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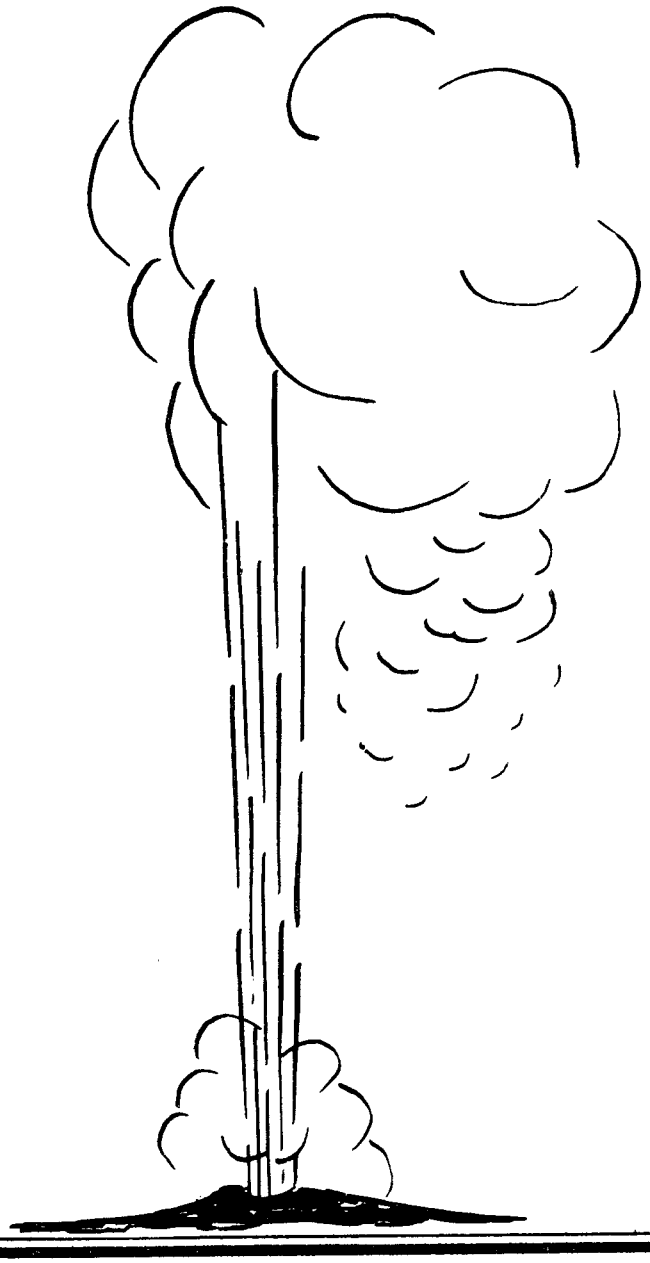

THE GEOTHERMAL LOAN GUARANTY PROGRAM AND ITS IMPACT ON GEOTHERMAL EXPLORATION AND DEVELOPMENT

By
Louise H. Nasr

May 1978

Work Performed Under Contract No. ET-78-C-02-4635

Colorado School of Mines
Golden, Colorado

U. S. DEPARTMENT OF ENERGY
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ABSTRACT

The study provides an evaluation of the impact of the Geothermal Loan Guaranty Program on geothermal development in the United States. The report includes an assessment of the program's impact on private and public decision making for investment in geothermal resource development.

The legislative background, the current and potential applications, the operating procedures, and the review process of the Loan Guaranty Program are examined. Current problems resulting from external factors affecting the program (e.g. the ERDA-DOE transition, leasing practices, environmental regulations) are also presented.

The research methodology consisted of personal interviews with representatives of the financial community, the geothermal industry, and the utility companies. Government documents were reviewed for pertinent material. The perspective of lending institutions, private industry, and utility companies, were assessed and the conclusions were arrived at by the author as a result of an evaluation of the foregoing.

The study showed that the Geothermal Loan Guaranty Program has had only a negligible effect on geothermal development and the response to the program was far less than expected. The streamlining of environmental regulations and leasing policies, and the granting of intangible drilling cost write-offs and depletion allowances to operators would have had a greater impact on geothermal energy development. The loan guaranty program did not promote the undertaking of any new projects that would not have been undertaken without it. The program only accelerated the pace for some development which might have commenced in the future.

Included in the study are recommendations for improving the operation of the program thereby increasing its attractiveness to potential applicants.

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INTRODUCTION

Loan guaranties to stimulate investment and development for social or political benefit have been used in the United States for over 30 years with varying degrees of success. The use of this vehicle as an incentive to develop energy resources and technologies is new; and its success in achieving the objectives has not yet been determined.

The United States government has several programs directed at the development of geothermal resources[1]. The potential contribution of this resource to total energy supply has been estimated to be between 3-10 percent. Its role is especially significant in the western United States, where over 60 percent of geothermal resources are estimated to exist. The United States Geological Survey (CI 726, 1975) assessed the resource potential and estimated potential electric generating power to be 42,000 MW·cent[2] or 140,000 MW for 30 years. Three types of geothermal resources were

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(1) Geothermal resources are defined as the stored heat, both identified and undiscovered, that is recoverable using current or near current technology regardless of cost (USGS CI 726).

(2) A megawatt century of electricity is a unit of energy equivalent to 1 MW of power produced for 100 years (or 3.33 MW for 30 years).

evaluated: vapor-dominated hydrothermal[3], liquid-dominated hydrothermal[4] (for temperatures of >150°C and 90-150°C), and geopressured fluids[5].

The Geothermal Loan Guaranty Program (GLGP) is one government support directed at developing this resource potential. Title II of the Geothermal Research, Development and Demonstration Act of 1974 (P.L. 93-410) provided the legislation for enactment of the program. The Geothermal Loan Guaranty Program was the first such program aimed at developing an energy resource and has provided a model for additional loan guaranty programs for coal, synthetic fuel, and electric and hybrid vehicles.

It is the objective of this study to evaluate the Geothermal Loan Guaranty Program, to examine its operation, and to estimate its current and potential use in developing geothermal energy.

Data Sources and Method of Analysis

Data were acquired from primary sources and personal contact with lending institutions, government, private industry, and utilities. Contacts were made on the basis of involvement

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(3) Geothermal convection systems containing saturated or superheated steam.
(4) Geothermal convection systems containing hot water.
(5) Areas of abnormally high fluid pressure.

in geothermal development and/or interest in the loan guaranty program. The San Francisco Operations Office (SAN), the administrating office for the program, provided the author with a list of potential applicants as discussed in Chapter III.

