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**FINANCING GEOTHERMAL RESOURCE DEVELOPMENT
IN THE PACIFIC REGION STATES**

August 15, 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**

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FINANCING GEOTHERMAL RESOURCE
DEVELOPMENT IN THE
PACIFIC REGION STATES

August 15, 1978

A Report To The Program Manager
Pacific Region Team, DGE/DOE

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

Jack McNamara, President

JM Energy Consultants, Inc.
Los Angeles, California

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**INTRODUCTION: FINANCING GEOTHERMAL
RESOURCE DEVELOPMENT —
A BATTLE WITHIN THE PUBLIC SECTOR**

Perhaps we have not yet grasped the ironic significance of inter-minable public sector musings over the most effective means of stirring private sector financing of geothermal resource development. This may be due, in part, to the fact that the public sector itself, particularly the budget of the federal Department of Energy, represents the overwhelming bulk of present geothermal outlays. More to the point, it is the actions of other public sector players — Congress, Treasury and state finance and utility regulators — which will determine whether or not private sector involvement in this fledgling resource's future will ever approach "adequate" levels. For it is not so much a matter of providing "incentives" as it is a question of removing disincentives created by various government entities.

Thus any analysis of potential geothermal financing mechanisms must pay heed to the crucial role of the various public sector forces in determining both the avenues chosen and the effectiveness of their implementation.

It is therefore not our purpose here to convince the reader, e.g., that intangibles and percentage depletion are necessary to bring forth sufficient private sector investment. Not only has that task been performed elsewhere, and on numerous occasions,^{1/} but its present utility is akin to convincing one that warm clothes are essential in the vicinity of Point Barrow.

Similarly, though its necessity is not as widely perceived, we will spend but a brief time building a case for some mode of reservoir insurance. We will focus, instead, on the legal, institutional and

policy obstacles to effectuation of such a program and suggest means of overcoming those barriers.

In other words, we feel that it is no longer useful to study this "problem" and state that X incentive is a good idea.^{2/} A lot of good ideas die long before their supporters. We hope to go beyond the laundry list to a tactical plan of implementation.

FOOTNOTES

- 1/ See, e.g., C. Bloomster and C. Knutsen, The Economics of Geothermal Electricity Generation From Hydrothermal Resources - BNWL - 1989 (Batelle 1975).
- 2/ Though some, much ballyhoed studies have not even gone that far.

**SECTION ONE: TAX TREATMENT AS AN INCENTIVE
TO DEVELOPMENT, AND HOW TO
ACHIEVE IT**

A. FEDERAL TAX TREATMENT

The actual future of geothermal resource development may well depend upon the federal tax treatment accorded to it.

All natural resource developers face a protracted lead time between exploration and discovery, and another between the latter and production. But in geothermal this "lag" is more severe than elsewhere. Since geothermal resources can not be transported great distances, the user must locate his facility in the discovered field itself. This "site-dependency" injects a "second front" of delays into investor calculations. At present, the overall delays preceding an income stream presents horrific problems to a geothermal developer attempting to raise funds for exploration. It is at precisely this stage that the resource's development is most critically "blocked". In view of the resource's enormous potential, such a situation is intolerable.

The U.S. Geological Survey has projected the various geothermal resources as a potential energy source of immense magnitude — over 32 million quads worth. Applying even a 1% recovery factor to this total would result in enough energy for 4440 years of total U.S. energy use at present consumption levels. Deep hole drilling is the only way to "firm up" these calculations, locate the best areas, and convince utilities and other potential users to commit to the resource. The speculative nature of such ventures, combined with the protracted delay in recovering investment even if one is successful, rule out conventional and even venture capital financing paths. Only tax-driven funds can provide the necessary capital.

Developers presently face a tax regime in which they are accorded no positive incentives and many obstacles. The tax treatment accorded geothermal exploration and development expenditures is horrendous. Geothermal developers must capitalize all their costs. There is no recovery of this investment unless they abandon or sell the property or begin production. The problem this presents for a firm which believes it has a good prospect under lease is obvious. A large income stream might conceivably follow production. But first there must be sufficient resource evaluation to satisfy a utility. During the time this is being done (perhaps four or five years), as well as that lost while the utility is building its plant (3 or 4 more years, assuming siting approval is obtained) the developer must be able to "absorb" the entire investment himself. Without current deductibility, outside investors are effectively put off. It is therefore not surprising that the bulk of geothermal operations are performed by large oil and mining companies. Only they can internally generate sufficiently large cash flows and therefore utilize the large tax losses available over the long periods before an income stream.

Legislation is currently pending to remedy this situation.^{1/} But the passage of legislation is not enough. It is instructive to examine the reaction of the U.S. Treasury Department to previous pro-geothermal tax decisions rendered by the Courts and Congress.

The U.S. Tax Court (affirmed by the Ninth Circuit Court of

Appeals in 1972) has held that taxpayers involved in operations at The Geysers are entitled to claim a deduction for the intangible drilling costs of successful wells incurred during that year.^{2/} But this ruling was based on a stipulation by the Internal Revenue Service which was limited to that particular case.^{3/} The IRS has therefore taken the position that taxpayers who were not parties to that litigation have no such right.^{4/}

A similar challenge is being mounted against Geysers-area developers who claim percentage depletion in accordance with Reich.

This optional method of computing the deduction for the physical wasting of a resource deposit is currently granted, by statute, to oil, natural gas, coal, oil shale, uranium and sulphur, as well as a laundry list of other minerals.^{5/} The only apparent requirement is that the mineral must actually deplete itself over some unspecified period of time. The taxpayer is therefore not required to show any actual decrease for those minerals specifically listed. There is no upper limit on asset life either. As long as there is production, the percentage depletion deduction may be claimed.

Reich clearly held for the taxpayers on this issue. The Court there found that the dry steam at The Geysers was "gas" within the meaning of 26 USC 613 (b). Based upon expert testimony, it also found that the pressure in the geothermal reservoir at issue was declining, or depleting. Dry steam at The Geysers was therefore entitled to percentage depletion. The Service had maintained that

the resource was "water" and therefore specifically excluded by statute from percentage treatment.^{6/} In any case, they argued, the geothermal resource was "inexhaustible" and specifically excluded by the statute as well.^{7/}

Again, the IRS has recently notified operators claiming percentage depletion of a possible challenge. This in spite of the fact that Congress codified Reich in the Tax Reduction Act of 1975.^{8/} That statute is limited to "geothermal deposits which are determined to be a gas well . . .".^{9/} Congress left the door open for IRS challenges and the Service has accepted the invitation. An unending series of court cases could ensue, with resulting negative effect upon capital formation.

