemployment rate "already higher than the national average and considerably above what Hawaii had experienced in the last decade."^{1/}

Thus the prospect of a large, environmentally benign and indigenous energy resource on the largest island (Hawaii), with potential sites elsewhere (Oahu and Maui), must be a cheering economic thought to the Governor and the state's business community. Even aside from the legal and public policy problems discussed in the three preceding sections, however, there is a real question as to the competitive standing of a geothermal-driven industrial surge for Hawaii.

Bill Dolan, former two-time President of the Geothermal Resources Council and the very capable manager of geothermal operations for AMAX, one of the Nation's leading mining firms, addressed this crucial issue last Fall. Appearing before a County of Hawaii - sponsored "Geothermal Seminar",^{2/} Dolan pointed out that the economics of ocean mining in Hawaii were far from optimal. While he estimated that a geothermal

developer could make a good profit selling his output at 35 mills/kwh, Dolan pointed out that the potential market (70-75 Mw, as noted) was of too "modest [a] scale"^{3/} for AMAX and thus had "no appeal" to them^{4/} from a developer standpoint.

It would therefore appear that those firms actively exploring the geothermal possibilities in Hawaii are either interested in a vertically-integrated ocean-mining or alumina-processing operation based on geothermal power or wish to sell to one. AMAX is prototypical of such firms. Were they, or a firm like them, to locate in Hawaii they would require 525 megawatts of both firm and standby power for each aluminum processing plant.^{5/}

It is therefore significant that Bill Dolan was forced to report to them that "the economics . . . fail to meet AMAX's requirements."^{6/} The spread is also not encouraging. "An aluminum reduction installation cannot afford to pay more than 17 mills for power . . . [and] a ferrochrome reduction installation . . . cannot afford to pay more than 11 mills".^{7/} This is from the 35 mills he had pegged as the price of Big Island geothermal-based power.

Worse, Dolan called the vertically-integrated operation (geothermal developer and aluminum producer) option "beyond the realm of possibility."^{8/} He nonetheless examined it to point out that the geothermal side of the operation would

have to be run without profit in order to allow the aluminum processing installation to pay no more than 17 mills for its power and thus earn the minimum 15% acceptable return on investment.^{9/} Passage of tax incentives by Congress and liberal use of debt financing would improve the geothermal side of the equation, enabling it to make a profit also while simultaneously reducing the cost of power to the user side.

But there are other significant negative aspects as well. These include the inability to sell excess, standby power (175 of the 525 Mw) to other industries, "infrastructure costs such as port facilities, roads, major catastrophe abatement measures, housing, services, local taxation, . . . and . . . cycles in the price of aluminum".^{10/}

There is always the possibility that Dolan has mistakenly overstated plant and field costs in this new geothermal province, but that is unlikely.

What of ocean mining? Dolan did not even deal with it, since "AMAX's experts on undersea mining advise that cheap electricity, no matter how cheap, is not going to attract manganese nodule processing in [to] Hawaii in the near future."^{11/}

The Pacific Region Team needs to explore this analysis further, in concert with the State and particularly the County of Hawaii. It must find out if geothermal development in Hawaii is economically feasible and acceptable to the populace.

Footnotes

1/ Preliminary Report On Legal and Public Policy Setting For Geothermal Resource Development In Hawaii, (HGP, 1974), at p. ii.

2/ Op. cit., hereinafter cited as "Proceedings".

3/ Proceedings, op. cit., at p. 16.

4/ id.

5/ id.

6/ ibid., at p. 15.

7/ id.

8/ ibid., at p. 16.

9/ ibid., at p. 17.

10/ id.

11/ ibid., at p. 16.