Government documents and internally circulated memoranda were reviewed for information and insight into the workings of the program in relation to government organization. The Department of Energy and before that, ERDA (Energy Research and Development Administration), has contracted several studies devoted to various government financial supports including loan guaranties, cost-sharing, direct grants, and tax subsidies addressing the potential for promoting development and commercialization of energy resources and technologies. Two studies by large research institutes, Harbridge House and Bradford National, deal with lending institutions' attitudes and potential activity with respect to government loan guaranties (see Bibliography).

Utilities, their involvement, obstacles, and potential for utilizing geothermal resources are well documented in two studies by Sheldon Bierman, et al: Innovation and Monopoly and Geothermal Energy and the Bulk Electric Power and Petroleum Industries (draft). Legal and tax issues are being studied extensively by Jack McNamara at the University of Southern California; two papers have been produced:

Geothermal Energy and the Law, Vol I: The Federal Lands Management Program (draft), and Vol. II: Preliminary Analysis of the Impacts of Federal Tax Reform on Geothermal Energy Development in the United States. The U.S. Senate and House of Representatives are also studying the prospects for using loan guaranties and their affect on various sectors within government and industry. The U.S. General Accounting Office is preparing a report to Congress on government involvement in geothermal development. The GAO conducted a survey by sending questionnaires (Appendix A) to 180 federal and state leaseowners; approximately 62 percent of them responded. A GAO draft report should be ready by Spring 1978 and a final report by Fall 1978.

These sources and others that were consulted addressed the Geothermal Loan Guaranty Program directly, loan guaranties in general as a financing mechanism, the financial climate in the geothermal industry, other government supports, and geothermal development in the United States. All are referenced in the bibliography of this paper.

Study Organization

This study begins with Chapter II, an overview of the geothermal industry - the state of the art, and current and future potential, in order to give perspective to the scope of the problem of developing geothermal resources.

Chapter III, "The Geothermal Loan Guaranty Program," focuses on the specifics of the program: applications received and pending, operating procedures, and the reviewing process. Legislative background sets the timeframe in which the program has evolved.

Chapter IV. "Externalities Affecting the Geothermal Loan Guaranty Program," lends insight to those factors impeding the development of the resource and the effectiveness of the loan guaranty program. Barriers, other than financial, that have prevented the industry from developing to a point where full advantage could be taken of such a program are evaluated.

Chapter V. "Evaluating the GLGP: Attitudes and Perspectives," elaborates the private sectors perceptions of the loan guaranty program. An understanding of how the program meets the needs and serves the purpose of lending institutions, private industry, and utilties is required to determine its potential capability. The existing problems for the use and operation of the loan guaranty program aid in evaluating its impact and are the basis for recommendations made in Chapter VI.

The uncertainty and risk associated with geothermal resources with respect to the legal, institutional, and technical barriers are outside of the scope of this paper,

except as they are an impediment to the functioning of the loan guaranty program. These subjects have been addressed in greater detail by others.

The geothermal industry and the government have traveled far up the "learning curve" in a matter of a few years. Growing pains are apparent in this "infant industry" but growth is taking place, regardless of the status of the loan guaranty program. It is the hope of the author that information provided herein will aid in furthering the understanding of the magnitude, complexities, and interdependencies of constraints affecting the geothermal industry.

STATE OF THE ART -- GEOTHERMAL ENERGY OVERVIEW

Geothermal resources were used for the generation of electricity first at Laradello, Italy in 1904; 250 kilowatts were being generated by 1931. Italy presently produces 417 MW of electricity. In 1958, New Zealand was the second country to generate electricity using geothermal resources, with current production of about 170 MW. The United States was the third country to produce electricity, beginning in 1960 at the Geysers. Presently, several countries are exploring for and utilizing geothermal resources for non-electric uses and for generating electricity: Iceland, Hungary, USSR, Japan, Mexico, Honduras, El Salvador, Nicaragua, and several others (Table 1).

The United States is the world's largest producer of electricity utilizing a vapor-dominated hydrothermal (dry steam) resource. The only geothermal power plant generating electricity, at the Geysers in California, currently produces 502 MW of electricity with plans to generate an additional 626 MW by 1981 (Table 2). Total potential for this area has been estimated to be 2000-2500 MW.

Table 1

Worldwide Approximate Electric and Non-Electric Use of Geothermal Energy, 1976

Country	Operating Power (MW) Operating	Planned	Non-Electric (MW)
Hungary	--	--	380
Iceland	3	55	285
Italy	417	15	15
Japan	170	--	25
Mexico	75	75	--
New Zealand	170	210	120
United States	502	626	15
U.S.S.R.	6	20	5,100
El Salvador	30	30	--
Guadaloupe	--	30	--
Turkey	--	10	--
Nicaragua	--	100	--
Total	1,373	1,171	5,940

Based on data provided from: Birsic, 1976 and Howard, 1975 (cited in Sacarto, pg. 3)

Table 2

Existing and Expected Capacity at the Geysers Geothermal Power Plants

Unit	Year	Capacity Net KW	Capacity Cum.	Capital Cost Est. Total $(000's)	Capital Cost Per KW $	Steam Producer
1	1960	11,000	11	1,750	159	U-M-T
2	1963	13,000	24	2,200	169	U-M-T
3	1967	27,000	51	3,790	140	U-M-T
4	1968	27,000	78	3,170	117	U-M-T
5	1971	53,000	)			U-M-T
6	1971	53,000	184)	11,500	108	U-M-T
7	1972	53,000	)			U-M-T
8	1972	53,000	290)	11,900	112	U-M-T
9	1973	53,000	)			U-M-T
10	1973	53,000	396)	13,500	127	U-M-T
11	1975	106,000	502	14,404	136	U-M-T
12(C)	July/78	106,000	608	21,500	203	U-M-T
13(C)	July/79	135,000	743	28,900	214	Burmah (Aminoil)
14(C)	Feb/79	110,000	853	28,000	255	U-M-T
15(C)	Sept/78	55,000	908	17,300	315	Thermogenics
16(P)	May/81	110,000	1,018	42,400	385	
17(P)	May/81	110,000	1,128	41,600	378	

C-under construction
P-planned, government approvals pending
U-Union Oil Co.
M-Magma Power Co.
T-Thermal Power Co.

Source: Birsic, 1976; Pacific Gas and Electric and Union Oil Company, Promotional Material, 1976.