Worse, it is unlikely that the other geothermal resource types could as easily "prove" their depletable nature if such a showing is, as it appears to be, necessary. Hot water systems are difficult to model accurately. Whether or not they "recharge" is, as yet, an unsettled question.

Geopressured zones are "traps" but the elasticity of the shale cap-rocks and the tremendous potential for expansion by their gas/water mixtures might make a determination of depletability difficult.

Hot dry rocks are only conductors of the earth's heat. Is the entire planet to be measured by cross section? And though the planet will theoretically cool within time, the frame of reference may be eons.

Rather than sticking to strict statutory formulas (depleting, etc.),

we think the basic policy questions behind granting an incentive need to be analyzed, as well as the decision-making, and decision-influencing institutions involved.

There is clearly some loss of Treasury revenue accompanying enactment of intangibles and percentage depletion. Is this "expenditure" of tax dollars justified?

Not in the eyes of the Treasury Department's policy watchdogs -- the Office of Tax Analysis (OTA). OTA has persistently blocked pro-intangibles/percentage depletion recommendations by the Federal Interagency Geothermal Coordinating Council (IGCC) and its Institutional Barriers Panel (IBP). Their position on these issues was stated clearly in an April 19, 1976 "Staff Memorandum" by OTA's Seymour Fiekowsky.^{10/} Therein he stated that "Derivation of rules from other categories of investment, as for oil and gas, has no justification, either in terms of the economic processes of the two classes of investment, or in the public policy aspects of subsidization."^{11/} He also set forth the classic OTA school of thought on mineral/resource extractive tax incentives: "If the income tax rules preferentially[defer] . . . taxable income from a class of investment as compared with other investments, the initial impact is to increase the private after-tax rate of return for this class of investment as compared with other investments. This will cause more private investment to flow into the preferred class . . ."^{12/}

Let us assume arguendo that Fiekowsky is correct. Granting

geothermal tax subsidies would then divert capital into this secure, potentially enormous domestic energy source. We would then have fewer jewelry stores or gargoyle factories and more geothermal-based megawatts and direct applications. We would also import less foreign oil and gas and either conserve or make better use of the domestic supplies of those two precious commodities. Why is this a problem? All perceptions of our domestic energy worries have pointed to the need for domestic energy production. Perhaps OTA is laboring under a different set of assumptions. Or perhaps our espoused energy plan is only for public consumption and has no operational impact on non-energy federal agencies.

In any event, the Principal Investigator has elsewhere examined the factual data supporting the "capital market distortion" argument raised by Fickowsky.^{13/} To sum up the findings of that study, it appears that the oil and gas production sector (which is distinguished from downstream transportation, refining and marketing sectors) pays taxes at a much higher rate than those firms classified by the IRS itself as "Manufacturing" entities. In 1974, e.g., this sector, which equates with the geothermal developer sector, paid 25.3% of its gross income in federal taxes, compared to only 2.47% for "Manufacturing".^{14/} If pre-tax net income is used as the measure, the figures are closer, 47.25% to 43.47%.^{15/} This hardly seems to support the "distortion" scenario so glibly raised by Senator Kennedy, among others.^{16/} In fact, they would seem to support arguments for even greater geother-

mal tax incentives, rather than providing a policy basis for their denial. It does not support the abstract and highly artificial discounted cash flow projections bandied about by OTA.^{17/}

The other main OTA argument is that the "diversion" of capital into tax-favored industries causes an economic loss to the country as a whole due to the "foregone higher rates of return from the unsubsidized sectors" ^{18/} In the paper previously noted, ^{19/} it is pointed out that, despite a higher or roughly equal tax burden, the extractive resource sector has consistently brought in greater rates of return than that found in manufacturing. ^{20/}

The point here is that a branch of the U.S. Treasury Department has applied fairly specious reasoning to the proposals for geothermal tax breaks and thereby frustrated their enactment. The IGCC and IBP were able to recommend only a pittance — current write-off of exploratory expenses only, for a ten year period, as "Research and Development Expenditures," ^{21/} on projects "certified" by DGE. In a former incarnation, the Principal Investigator calculated the internal rate of return yielded by this "incentive" at roughly 5%.

Thus, an IGCC proposal to allow the current write-off of all exploration and development expenditures ^{22/} was cut back by OTA ^{23/} opposition.

This lack of concerted agency support was reflected in President Carter's National Energy Plan, issued several months later. Therein he advocated only support of intangibles, with the caveat that "issues

concerning overall allowance of deductions for intangible drilling costs will be reviewed as part of the President's tax reform program."^{24/}

This half-hearted proposal, carried by DGE over continuing OTA opposition, was then ambushed in the House Ways and Means Committee sessions. There, an OTA-inspired amendment limited the Committee's ten per cent percentage depletion vote to "adjusted cost basis." This was adopted by the full House^{25/} and has created a serious obstacle in Conference with the Senate, which imposed no such "cost" limitation. The limitation to "adjusted cost basis" is found only in Treasury's own regulations.^{26/} It accomplishes the feat of transforming percentage depletion into cost depletion.

Nor should the Conference Committee be regarded as a safe haven by geothermites, since it is staffed by OTA. The industry must build a concerted lobbying effort to support DGE's efforts in this area.

In addition to pushing for the Senate version of depletion (15% with no adjusted cost basis limitation), this effort should opt for that chamber's version of the "alternate energy credit" which adds 15% to the existing 10% investment tax credit for "alternate energy equipment." The House version inexplicably excludes geothermal turbines from this treatment,^{27/} effectively gutting the provision's positive impact.

OTA has also managed to infiltrate the ranks, as well as the thinking, of the D.O.E. Assistant Secretary For Policy And Planning.

The decade-old, Treasury/IRS/OTA red herring arguments about geothermal's actual "depletability" are once again being raised — this time by D.O.E.'s Policy representatives. Having frustrated the removal of this key legal barrier at the administrative level, Treasury has now turned to the legislative arena — both in Conference and on the floors of the two houses. The industry has no choice. It must either respond forcefully — or dissolve.