Resource Potential

Electric generating potential from hydrothermal convection systems[6] and geopressured sedimentary environments[7], assumed recoverable with present and near-current technology and without regard to cost, are presented in Tables 3 and 4. Electric potential from hydrothermal reserves is 3,500 MW·cent or 11,700 MW for 30 years, with an equal amount from paramarginal resources. Undiscovered hydrothermal (>150°C) resources are estimated to have a potential, assuming 60 percent recoverable at prices 2X present prices, of 38,000 MW·cent (126,700 MW for 30 years). Geopressured fluids of the Gulf Coast range in potential from 9,000 to 35,000 MW·cent (31,000 to 115,000 MW for 30 years) depending on factors of production (excluding methane gas). Production potential from identified hydrothermal and geopressured systems, disregarding cost, with present or near present technology is estimated to be about 42,000 MW·cent (140,000 MW for 30 years) (USGS CI 726, pg. 155).

Hot dry rock, methane gas from geopressured resources, and yet undiscovered hydrothermal convection systems will be of significant contribution to the national energy needs. USGS

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(6) Heat is transferred by convection circulation of water or steam rather than by thermal conduction through solid rock (CI 726, p. 5).

(7) Deposition of fluids under abnormally high pressures in sediments.

Table 3

Geothermal Resources of Hydrothermal Convection Systems

	10^{18}cal 1/	Electrical energy MW·cent 2/	MW for 30 years 3/
High-temperature systems (>150°C; for generation of electricity)			
Identified resources	257		
Reserves 7/		3,500	11,700
Paramarginal resources 8/		3,500	11,700
Submarginal resources 9/		>1,000 4/	>3,300 4/
Undiscovered resources	1,200	38,000 5/	126,700 5/
Intermediate-temperature systems (90° to 150°C: mainly non-electrical uses).			
Identified resources	345		
Undiscovered resources	1,035		
TOTAL	2,837	46,000	153,400

1/ 10^{18}cal (a billion-billion calories) is equivalent to heat of combustion of 690 million barrels of oil or 154 million short tons of coal; these estimates exclude the national parks.
2/ Unit of electrical energy; 1 MW·cent is equivalent to 1000 KW produced continuously for 100 years.
3/ Assumes that each MW·cent of electricity can be produced at rate of 3.33 MW for 30 years.
4/ Small because of exclusion of systems with temperatures below 150°C.
5/ Perhaps as much as 60 percent will be reserves and paramarginal resources; costs of discovery and development are more speculative than for identified resources.
6/ Reserves: recoverable with present technology and competitive cost.

7/ Paramarginal: recoverable with one to two times current energy costs.
8/ Submarginal: recoverable at greater than two times current prices of competitive energy sources.

Source: U.S.G.S. CI 726, p. 150.

Table 4

Geothermal Resources of Geopressured Sedimentary Environments

	Heat in pore fluids 10^{18}cal 1/	Electrical energy, MW·cent 2/	MW for 30 years 3/
Gulf Coast geopressured fluids in sediments of Tertiary age; assessed on-shore parts only, to depth ranging up to 7 km.	10,920		
Thermal energy		24,380	81,260
Mechanical energy (thermal equivalent)		9,970	33,230
TOTAL		34,350 4/	114,490 4/

1/ Thermal energy only; 10^{18}cal is equivalent to heat of combustion of 690 million barrels of oil.

2/ Units of electrical energy; 1 MW·cent is equivalent to 1000 kw produced continuously for 100 years.

3/ Estimates made for 20 yr. production period; converted to 30 yrs. to be consistent with other estimates of this circular.

4/ Perhaps in part reserves but mostly paramarginal, depending on environmental and other costs.

Source: U.S.G.S. CI 726, p. 151.

estimates potential for these resources to be at least 100,000 MW·cent (or 330,000 MW for 30 years).

Leasing

Leasing activity on federal land was supposed to have been spurred on with enactment of the Geothermal Steam Act of 1970 (P.L. 91-581); however, several problems have dampened this effort. Regulations for the implementation of the leasing program were not completed until December 1973 and the first lease sale was in January 1974.

The Bureau of Land Management (Dept. of Interior) was designated the lead agency, working with the U.S. Dept. of Agriculture (Forest Service) to issue competitive lease sales for KGRA's (Known Geothermal Resource Areas) and noncompetitive lease applications for land authorized for geothermal exploration but not designated as KGRA's.

The competitive lease sales are made by bonus bidding--the lease is sold to the highest qualified bidder. A corporation established to do business in the U.S. or an individual can bid on a lease.

The U.S. Geological Survey has identified 106 KGRA's in a total area of greater than 3.3 million acres. These are listed in Appendix B.

Since January 1974 and as of January 30, 1978 federal leasing activity has been as follows: 178 competitive leases

totaling 349,659 acres and 1,024 non-competitive leases totaling 1,673,505 acres were issued (Bureau of Land Management, oral communication).

Of the 3.3 million acres located in 10 western states and Alaska designated KGRA's, 1 million acres are on Federal land. An additional 96 million acres are listed as having potential value for geothermal resources; of these, 58 million acres (60 percent) are on Federal land.

Only 10.5 percent of all KGRA's and only 3 percent of federal lands authorized for geothermal exploration have been leased. Many firms conduct some exploration before leasing but these efforts are not impressive with respect to the potential development of geothermal resources.

Private land is also leased for geothermal exploration and development. The extent of private leasing activity is difficult to monitor but is thought to be more extensive than leasing of state and federal lands partially due to the delays and paperwork involved in federal leasing procedures.

Several major oil companies are active in geothermal leasing and development. Appendix C presents competitive lease sales as of December 31, 1977, and is also a good indication of which firms are involved in geothermal leasing and the competition for leases.

Drilling Activity

Drilling is an expensive venture and capital must be available in order to locate additional geothermal reserves. Table 5 represents typical drilling costs.

Drilling activity for geothermal resources has not been significant compared to the number of oil and gas wells drilled in the United States. The majority of all geothermal wells have been drilled at the Geysers. The Imperial Valley is the only other area with significant drilling activity. Table 6 represents the number of geothermal wells drilled in 1975, 1976, and 1977. Appendix D lists drilling by operator and location. Drilling, together with leasing activities listed by operator indicates those most active in exploring and developing geothermal resources.

Table 6

Geothermal Wells Drilled in the United States, 1975-77

Year	Geysers	Imperial Valley	Other Locations	Total
1975	24	10	18	52
1976	30	16	19	65
1977	32	8	18	58

Drilling taking place in states other than California includes New Mexico, Nevada, Utah, Idaho, Oregon, and Hawaii.