FOOTNOTES

- 1/ The National Energy Act, currently in Conference Committee, would grant intangibles and some form of percentage depletion.
- 2/ Reich v. C.I.R., 454 F. 2d 1157 (Ninth Circuit 1972).
- 3/ Arthur C. Reich, 52-74 PHTC (1968), at p. 508, fn. 13.
- 4/ See, e.g., Dunnigan Enterprises (Tax CT. DKT. 657-74).
- 5/ 26 U.S.C. § 613 (b). Geothermal resources "found to be a gas" are also included. 26 U.S.C. § 613 (A).
- 6/ 26 U.S.C. 613 (b) (7).
- 7/ id.
- 8/ P.L. 94-12, [H.R. 2166], § 501 added 26 U.S.C. § 613A to allowing 22% percentage depletion to "any geothermal deposit . . . which is determined to be a gas well within the meaning of section 613 (b) (1) (A)".
- 9/ 26 U.S.C. 613 (A).
- 10/ "Tax Issues In Geothermal Resource Investment," S. Fiekowsky (OTA), 4/19/76.
- 11/ ibid., at p. 1.
- 12/ ibid., at p. 7 (emphasis in original). See also Stephen McDonald in M. Gaffney (ed.). Extractive Industries and Taxation (U. Wisc. 1967) and particularly the work of Gerald M. Brannon, former head of OTA, in Energy Taxes and Subsidies (Ballinger, 1974) for a fuller discussion of this theory.

FOOTNOTES

13/ See McNamara, "The 'Effective Tax Rates' of Extractive Industries and The Case For A Geothermal Resource Tax Incentive", 6 Geothermal Energy Magazine, No. 6, p. 11 (June 1978).

14/ ibid., at Table A, page 12.

15/ id.

16/ Statement To Senate Finance Committee, Sept. 6, 1977, quoted in McNamara, op. cit..

17/ See Fiekowsky, op. cit., at pp. 13-18.

18/ ibid., at pp. 20-21.

19/ McNamara, op. cit..

20/ ibid., at p. 16, Tables D and E.

21/ 26 USC § 174.

22/ See 11/5/76 Letter of Robert Hirsch, Asst. Admin. /ERDA (and then - IGCC Chairman) to Treasury Secretary Simon.

23/ See 12/21/76 Letter of Assistant Treasury Secretary For Tax Policy Walker to Hirsch.

24/ National Energy Plan, White House Energy Policy and Planning Office, April 29, 1977, at p. 78.

25/ H.R. 8444, The National Energy Act, at 2073 (b).

26/ 26 C.F.R. § 1.01 (d).

27/ H.R. 8444 at § 2061.

(B) STATE TAX TREATMENT

Though most of the heat and fire has been rightfully focused on the federal tax treatment of geothermal expenditures, recent developments in several Western states have again pointed out the importance of state and local taxation in the resource's future. Once the battle is won at the federal level, it will not be premature to join it at the state level.

State taxation of resource extraction activities usually focuses on three key points. One involves fairly straightforward ad valorem (or property) taxation of the estimated value of the resources in place, by means of a discount-type formula. This system is utilized in California, Washington, Oregon and Hawaii in the Pacific Region.

The second does not attempt to ascertain the exact nature of the mineral resources in the ground. Instead, it levies a percentage tax on the gross proceeds derived from the sale of those resources. This is called by a variety of names, though severance tax is the most common. This device is used in Alaska, though that state actually uses both systems, crediting payments made under the latter against property taxes.

In addition to the ad valorem and severance tax models, all the states of the Region impose some form of corporate income or franchise tax upon incorporated geothermal developers. These range from 9% of net income in California^{1/} and 9.4% in Alaska (including a 4% surtax)^{2/} to 6.435% in Hawaii,^{3/} 7.5% in Oregon^{4/} and 6.44% in Washington (including a 6% surtax through June 1979).^{5/}

Though the impact of these taxes is far less than the maximum 48% federal rate, they can still impose a unwanted burden on resource operators. The latter have therefore moved to gain enactment of intangibles and percentage depletion in many states. They succeeded in California, though that state cut its percentage depletion provision back by limiting it to the "adjusted cost" of the properties involved.^{6/}

(a) Ad Valorem Taxes

The taxation path chosen by each state is basically an expression of revenue-raising philosophy which is akin to the 1913 - 1926 battles at the federal level over cost and percentage depletion. Those opting for ad valorem taxes are hewing to the line that feels confident in early assessments of the resources in place. They are also expressing a desire to tax developers immediately on what is still a speculative venture as to both actual resources and projected income stream. This system, by imposing taxes upon a developer well in advance of cash flow from the property, deters smaller, less capitalized operators and therefore exerts a bias in favor of extensive land holdings by large, often multinational concerns.

The prime example of the pitfalls of the ad valorem system in the geothermal arena is found in California. The counties impacted by early development at The Geysers (principally Sonoma) created, under the guidance of the State Board of Equalization, a multi-layered formula^{7/} for assessing the value of lands which were,

for the most part, non-productive.

Testimony before the STATE GEOTHERMAL RESOURCES TASK FORCE during 1977 brought out the fact that there were no less than fourteen separate tiers of assessment. These depended not only upon the developmental level of the property (from actual production to contract for sale to active exploration to a bare leasehold interest) but also upon whether it was located on public or private land. Federal or state lessees found themselves paying ad valorem taxes based upon their bonus bids for the property in question. Private land lessees, on the other hand, were not taxed at all. This was not a policy decision, merely an administrative convenience. Bonuses paid for private land leases were simply not public information and therefore not accessible to the tax man. Thus the speculative nature of the ad valorem system was compounded by administrative caprice in much the same manner as the 1913 and 1918 federal depletion regimes fell before the exigencies of Treasury Department operation.

Unsurprisingly, geothermal operators within California have tried to extract (no pun) themselves from the ad valorem system for years. A Joint Legislative Committee found that "one of the most persistent complaints heard . . . was in regard to ad valorem taxation of known or proven but unused geothermal resources."^{8/} Unfortunately for their efforts, the system is based in the State Constitution.^{9/} It therefore requires a two-thirds vote of the legislature and voter approval in order to change it. The Constitution itself

exempts "growing crops" and "immature . . . trees"^{10/} from its taxing stricture, However. As yet unproductive geothermal or other mineral resource properties would seem to present an equally strong case for exemption. Several attempts at such an exemption have fallen far short however, including one last year.^{11/} They met continued opposition of both the State Board of Equalization^{12/} and the County Supervisors Association. The latter has called it "a further erosion of the tax base."^{13/} Worse, individual County Assessors taking it upon themselves to exempt geothermal property from taxation until production have run into "strong opposition"^{14/} from the State Board of Equalization.

The recent passage of the so-called Jarvis-Gann initiative, Proposition 13 on the June 1978 Ballot, has helped greatly by limiting ad valorem taxes to 1% of assessed valuation as of 1975. Unfortunately, this limit does not apply when a property is transferred, or on newly acquired leaseholds. The political maneuvering surrounding its passage has also muddied the waters, with strong sentiment emerging to limit the tax savings to residential properties.

(b) Severance Taxes

In order to avoid the pitfalls of the ad valorem system, many states have chosen to utilize a tax on the gross proceeds of the resource property. Though it masquerades under a variety of names (severance tax, production tax, conservation tax, excise tax, privilege tax, license tax, etc.) we shall refer to them all as

"severance taxes." Though the Nation's largest oil and gas producing states — Texas and Louisiana — rely almost exclusively upon this method,^{15/} only Alaska, among the five states of the Pacific Region, has seen fit to implement it. They have done so with a vengeance. The State of Alaska exacts a "Gas Production Tax,"^{16/} a "Mining License Tax,"^{17/} and an "Oil Production Tax".^{18/} Should geothermal development in that state become a reality, there is no question that a similar tax would be enacted for it in the 6% to 12% range. This tax burden would be roughly equivalent to that imposed on developers at The Geysers under the ad valorem system.^{19/}

There is at least one important difference between the two systems, however. It is a difference, moreover, which possesses great significance for geothermal's future.

As William Dolan of AMAX, Inc.^{20/} has often expressed:
"resource industries are very vulnerable politically."^{21/} In other words, they represent an inviting target for slogan-happy politicians. The five year old spectre of oil company abuse at the national level has been replayed on many occasions at the state level, with the mining industry in particular as political target-of-the-month. Severance taxes are not state constitutionally based. As such, they are particularly susceptible to dramatic increases accompanied by emotional campaigns aimed at resource extractors. Though Alaska is a prime recent example of this, the most blatant exhibit may be found in Montana. That state, beset by controversy over large-scale strip-mining of ranch and farm land, enacted a whopping 30%

severance tax on surface-mined coal only last year.^{22/} Geothermal developers, and the Pacific Region Team, should be concerned lest this scenario be re-enacted in California (where counties are looking for new revenue sources from the state to compensate for Proposition 13), Oregon (where a Prop. 13-type measure is on the ballot and environmental concerns run high) and Hawaii (to be used to compensate the native Hawaiians and overcome their opposition).

- 1/ CAL. REV. and TAX CODE § 23501.
- 2/ ALASKA STAT. § 43.20.010, et. seq..
- 3/ HAWAII REV. STAT. § 235-71.
- 4/ Under either the "Corporate Excise Tax" (ORE. REV. STAT. § 317.005 et. seq.) or the "Corporate Income Tax" (ORE. REV. STAT. § 318.010 et. seq.).
- 5/ WASH. REV. CODE §§ 82.04.220, 82.04.100, 82.04.290.
- 6/ CAL. REV. and TAX CODE
- 7/ 18 CAL. ADMIN. CODE §§ 27, 28.
- 8/ "Geothermal Resources In California: Much Heat and Some Lights", A Report of The Subcommittee on Geothermal Resources, (Nov. 20, 1974) at p. 21.
- 9/ CAL. CONST. ART. XIII, §1.
- 10/ CAL. CONST. ART. XIII, § 3, (h) and (j), respectively.
- 11/ Summary Report of The State Geothermal Resources Task Force, dissent of J. McNamara, Public Member. A.C.A. 32 (1973-74), Preprint Constitutional Amendment by Senator Dills, reprinted in "Much Heat", op. cit., at App. A.
- 12/ The state's version of Treasury /OTA, this elected body has been characterized as "the most uncontrollable agency of state government" and "the one agency that does not think it works for the state" by highly placed state officers in conversations with the author.
- 13/ "Much Heat", at p. 22.
- 14/ id.

- 15/ Louisiana is a stiff 12 1/2% of gross value of oil (LA. REV. STAT. ANN. 47:633), Texas' goes for 4.6% of the market value of oil (TEX. REV. CIV. STAT. ANN., art. 4.01) and 7 1/2 of the market value of natural gas (TEX. REV. CIV. STAT. ANN. art. 3.01).
- 16/ ALASKA STAT. § 43.55.016 (10% of gross or \$.064/mcf).
- 17/ ALASKA STAT. § 43.65.010 (3% to 7%).
- 18/ ALASKA STAT. § 43.55.011 (12.25% or 60¢/bbl.).
- 19/ Testimony by the State Board of Equalization to the State Geothermal Resources Task Force.
- 20/ And former two-time Chairman of the Geothermal Resources Council.
- 21/ Conversation with the author, June 1976.
- 22/ 1977 Mont. Laws Chapter 164 (H. B. 237), Mont. REV. CODES ANN. § 84-1312 et. seq..

**SECTION TWO: NON-TAX FINANCIAL INCENTIVES
— THE OTHER SHOE**

**(A) THE FEDERAL GEOTHERMAL
LOAN GUARANTY PROGRAM**

One of the basic problems faced by federal officials when contemplating the "geothermal industry" and "its" problems is their failure to perceive that industry as two separate and distinct types of animal.

On the one hand, there are the resource developers. They are used to high risks and high returns. Their breed is best symbolized by Magma Power and Thermal Power, without whom there would probably be no geothermal alternative. Most commercial banks are still backed off by resource firm practices, which they consider patently "unsound". The capital to drive holes several thousand feet into the earth must therefore be generated internally, or obtained from high-bracket outside investors in desperate need of sheltering, and willing to go for the high stakes that oil, gas or geothermal drilling programs offer. Due simply to the chronology of geothermal's maturation, it is these resource operators who have dominated the geothermal scene since the resource began to attract national attention in the early 60's. As noted earlier, the most crying needs of this sector coincide with its normal "land play"/exploration practices. Their highest priorities are therefore current deductions for intangible drilling expenses and the expedit-
1/
ing of the federal leasing program.

The "other half" of the "geothermal industry" is a totally distinct breed with different business practices and different perceptions of the state of the geothermal art. If geothermal resources are ever to gain acceptance, programs must be developed

to meet the more conservative but equally pressing needs of these regulated utilities and non-resource industrial organizations. To date, the federal government has made scant effort to perform this task.