Table 5

Drilling Costs for Geothermal Wells

Depth (KM)	$ Total Cost	Average Cost/Meter	Marginal Cost/Meter	Source
0.5	50,000	100	100	Meidav
1.0	150,000	150	200	Meidav
	150,000	150		USGS
2.0	420,000	210	270	Meidav
	300,000	150	150	USGS
	300-520,000	166-216		Rex
3.0	810,000	270	390	Meidav
	500,000	167	200	USGS
	425-770,000	170-260	250	Rex
5.0	1,000,000	200	250	USGS
	635,000-1,055,000	200-230	250	Rex
10.0	5,000,000	500	800	USGS
	2,750,000	300	340	Rex

Source: Sacarto, State Policies for Geothermal Development, 1976, p. 25.

These figures are not significant if 20,000 MW is expected to be generated by the year 2000. Problems associated with drilling activity are dealt with in Chapter III.

Status of Geothermal Prospects

Presented here is the current status of six principal geothermal areas and the potential development associated with each. Figure 1 presents the location of these and other areas undergoing various phases of development.

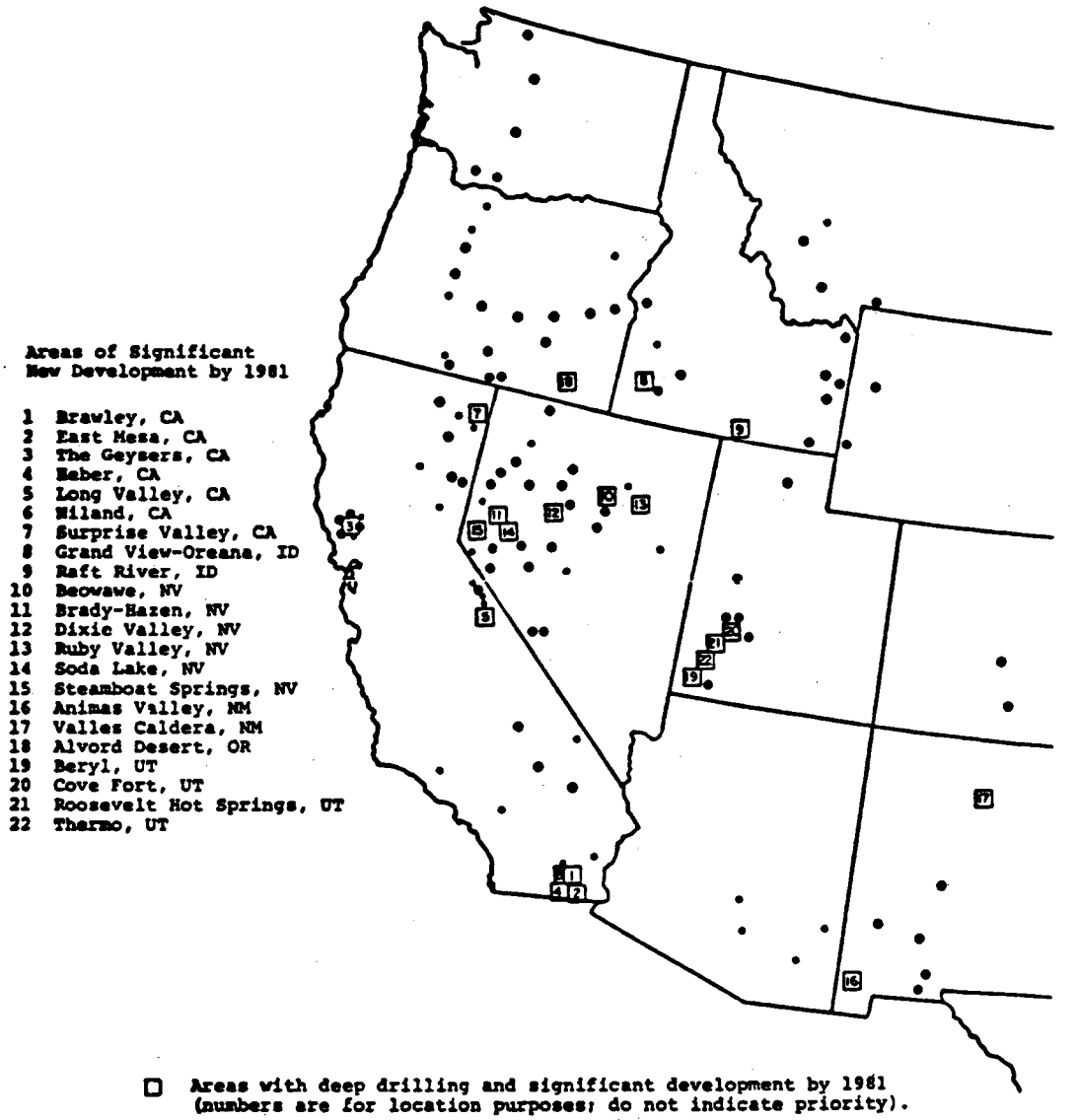
The only power plant in operation is at the Geysers in California. The eleven power plants mentioned here, in planning stages, should generate an additional 435 MW (excluding the Geysers); six of the eleven potential power plants would be financed with federal loan guaranties and two are candidates for the government cost-shared demonstration plant.

I. Geysers

1) Pacific Gas and Electric Company owns the power generating units. Union Oil is the operator, Thermal Power Co., Magma Power Co., Aminoil, and Thermogenics, Inc., are steam suppliers. Current power is 502 MW, with an additional 626 MW planned.

2) The California State Department of Water Resources plans to build a 55 MW power plant to be operating by 1983. An estimated $25 million will be spent on construction. McCulloch Oil Co. will supply the steam earning working

Figure 1. Geothermal Resources Development.



Source: U.S. Fish and Wildlife Service, Department of Interior, Geothermal Project, 1976.

interest revenues of 49 percent, with Geothermal Kinetics, Inc., receiving 30 percent and Entex Petroleum 21 percent. Financing will be via conventional means, e.g. revenue bonds (The Geysers, 1977).

3) The Northern California Power Agency has contracted with Shell Oil to supply steam for a 55 MW power plant. This is pending financing with a federal loan guaranty and negotiating a contract with Pacific Gas and Electric to transmit the electricity.

II. Imperial Valley, California

East Mesa

4) Magma Power Company (Imperial Magma) is constructing a 10 MW binary cycle[8] power plant, operation to begin in August, 1978.

5) Republic Geothermal, Inc. is doing field development work with a federal loan guaranty and plans to construct a double flash[9] 48 MW power plant.

Brawley

6) Union Oil Company has obtained a permit to construct a 10 MW single flash power plant. Possibly Southern California

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[8] Binary cycle: use of a heat exchanger to conduct heat from a geothermal brine to the working fluid (isobutane) which drives a turbine.