Paradoxically, the sole federal program designed to assist this "user" side of the industry was probably ill-timed and should never have been enacted. Instead of passing a "Geothermal Loan Guaranty Program" in 1974,^{2/} Congress would have well advised to form capital in the developer sector by use of the proven intangibles depletion mechanism. Unfortunately, there was no one around to so counsel them, and, lacking competent "consigliere" in the administrative agency sector, they proceeded nonetheless.

The result was the "Geothermal Loan Guaranty Program" (GLGP). It was based on the implicit assumption that loans were available for exploratory drilling, the stage at which the non-Geysers resources were (are) stranded. As any resource developer or commercial banker could tell you, this has never been the case. Even in oil and gas, where reservoir modeling is much further along and the larger banks have their own "resident experts," loans for exploration are made only upon the security of already-producing properties. Bankers are not gamblers. Resource developers are. Never, or rarely, do the twain meet. Congress held one-half day of hearings before moving along with the GLGP. No bankers or other financial sector personnel were asked to testify. Only geothermal firms with already-existing development projects, i. e., Union Oil, Magma

Power and Thermal Power, were asked for their opinions. Since it's not polite to "tug on Superman's Cape", they were exceedingly polite.

Carel Otte told Congress that Union probably wouldn't use the program. Magma's Joseph W. Aidlin didn't even bother to attend. Instead he sent a non-Magma emissary to make a brief but noncommittal statement.

From its birth then, the GLGP became a program without a constituency — a rarity if not a miracle in the annals of federal incentive and subsidy mechanisms. Worse, it probably wouldn't have done Otte and Aidlin any good to come on strong for intangibles and percentage depletion anyway. Those words conjure up the spectre of "obscene oil company profits". Loan guarantees, by contrast, are nice, quiet ways to "assist" the private sector. They are not part of the federal budget, or deficit. Better, from a politician's standpoint, they are exceedingly "safe" vehicles. If the private banking sector won't make the loans anyway (as in the case of geothermal exploration) then the legislator has a ready answer for all comers. To the geothermal industry he says: "We tried. The banks say you're the problem." To the OTA/Treasury Department/consumer group troops he says: "It hasn't cost us a dime", or "only a few dimes." That is the way of the political world. Unfortunately, in the real world of capital formation and megawatt-creation those pat replies don't work. Neither does the GLGP.

The most telling critique of the GLGP may well have come last year in the now famous "Dear Geothermist" open letter to the entire

industry from Mark Silverman, the program's very able Administrator. In that letter, Silverman noted that, three years after passage of the GLGP by Congress, and one year after the finalizing of DGE/ERDA regulations for its implementation, barely a half-dozen guarantee applications had been received. GLGP had gone to Congress asking for annual authorizations of \$200 million and outlays of \$50 million. Even if they had approved and processed every application they had received the total expended would have been less than half of the requested appropriation. Powerful forces outside the GLGP itself were puzzling over these same figures.

OMB and the staffs of the relevant Congressional oversight committees (House Science and Senate Energy) were casting dour glances at the fledgling GLGP. ERDA higher-ups were concerned as well, lest its plight prejudice their chances of securing Capitol Hill's approval of a similarly-structured but far more expensive loan guarantee package for synthetic fuels.

Industry response to the Silverman letter was swift and predictable. The GLGP Administrator had directed two very basic questions at what was supposedly his constituency: "Does the industry really want and/or need the GLGP?" and "Does the industry really need \$200 million per year?". Donald Francisco Xavier Finn of the Geothermal Energy Institute, often an accurate reflector of industry opinion, gave Silverman the answers to questions that Congress should have been asking three years earlier. Finn said: "The Federal Geothermal Loan Guaranty Program requires that . . . [geothermal] inves-

tors and operators raise 25% of the proposed total aggregate costs of a geothermal project. They cannot, given the lack of tax incentives and continuing IRS opposition to claims for IDC's [intangible drilling cost deductions] and depletion."^{3/}

As Finn pointed out in further comments, however, the industry does need the GLGP. Tax-driven risk financing alone can not supply the \$10 billion that Carel Otte, for one, had estimated as necessary for the initial support of 20,000 geothermal-based megawatts.^{4/}

DOE and Congress should know that public exploratory oil and gas drilling programs bring forth \$300-\$400 million annually, with another \$600-\$700 million coming from so-called "private placements." Most of this private money comes from large end-users, usually natural gas pipeline and distribution companies. The largest chunk of all — several billion dollars worth annually — is internally-generated and expended by large oil firms.

All of this money comes to perhaps \$4-5 billion total from the three sources. But that is in oil and gas, where exploratory techniques and reservoir modeling are well proven, lead times are generally less onerous and there is no shortage of buyers. In geothermal none of these verities exist and worse, the sale price is uncertain. Negotiations with a regulated utility are not as certain as "upper-tier" or world oil prices. Thus the geothermal industry does need the GLGP, after it gets tax incentives to attract risk capital. Congress and DOE (then ERDA) got the resource's maturation cycle a bit backwards.

The GLGP must also come up with a solution for the power-hungry publicly-owned utilities who may be its, and the resource's, best customers over the next 15 years. They are not able to utilize the program because of a longstanding Treasury Department ban on federal guarantees for federally tax exempt offerings (i. e., in this case, municipal bonds). The City of Burbank, e. g., was forced to set up a non-profit corporation which will then market its own bonds (and not the city's) to finance the 25% equity share of each project. Since the corporation's bonds will not be tax-exempt or backed by the City's "full faith and credit", they will have to pay investors a higher interest rate. DGE and the GLGP have proposed an "interest differential" to ameliorate this problem. GLGP would further subsidize any public entity by reimbursing it for the difference in interest rates between their normal, tax-exempt offerings and the bonds floated to qualify for GLGP participation. This seems like a sound idea and hopefully it will be included in any Geothermal Omnibus Bill forthcoming from the next Congress.

The GLGP has also been accused of unnecessarily wearisome and costly application procedures. They have moved to speed up their "screening" and approval process by the use of several outside consultants. This is an excellent idea, since their very capable staff is consistently overloaded. Passage of developer and/or plant operator tax incentives will surely exacerbate this problem still further.

In sum, the GLGP is basically an excellent program whose time may just be arriving.

- 1/ The latter was dealt with in our recent report,
- 2/ As Title II of the Geothermal Energy Research, Development and Demonstration Act of 1974, P.L. 93-410.
- 3/ Letter of D.F.X. Finn to Mark Silverman, June 4, 1977 at pg. 1. (emphasis added).
- 4/ *ibid.*, at p. 2, quoting Dr. Otte's 5/20/77 testimony before House Ways And Means.

(B) FEDERAL GEOTHERMAL
RESERVOIR INSURANCE

It has become evident to the Principal Investigator over the course of the past two years that geothermal resources needed a triad of supporting financial incentives.

The first leg would be tax breaks to encourage capital formation in the risky exploratory stage. These dollars would unearth new "discoveries", prove them up to a certain degree and bring general, as well as reservoir-specific, resource knowledge up to a level where more conventional financing modes could "pick up" the resource and carry it forward.

In order to make up the remaining confidence deficits of the financial community, the GLGP would then stand behind 75% of total project costs, which could include guaranteeing 100% of a loan for that percentage of project costs. These guaranteed projects would either be developmental (if electric) or even utilization (more likely if non-electric) in nature.

Hopefully they would allow end-users (utilities or industrial customers) to commit to particular geothermal reservoirs for part of their future load demands. Realistically, however, many if not all potential users of geothermal resources have severe doubts as to both utilization technology and reservoir performance. Even assuming a higher level of private investor and financial sector acceptance, the built-in caution and skepticism of the user side would dampen the addition of geothermal-based capacity.

R & D breakthroughs and construction of demonstration plants by government or industry will prove the functionality of binary cycles

and other hardware. But there is a need for some form of geothermal reservoir insurance.

The Principal Investigator has been involved in trying to provide answers to this key institutional problem for nearly two years.^{1/} His preliminary survey of the private insurance sector provided the distinct impression that those very large but very conservative financial players were interested, but not yet ready to move.

This reading dove-tailed with earlier discussions held with various commercial bankers. The latter were more geothermal-savvy and less cautious than insurers, a ranking they accurately predicted. Insurer "take-out" financing of commercial bank efforts, once a project had proven itself productive, was considered a must by the bankers, however. If the GLGP could entice them into loan commitments, as it has already begun to do, then it becomes doubly important to also bring in the private insurance sector as a "bridge" from short-term "project" to stable, long term financial arrangements between the industry and the commercial banking sector. These large, institutional investors may well be more standbackish than the utilities. Far from providing the answer to the reservoir insurance dilemma, they are but another constituency for a federal program to provide it. DGE efforts to alternately woo/browbeat them into providing it themselves are counterproductive. The actuarial data just isn't there.

Why is such a program necessary? What must it consist in?

Of the four major types of geothermal resources — "dry" steam,

geopressured zones, hot dry rock, and "hot water" or liquid-dominated systems — the latter present the largest near term potential for contributing to domestic energy needs and weaning us away from imported oil. The "dry" steam field at The Geysers is believed to be a relatively rare occurrence and the geopressured and hot rock resource types, though vast, are not yet past the research and development stage. By contrast, "hot water" systems are both abundant and on the brink of commercialization. In fact, they are already operative in many parts of the world. The hotter ones produce electricity in New Zealand, Mexico, the Soviet Union and Japan, while those of lesser heat content (usually defined as less than 150 C. subsurface temperature) are used for space and process heating (Iceland, Boise, Idaho and Klamath Falls, Oregon).

Many hot water systems of both categories have been discovered in the U.S.. U.S. Geological Survey Circular 726 (1975) lists several hundred. More than a few of these have been tentatively explored by developers.

Why haven't any of these systems yet become productive? The chief reason is utility and industrial user skepticism over the performance life of the reservoir. Unlike oil and gas, where consulting firms like De Golyer and MacNaughton can tell you to the nearest fraction of a barrel exactly how much resource you will recover, the art of geothermal reservoir engineering, though vastly improved, is still in its nascent stage. Also, geothermal resources are site-specific. That is, they must be used in the discovery field. Risk of

reservoir failure can not, therefore, be hedged against other prospects. Each geothermal power plant has only one chance and one reservoir upon which to depend. While geothermal developers like Magma Power and Union Oil are willing to trust their own judgment and sink millions into field development, utilities can not afford even the slightest gamble. After five or six years of actual performance, the now-guess-timate prophecies of a reservoir engineer's model would be firmed into realistic probabilities. But that initial production must come from a fully-built and rate-based power plant. It is here that geothermal resources are perched. And it is here that federal geothermal reservoir insurance could bridge the gap and get a large domestic energy alternative on the way to respectability.

What must such a plan include? (a) Basically, utilities or other users seeking to use geothermal resources must be assured that their unrecovered costs will be returned to them, should a geothermal reservoir cease functioning or produce at an unacceptably reduced rate at any time prior to fifteen or twenty years from the start-up date. This is basically the Overseas Private Investment Corporation (OPIC) model; (b) In addition, there might need to be a directive to state utility siting commission's, instructing them to accept such insurance as proof of resource "reliability"; (c) The user might also have to be guaranteed an equal amount of wholesale electricity.

An intriguing suggestion for revamping the GLGP such that it could, in effect, provide this support has been created by Paul Rodzianko of Geothermal Energy Corporation. Paul's proposal would increase

the federal back-up to 90% on pilot-sized power plants under 25 MW in size and located on a "new resource". The proposal has several advantages, As Rodzianko puts them: "[it]. . . would encourage resource companies not to overinvest in a reservoir prior to obtaining field operating experience under commercial conditions. This approach would also obviate the need for a separate overhead structure within the Federal Government . . .".^{2/}

The merits of such a plan are obvious. One might also add that, as noted above, the instincts of Congress are usually out of sync with those of reality. Turning them loose on a question as far-reaching as insurance might result in an abomination, given the history of their work with federal leasing and federal tax, to say nothing of the GLGP.

FOOTNOTES

1/

See McNamara, "Geothermal Reservoir Insurance — A Problem That Must Be Faced", 6 Geothermal Energy Magazine No. 2 (Feb. 1978) at p. 24.

2/

Letter to J. McNamara (6/27/78), at p. 1. See also, Rodzianko, "Steps In The Development of Commercial Geothermal Power Generation", Public Utilities Fortnightly, (6/22/78), at pp. 48-49.