[9] Single or double flash: steam produced from hot water due to a decrease in pressure.

Edison or the Imperial Irrigation District will purchase electricity. Principal operators at Brawley are Union and Chevron.

Heber

7) San Diego Gas and Electric has submitted a proposal to DOE for the demonstration Program Opportunity Notice (PON) for a 50-MW binary cycle power plant costing about $42 million. Chevron, Magma, Union, and New Albion Resources Company (NARCO), a subsidiary of SDG&E are principal leaseholders at Heber.

Salton Sea

8) DOE and SDG&E have a cost sharing agreement that funded the construction of a 10-MW binary cycle Geothermal Loop Experimental Facility--in operation since May 1976. Principal operators are Magma Power Co., Southern Pacific Land Co., and Southern California Edison. A 50-MW flash binary power plant is under consideration.

Westmoreland

9) Republic Geothermal and Mapco jointly lease and operate this prospect. An application for a federal loan guaranty has been submitted for reservoir assessment and drilling. A 50-MW double-flash power plant is planned.

III. Desert Peak (Brady-Hazen), Nevada

10) Phillips Petroleum is the principal operator. Sierra Pacific is interested in purchasing electricity at the busbar.

A 50 MW double flash power plant is under consideration. The Geothermal Energy Corporation and Morrison-Knudsen are involved in the negotiations; submission of an application for a loan guaranty is pending.

IV. Beowawe, Nevada

Chevron and Chevron/American Thermal are the principal operators. Sierra Pacific had spent some $300,000 without success. The operators plan for extensive exploration.

V. Roosevelt Hot Springs, Utah

Principal operators are Phillips Petroleum and Thermal Power Co.

11) Rogers Engineering is submitting an application for a federal loan guaranty for construction of a 52 MW double flash power plant at a cost of about $35 million. Utah Power and Light will purchase the electricity and Phillips Petroleum will supply the resource.

12) O'Brien Resources, together with VTN, Thermal Power Company, and AMAX Exploration are submitting an application for a federal loan guaranty to drill 8-9 wells, including 3 reinjectors, and construction of a 55 MW double flash power plant. Negotiations are underway to sell electricity to the city of Bountiful.

VI. Valles Caldera, New Mexico

13) The principal operator is Union Oil Co. Union has submitted a proposal to the Department of Energy for the construction of a 50 MW flash demonstration plant in response to the PON. The Public Service Company of New Mexico is the utility involved in this venture.

Many other areas are being explored for geothermal resources and development: a) Cove-Fort Sulphurdale, Utah-Union, b) Coso Hot Springs, California, China Lake, Naval Weapons Center has requested proposals and is looking for a developer. c) Beowawe, Nevada - extensive exploration by Chevron Oil Company, d) Raft River, Idaho - Department of Energy, binary cycle power plant, e) Los Alamos Scientific Laboratory, New Mexico - Hot Dry Rock Geothermal Energy Project funded since 1970; drilled into 200°C granite to 3 KM. A 10 MW (thermal) binary cycle power plant is planned, f) Hawaiian Islands- exploratory drilling in Kilauea and Puna. Geopressured resource potential and feasibility are being studied extensively at the University of Texas, Bureau of Economic Geology, which was awarded $17 million in grants from the Department of Energy.

Non-electric Utilization

Significant thermal resources, 700 MW_t worldwide (Lund, OIT), are available for direct application, including space

heating, crop drying, industrial processing, sugar refining, fisheries, agribusiness, hydroponics, greenhouse complexes, pulp and paper processing, absorption - refrigeration, amonia synthesis, and chemical extraction. Space heating utilizes low enthalpy hydrothermal convection systems of temperatures 65-100°C. Transmission distance of 50-100 km has been calculated and a 20 km distance is in use presently. Direct use offers high conversion efficiency of 80-90 percent, technology is presently available, and direct use costs are 60-75 percent of the fossil fuel costs, payback is 5 to 10 years (Geothermal Resources Council Symposium, 1978).

The possibility of using spent geothermal resources from electric generation for a secondary use can be a contribution to increasing efficiency and decreasing costs. The rate of return for direct use is lower than for electric use but the payout is faster and capital investment is not extensive.

Klamath Falls, Oregon, Pagosa Springs, Colorado, and Boise, Idaho use their geothermal resources for extensive municipal and private residence space heating with plans for expansion. Currently, industries are utilizing geothermal resources for food processing, fisheries, hydroponics, greenhouse complexes, but it is insignificant in comparison to the potential use.

Figure 2 indicates some of the uses and their corresponding temperatures for nonelectric application of geothermal fluids.