(C) STATE FINANCIAL INCENTIVES

Just as our thinking on the issue of tax incentives may reflect an advanced case of "Potomac Fever", the arena of non-tax financial incentives is the purview of the states as well. State utility commissions can influence their regulatees towards the selection of certain base fuels, including geothermal. This can be done through changes in the treatment of certain costs or through the plant siting process.

State legislatures and energy offices can institute tax credits, exemptions and/or deductions in order to skew fuel mix decisions in certain directions.

First of all, it must be borne in mind that the largest potential market for geothermal resources are the investor-owned but state-regulated electric utilities. Any movement aimed at encouraging their acceptance of this new energy source must focus on that key word — regulated. The IGCC's Panel on Institutional Barriers (IBP) has recognized this fact and made several tentative recommendations over two years ago. The IBP thought that the Federal Energy Regulatory Commission^{1/} should "establish a uniform accounting system"^{2/} which would allow the inclusion of all geothermal exploration and development costs in the rate base of the utility incurring them. They also felt that, as a further incentive to geothermal growth, the regulated rate of return allowed on these costs, as well as any actual geothermal power plant expenditures, should be set higher than that allowed for fossil and hydro plants.^{3/}

Is such a provision necessary to induce investor-owned electric utilities (IOU's) to enter geothermal at the exploration and

development stage? Is the enactment of such a provision sufficient to bring about such entrance? And is vertical integration preferable, from the public's point of view, to a non-integrated approach?

It must be made clear at the outset that development of satisfactory utilization technology and reservoir modeling still loom as the major stumbling blocks to utility commitment to geothermal. As the IBP itself admits: "Recovery by utilities of investments in geothermal exploration . . . does not appear to be a major problem." ^{4/} It is noteworthy, however, that San Diego Gas and Electric, Southern California Edison, Utah Power and Light, Pacific Power and Light and several municipal utilities (City of Burbank, Northern California Power Agency, etc.) are so interested that they have invested large sums of their own money in the risky business of geothermal exploration, usually in joint venture with a "purely" developmental company.

The trend toward vertical integration by these utility firms is not limited to geothermal. Pressure by state regulators seeking system "reliability" and their own outrage at "gauging" by oil producing countries and large oil companies have led them increasingly to seek the security of an assured source of energy fuels.

Gas utilities in New York and Oklahoma have entered into exploration programs, as have many interstate gas pipelines. Much of this wildcatting was financed through the old FPC's controversial (and now defunct) "advance payments" program.

Western electric and gas utilities have been involved in developing their own coal reserves for several years. They either burn the

coal in place (in Utah and New Mexico) and wheel the electricity to their load centers or convert it into gas and pipe that to their own gas turbine generating plants (or end users).

Nor are Western electric suppliers the only ones enamored with vertical integration. TVA, the nation's largest coal consumer, was upset enough about fuel cost increases (its coal price had jumped from \$8 to \$26 per ton) that they tried to buy out the Nation's largest coal producer. When doubts over pending lawsuits and reserve estimates made them back off, a consortium of 18 midwestern electric utilities snapped up Peabody Coal and its resources.

The flurry of utility activity in geothermal drilling should be seen as part of a larger picture. It could well be that these firms would have integrated in this fashion long ago (following the lead of oil refineries, steel plants and aluminum processors facing virtually identical management problems) were it not for regulatory intransigence and the soothing spectre of eternally cheap energy. How are these costs recovered within the regulatory framework?

Since January 1, 1974, the California P.U.C. has been authorized^{5/} to allow utilities to pass on to their ratepayers costs classified as "research and development expenses", as long as the PUC has accepted each individual project as "qualified" for such status.^{6/} Geothermal has been a prime beneficiary of this provision.

The P.U.C. currently allows Southern California Edison (SCE) to pass geothermal exploration costs under a rate "line" set up specifically for that purpose. Among the projects so "qualifying"

are geothermal exploration programs conducted by Mono Power, an SCE subsidiary, in Long Valley (with Getty) and the Salton Sea (first with Phillips and now with Union).

San Diego Gas and Electric (SDG & E) has geothermal work under way at both Niland^{7/} and Heber, as well as East Mesa and "other Imperial Valley areas". San Diego conducts some of these under its own aegis, and passes them on to its customers under the P.U.C. procedure described above. Unlike SCE however, SDG & E capitalizes its dry/unproductive holes and recovers them over five years.^{8/} Its successful wells are rate-based and amortized "over the useful life" of the resource.^{9/}

Much of SDG & E's geothermal involvement is through New Albion Resources Co. (NARCO), an off-rate base subsidiary. NARCO also conducts coal and oil and gas exploration and development projects under an agreement with SDG & E.^{10/} Not until 1976 did SDG & E seek to include these costs in its ECAC for recovery from its ratepayers.^{11/} NARCO's previous efforts had been directly financed by the utility's private owners. NARCO's expenditures are limited, both by agreement and PUC order, to 5% of SDG & E's fuel budget.^{12/} The on-going NARCO work in the Imperial Valley was approved by the PUC for pass-through^{13/} but future projects must obtain "prior recognition" and approval from that body in order to be recovered from ratepayers.^{14/}

It would not seem that the regulatory climate in California is hostile to utility involvement in exploration. Unfortunately, however,

this area is of marginal significance in driving these firms toward acceptance of the geothermal alternative: The very capable men who are in charge of SCE and SDG & E's resource programs^{15/} are more developer than utility officer. They do not make the ultimate fuel-mix decisions. Their always sound advice is, unfortunately, not always heeded. If it were, there would be many more geothermal-based megawatts on line in Southern California.

Given the utilization and reservoir skepticism prevalent in most utility managements throughout the West, it will take more than an encouraging treatment of resource exploration costs to make geothermal a reality. What else could and should state utility regulators do? Is the IBP's suggestion of a higher rate of return a viable one? We frankly don't think so.

In order for any state utility commission to justify favoring a particular resource, they must be convinced that the resource in question is both economically competitive and exceedingly reliable. Though the former does not appear to pose any real problem, the aforementioned concern over geothermal reservoir performance strike at the very heart of any red-blooded P.U.C. operative. The spectre of even one geothermal system petering out prior to the end of its estimated "useful life" is enough to terrify the steeliest of regulators.

Nor is it helpful to insert a provision into law allowing the P.U.C. to set up shorter amortization periods for geothermal power plants, as California has done.^{16/} This "solution" fails to acknow-

ledge two problems. The shorter write-off means much higher costs per kilowatt (endangering the economics) and the "dead" system renders useless the plant sited upon it. A hole is therefore created in the utility's load.