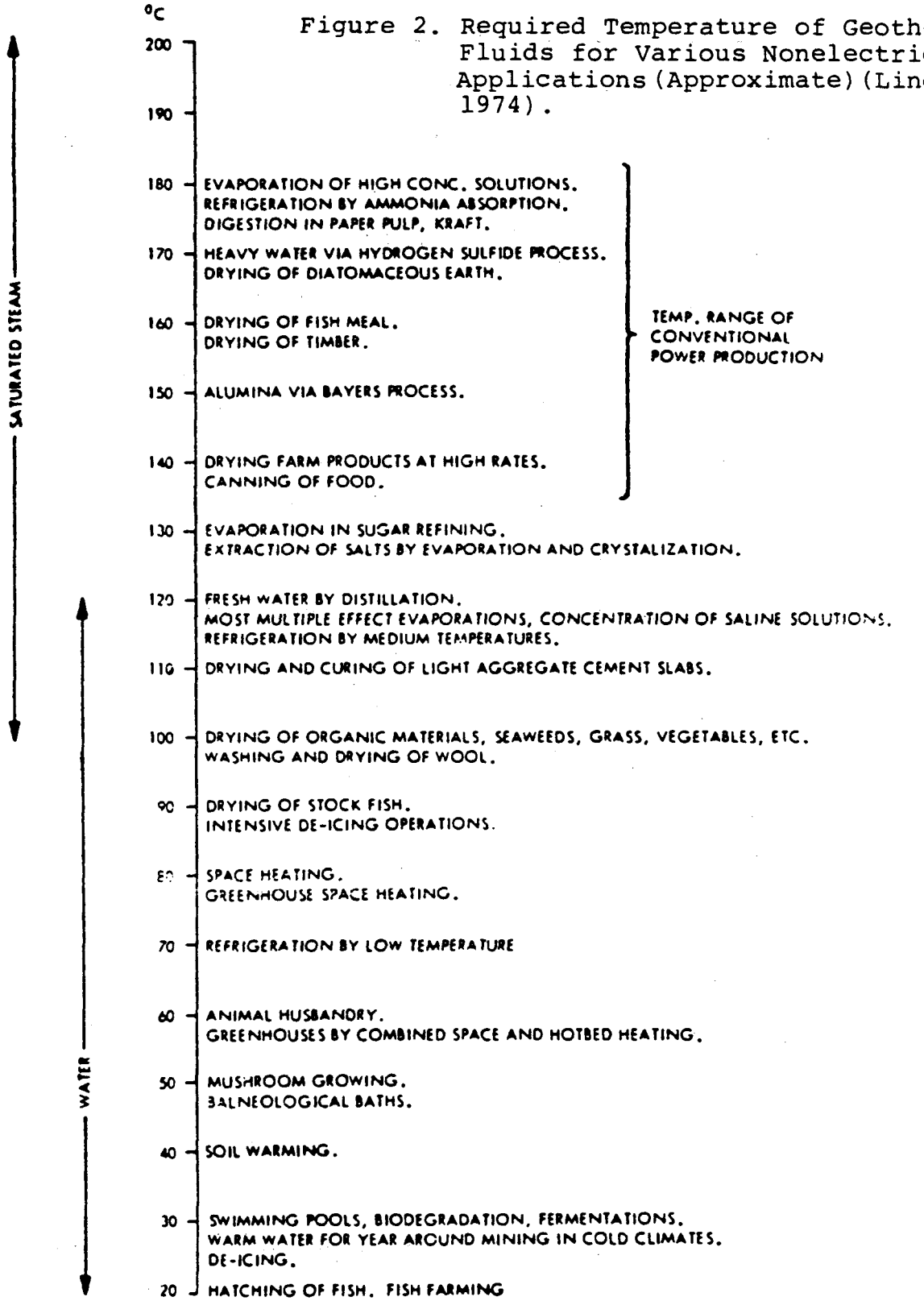

Figure 2. Required Temperature of Geothermal Fluids for Various Nonelectrical Applications (Approximate) (Lindal, 1974).

Source: Geothermal Resources Council, Direct Utilization Symposium, 1978.

Industry Structure

The geothermal industry is fairly new and most firms began their industry involvement 5 to 7 years ago. The industry is relatively small, with major developments involving a few firms. Reviewing leasing and drilling activity provides a good indication of which firms are more active. These are listed in Appendix E. Planned power plant construction, as outlined in the previous section, indicates Chevron, Phillips, Magma, and Union to be leading the way. Other projects involving field development, resource supply contracts, and potential construction of power plants involve Shell, Amax, Mapco, Thermal Power, Thermogenics, Republic Geothermal, Geothermal Kinetics, Geothermal Resources International, McCulloch Oil, Aminoil, and Phillips Petroleum.

Utilities, engineering firms, land ventures, and municipalities are also involved in several stages of geothermal resource development. Table 7 lists these firms and the various stages of development in which they are most likely to participate.

There are basically four areas the industry is directed towards:

1) Land acquisition:

    a) federal - state
    b) private

2) Exploration:

    a) initial exploration - geological and geophysical surveying. May precede lease acquisition.

Table 7

Types of Firms and Involvement in Geothermal Development

	Lease Acquisition	Exploration	Field Development	Power Plant Construction
Oil Companies (1)	x	x	x	
Geothermal firms (1,2)	x	x	x	0
Engineering firms				0
Municipalities (3)	x	x	x	x
Utilities (3)	x	x	x	x

(1) sell resource; (2) sell electricity; (3) transmit electricity.

X-probable
0-possible

b) exploration drilling - thermal gradient holes, observatory wells, deep wells.

3) Full field development:

Drilling production and injection wells.

4) Utilization of the resource:

a) generation of electricity
b) direct-use (nonelectric)

A firm or an individual acquires a lease and has several options depending on the objectives of the firm, value of the lease, and the type of organization. Leaseowners will try to increase the value of the lease by doing exploratory work and/or drilling to prove up a resource. A lease may then be sold to a developer who will engage in field development and either sell the resource to another party or the developer may engage in the construction of a power plant and sell the electricity to a utility, or engage in a joint venture with a utility who will build a power plant.

The experience in geothermal is similar to that in oil and gas: small independent firms are doing the exploration and the larger firms with better access to capital are developing the field. Several small firms are engaging in promoting resource utilization by joint venturing with resource owners, engineering firms, operators, leaseowners, utilities, and municipalities. Arrangements have been made whereby a resource owner contracts to supply steam to a power plant facility at

a specified price and a utility purchases the electricity and most probably will option to purchase the power plant after several years of proven feasibility. The question remains as to whom will pay for the power plant. The developer is willing to finance the development of the field but neitherhe nor the utility companies, for various reasons (capital requirements, reservoir uncertainties, and regulatory issues) have been willing to finance liquid-dominated power plant construction. Several small independent firms are willing to act on behalf of a utility and resource supplier and apply for a loan guaranty to finance this construction.

Financial Arrangements

Financing for geothermal development is made available by the same mechanisms as in other resource investment oppotunities. Raising capital for geothermal ventures differs in that the resource is unconventional, expensive to exploit, and involves a high level of risk. The payout is longer than for oil and gas, and many uncertainties including tax treatment make financing more difficult.

Geothermal investments are judged by the same criteria as other natural resources but may be viewed more critically and a higher rate of return may be required due to higher risks. Geothermal projects must compete for capital in a thin market, and with other investments of large integrated

firms.[10] The considerations for investment may be: undiluted interest to retain full control, cost of capital, and minimization of front end exposure.

Oil companies and other well-established industries, geothermal enterprises, municipalities, and utilities have different means of raising capital. Large established firms may sell securities to raise capital or use internally generated funds from other investments. Commercial banks will lend money to these firms at prime interest rates and generally they have little problem of financing. Smaller firms will seek capital through joint ventures with the larger firms, selling limited partnerships, or the venture capital market. A leaseowner or small "independent" may joint venture with a developer who has available capital. Drilling programs are a source for raising high risk capital. The limited partnership is used widely in the geothermal industry because it provides the operator with control and limits the liability of the limited partners to the amount of the investment and allows for attractive tax consequences. Table 8 identifies the sources of capital for different types of firms.

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[10] The University of Pennsylvania, Energy Center, is under contract to the Division of Geothermal Energy, DOE, to study investment decisions for geothermal resources.