Fears over reservoir reliability become even more pronounced when one considers that geothermal fields unlike, e.g., gas turbines, can not be stopped and started quickly. They must therefore be used to satisfy base load, as opposed to peak demand. Their performance must be virtually flawless.

Despite our skepticism on the subject, we can not deny that geothermal-based generating plants are at a severe disadvantage in the weird world of regulation because they exhibit lower costs per unit of installed capacity than do coal and nuclear facilities. This built-in bias is usually referred to as the "AJ" or "AJW" syndrome after the two economists who first brought it to light — Averch and Johnson.

It works like this: Assume that an IOU utility needs about 1000 Mw of additional generating capacity. Assume further that it has basically two alternatives: It can build nine, 110 Mw geothermal units at \$500 per installed kw (a total of \$55 million). Or it can build one, 1000 Mw nuclear plant at \$1000 per installed kilowatt (a total of \$1 billion). Both could be rate based at a regulatory-set 8% rate of return. Assuming respective fuel costs of 20 mills/kwh and 8 mills/kwh, the utility can make a much higher return on the nuclear plant expenditure than on the geothermal.

This is true even if the geothermal operation is vertically-integrated (due in part to systems like California's ECAC) and the nuclear is not. In that situation, even if the field's capitalized costs equal \$300/kw, this brings the total geothermal cost to \$800/kw or \$88 million, far less than the nuclear. When the allowable return is applied to both, the nuclear brings in much more revenue. If access to adequate capital is no problem, the nuclear plant will be chosen every time.

There are other reasons for the utility to prefer the nuclear unit, of course. While nuclear plants have shown fairly high "outage" (or down time) rates, ^{17/} there is at least a "track record" of reliability to examine. Only dry steam geothermal, a seeming exception, has a similar history.

Despite these other, non-economic problems, the large difference in utility revenue caused by the Averch-Johnson effect remains a prime geothermal stumbling block, all the moreso since it will exist when the siting clearance, technological and other barriers have been removed. But how much higher a rate of return is necessary to balance this bias? Theoretically, it should be enough to equal the utility's revenue from other facilities. Absent vertical integration, this might require allowance of truly Herculean rates on geothermal plants. In our example, the utility would reap \$80 million in revenue from the first full rate basing of the nuclear plant, and only \$63 million from the nine geothermal plants. Does this mean that geothermal plant expenditures must be allowed a 33%

higher return to be "competitive"? If so, such a proposal is not likely to win state regulatory approval.

There is also the institutional factor involved in getting siting and other permits for nine separate plants, instead of one. Although we might assume that the nuclear installation would have more trouble from environmentalist and consumer challenges, etc., it is also true that the four recent Geysers units (numbers 12 through 15), none of which is in a coastal or other "sensitive" area, took more than two years for approval. Despite recent improvements in California Energy Commission procedures for siting geothermal power plants (and the troubles confronting nuclear proposals), the sheer work involved in obtaining a half dozen or more approvals as opposed to one still militate, when combined with Averch-Johnson and reservoir skepticism to push utilities toward coal and even oil-based generation.

Nor are utility tax breaks a likely answer. They pay little in tax anyway due to whopping investment tax credits, etc.. In California, after Prop. 13, their property tax component is also diminished.

It may be that, at present, it is necessary to find, create or stimulate someone other than the regulated utilities into building geothermal power plants. This group must be able to utilize federal tax breaks and be outside of the PUC regulatory sphere. They should also be more eager than the utility sector has been to utilize the GLGP.

A few large engineering firms, including Rogers and Morris-Knudsen, have begun to emerge as leaders of this necessary "intermediary" industry sector.

They are anxious to get in on the ground floor of a new line of business, as well as to take advantage of the additional large investment tax credits for "alternate energy" equipment which will soon be forthcoming as part of the National Energy Plan.

Their ability to obtain commercial bank financing is far greater than that of the smaller resource developers, who have thus far been the only possible source of non-Geysers power plant construction.

They do not appear averse to GLGP participation. The only remaining question involves their willingness/ability to raise the 25% equity portion of plant project costs.

Two solutions are possible. The states could set up a bail-out fund to "cover" these companies or their outside investors, protecting them against loss of this equity while allowing them to obtain the benefits of the increased tax credits. Some sort of state-controlled "screening system" for approval of loss payments would have to be set up to avoid GLGP assertions that the 25% was not equity due to the state's back up. This does not seem to be an insurmountable obstacle. California is currently considering the creation of such a fund, and has obtained the underwriting assurances of at least one investment backing firm should it proceed.

The other possible solution is the aforementioned suggestion of Paul Rodzianko. Reducing the equity requirement to 10% on plants

of 25 Mw or less might be another successful approach. Our only fear is that the reservoir knowledge obtained from operating, say, a 10 Mw plant would be inadequate predictors of its performance for 110 Mw and up. If it were adequate, then this vehicle must also be considered.

FOOTNOTES

- 1/ At that time the Federal Power Commission (FPC).
- 2/ IGCC-IBP, "Institutional Barriers To Geothermal Development", May 14, 1976.
- 3/ id.
- 4/ ibid., at p. 18.
- 5/ CAL. PUB. UTIL. CODE §740.
- 6/ Each utility requests that the P.U.C. set up an "Energy Exploration and Development Adjustment" (EEDA) in its expense line entitled "Energy Cost Adjustment Clause".
- 7/ The Geothermal Experimental Loop Facility (GELF).
- 8/ Calif. P.U.C., "Staff Report on The Exploration And Development Programs of San Diego Gas & Electric Company, Case No. 10056, Application 56877" (S-2278, 2/10/77), at p. 5.
- 9/ id.
- 10/ ibid., at p. 1. S.D.G. & E.'s own Gas Department had asked the P.U.C. in 1972 to allow it to conduct such programs directly, but had been turned down. See Decision No. 80432, (Aug. 29, 1972).
- 11/ Application 56877.
- 12/ CAL. P.U.C. Staff Report, op. cit., at p. 4.
- 13/ ibid., at p. 7.

14/ *ibid.*, at p. 4.

15/ Mel Swinney of Mono Power and Jim Nugent of NARCO.

16/ CAL. PUB. UTIL. CODE § 456.5.

17/ Their load factors have just recently surpassed the 60% mark.