Table 8

Capital Formation for Geothermal Projects

Large established firms e.g. oil comp.	) internal cash flows) commercial lenders) securities offerings) drilling contributions from other firms) joint ventures-land, drilling, federal government
small firms e.g. lease exploration	) venture capital - drilling programs) joint ventures - general partnership) limited partnership) farm-outs federal government
Municipalities	- revenue bonds federal government
Utilities	- revenue bonds federal government

Government and Geothermal Development

The federal governments expectations for the development of domestic geothermal resources are shown in Tables 9 and 10. Potential electricity production from geothermal resources according to ERDA is 3000-4000 MW by 1985. The expected estimated utilization of the resource has undergone change from 1975 to 1977.

Table 10 was published a little more than a year after Table 9, at which time the figure for electrical generation was halved. The estimate is qualified by the assumption that federal program implementation is "successful." Many people in the geothermal industry have doubts of 3000-4000 MW generating by 1985. PG&E at the Geysers, as planned, will

Table 9

Estimated Geothermal Utilization Given Successful Federal Program Implementation*

	1985	2000	2020
Electric Capacity (MW)	6,000	39,000	140,000
Electric Applications Equivalent Energy (Quads/yr)	0.5	2.9	10.4
Nonelectric Applications (Quads/yr)	0.1	1.5	8.2
Total Energy (Quads/yr)	0.6	4.4	18.6

Quad - 10^{15} Btu

*Assuming - 1 MW hr - 10^{7} Btu 85 percent load factor

Source: Definition Report, DGE, ERDA, Oct. 1975.

Table 10

Intended Commercial Geothermal Utilization Potential Given Successful Federal Program Implementation

	1985	2000	2020
Electric Capacity (MW)	3,000-4,000	20,000-40,000	70,000-140,000
Electric Applications			
Equivalent fossil fuel energy (Quads/yr)	0.2-0.3	1.5-3.0	5-10
Nonelectric applications (Quads/yr)	0.1	1	8
Total Energy (Quads/yr)	0.3-0.4	2.5-4.0	13-18

Quad = 10^{15} Btu

Source: ERDA, Program Approval Document, Fiscal Year 1977, Geothermal Energy Development, January 17, 1977. (Bierman, p. 63).

have about 1125 MW by 1981 and if the 11 power plant projects outlined in this report are completed, that will mean an additional 435 MW. Given the time constraints of drilling, permitting, construction, capital requirements, etc., one wonders where the additional 1500-2500 MW will come from.

The government is spending millions of dollars on research and development of geothermal resources trying to realize the numbers they have forecasted. Projects have been undertaken, much of which have been contracted out to private industry, to address technological developments, resource assessment, policy and planning issues, institutional and legal barriers, and financial incentives.

The ERDA budgetary outlays for the geothermal research, development, and demonstration program for FY 1978 was $68 million, an increase of $19 million from FY 1977. Table 11 presents budget outlays and authority for geothermal energy from 1975 to 1979. Appendix F contains the entire ERDA budget for FY 76 through 1978.

Legislation, cost sharing programs, tax incentives, and the loan guaranty program are efforts to promote exploration and development of geothermal resources. A survey of these programs is outlined herewith to present the extent and means of the programs in operation.

Table 11

Federal Budget for Geothermal Energy 1975-1979

	Budget Outlays (million $)	Budget Authority (million $)
1975 (ERDA)	21	28
1976 (ERDA)	30	32
1977 (ERDA)	49	100 (50 GLGP)
1978 (DOE)	93.5	126.2
	(6.6) GLGP	(15.0)
	(5.0) IDC	(5.0)
Total	81.9	106.2
1979 (DOE)	134.9*	145.7*
	(6.0) GLGP	(6.0)
	(10.0) IDC	(10.0)
Total	118.9	129.7
Non-federal support		
1975	10.7	10.9
1976	10.1	12.2
1977	5.8	5.9

* Excluding hydroelectric

GLGP - Geothermal Loan Guaranty Program

IDC - Expensing of intangible drilling cost

Note: Of the Department of Energy's first year budget, $10.4 billion, about 6.5 percent is for geothermal energy.

Source: Office of Management Budget, 1978, oral communication.

I. The Geothermal Loan Guaranty Program preceded the cost sharing programs. The GLGP less-than-successful history is often cited as reason for implementing additional programs. The Geothermal Loan Guaranty Program is described in detail in Chapter III. In short, the government will guaranty 100 percent of a loan of up to 75 percent of total project costs. Limits of the guaranty are $100 million per project and $200 million per borrower.

II. The Geothermal Reservoir Case History Program, an "industry coupled" program, offers 30 to 50 percent of costs to purchase information regarding drillholes in geothermal areas. The purpose is to publish the information obtained, thereby improving availablity of technical information. The program's architects hope to reduce risk and thereby reduce costs of developing geothermal energy, and hope to stimulate exploratory drilling. Geophysical data, subsurface logging and coring data, flow and pressure test data will be obtained from the participants.

Request for Proposals (RFP) is the means of soliciting bids from industry to participate in the program. Six contracts have been awarded to the following firms:

1) Union Oil Company of Los Angeles, Calif. to drill, test, and provide data from three 10,000 foot holes in the Cove Fort-Sulphurdale, Utah area. Estimated share by DOE: $2,560,000 (The Geyser, Oct. 1977).

2) Getty Oil Company of Bakersfield, Calif. to drill a 6,000 foot exploratory well at (South) Roosevelt Hot Springs, Utah. Estimated share by DOE: $396,000 (The Geyser, Oct. 1977).

3) Geothermal Power Company of Novato, Calif., to drill 15 heat gradient holes 300 to 500 feet, drill two 2000 foot observation holes, and drill three exploratory wells up to 7,000 feet in the Roosevelt Hot Springs area (northeast), Utah. Estimated share by DOE: $710,500 (The Geyser, Oct. 1977).

4) Thermal Power Company of San Francisco, Calif., to provide data on existing wells in the dome fault at Roosevelt Hot Springs, Utah. Estimated share by DOE: $282,000, 20 percent of Thermal's cost (The Geyser, Oct. 1977).

5) Seismic Exploration, Inc., of Salt Lake City, Utah, to obtain geophysical data north of the dome fault at Roosevelt Hot Springs, Utah. Estimated share by DOE: $11,740 (The Geyser, Oct. 1977).

6) University of Denver, Denver, Colorado, to test and provide data from a two-phase flow in the wellbore on an existing well at Roosevelt Hot Springs, Utah. Estimated share by DOE: $67,330 (The Geyser, Oct. 1977).

Private industry has expressed concern in turning over proprietary information to the government. Several factors account for their concern: private industry-government relationship and economic effects. Industry is concerned with government's involvement in developing energy resources. It may also prove to be an economic disadvantage to some firms, while an economic advantage to others. For example, if two firms have adjacent leases and one finances exploration with private funds only while the other uses government assistance, the economics for the latter improve substantially. If several million dollars has been spent in an area by one leaseholder and information on the area is publicized by the government, the competitive advantage is lost. A company holds exploration data proprietary to gain advantage in purchasing future lease offerings. The Reservoir Case History Program may, therefore, inhibit exploration in areas where data will be made public. Several firms have expressed interest in this program in comparison to the loan guaranty program.

III. The Department of Energy has other cost sharing programs in electric and nonelectric utilization of geothermal resources. The Division of Geothermal Energy of the San Francisco Operations Office has offered two Program Opportunity Notices (PON), and has plans for another PON in addition to two Program Research and Development Announcements

(PRDAs) for site specific engineering and economic studies of nonelectric applications.

The first nonelectric PON was offered in 1977, with a closing date of November 30, 1977. A final decision granting eight contracts, out of a total of 22 proposals, was reached in February, 1978. Under ERDA, $1.5 million was allocated for this PON. Several of the grants were for space heating projects and one was for retrofit of a food processing plant.

The Geothermal Demonstration Plant (PON) estimated cost by DOE to be $130 to $150 million. The DOE share is expected to be 50 percent or less of the estimated cost. The closing date for the Geothermal Demonstration Plant Program Opportunity Notice was January 31, 1978. A decision is scheduled to be reached by September 30, 1978. The purpose is to support the design, construction, and demonstration of a power plant utilizing a liquid-dominated hydrothermal resource. It is hoped that the demonstration program will reduce reservoir uncertainty, demonstrate availability of the technology, and provide information on the performance and operation of the power plant and reservoir. ERDA proposed that the plant should be in operation by the end of 1982 and generate approximately 50 MW net electric power.

The Demonstration Program has been the subject of great debate in government and industry. The proponents of the

demonstration program feel that only a demonstration can provide the experience and data necessary to stimulate construction of power plants for utilization of geothermal resources. It is expected to be in operation by 1982. However, Magma Power Company expects to have its binary cycle power plant at East Mesa generating electricity in August, 1978.

The MIT Energy Laboratory Policy Study group has addressed government intervention in developing new energy technologies and the issues of funding a demonstration plant.

The MIT study concludes that:

> "In most cases, the long-run commercial potential of new technology, when evaluated prior to the introduction decision, will be independent of possible federal interventions in the introduction stage. In most cases, the costs of the introduction stage (which often is not recovered) during that stage, are a small fraction of the total cost of the product after introduction, if, when examined at the end of its development, a technology appears to be commercial in the long run, it usually is introduced and "commercialized" by the private sector (MIT, 1976, p. 72). In most cases ERDA demonstration programs, therefore, simply do not have very much leverage. They may be useful, but they are not often likely to be decisive in determining the fate of a new technology" (MIT, 1976, pg. 73).

> "Thus, ERDA's commercial demonstration programs can be viewed somewhat crudely as subsidies or offsets to the 'introduction stage'--i.e., the excess of cost over production revenues during the introduction stage"(MIT, 1976, p. 73).

It is important to mention the effect of such a program on normal investment decisions of private industry. A firm may decide not to invest or take the stand of "wait and see" if a project will potentially be subsidized by the government. If a firm can halve its cost of a commercial power plant by obtaining government subsidy, it is reasonable to believe the firm would prefer it; however, it is not to say that they would not have found other means to finance the project. A firm gains a competitive edge if it receives the subsidy. If such projects are only feasible with a subsidy, then the demonstration will do little to promote geothermal power plant construction even if it resolves technical uncertainties: unless it is believed that it is only those issues that are inhibiting the development.

Several problems associated with the resource and power plants arise out of the fact that each project is site specific. If the demonstration program can be at all successful, it must address geothermal fluids and geological areas that are diverse in nature. The current PON was directed at "a high-temperature, low-to-moderate-salinity resource with a binary or flashed steam power conversion cycle" (DGE Annual Report, April 1977, pg. 127). This does not eliminate technical problems associated with geology and geochemistry of fluids in other locations. The PON clearly states that current

plans include only one demonstration plant but, according to government officials, they are considering funding a second demonstration plant. The controversy surrounding this program will continue for some time.

Another form of government incentives are tax treatments of geothermal resources: percentage depletion and write-offs of intangible drilling costs. Legislation is currently pending to allow for these but it has been forthcoming for some time now. The geothermal industry feels very strongly about acquiring these tax deductions and that these will stimulate the industry.

Reservoir indemnity insurance, as an incentive to developing the geothermal industry, is a topic generating a lot of discussion. Members of the geothermal industry feel this could minimize the problem of the reservoir uncertainties of life and capability which they believe are the main obstacles to development. Legislation is being drafted to provide for reservoir indemnity insurance. At this time, it is difficult to determine whether or not this will become a reality.

In summary, little has been achieved in developing geothermal resources, in view of its large potential.

THE GEOTHERMAL LOAN GUARANTY PROGRAM

Chapter III is devoted to the Geothermal Loan Guaranty Program and the specifics of its operation. Discussed are the objectives and purposes of the legislation, budgetary allocation, expectations, operation and management of the program, processing and reviewing of applications, current status, and problems associated with the program.

Legislation and Objectives

The Geothermal Energy Research, Development, and Demonstration Act of 1974 (P.L. 93-410, Appendix G) was passed to facilitate in the development of geothermal resource potential. Title I of the Act established the Geothermal Energy Coordination and Management Project to conduct resource inventory and assessment, research and development, "initiate a program to design and construct geothermal demonstrations plants", and provide for scientific and technical education programs through the National Science Foundation.

Title II provides for the establishment of a loan guaranty program, assistance in the payment of interest charges, and establishment of the Geothermal Resources Development Fund.

Title III, General Provisions, states the requirements for carrying out the stated objectives of the Act.

The Law states that the purposes of the loan guaranty program are:

1. The determination and evaluation of the resource base (resource assessment),
2. research and development with respect to extraction and utilization technologies,
3. acquiring rights in geothermal resources (lease acquisition), and
4. development, construction, and operation of facilities for the demonstration or commercial production of energy from geothermal resources.

Under the terms of the Act, loan guaranties will be granted for up to 75 percent of project costs with the federal government guarantying up to 100 percent of the amount borrowed; the applicant contributes 25 percent equity. The amount to be guaranteed is limited to $100 million per project and $200 million per borrower.

The life of the program is 10 years, to terminate on Sept. 3, 1984, but all loans guaranteed up to that time will be honored according to the terms of the loan agreement. The maximum term for any loan guaranty is 30 years or "the expected average useful life of any major physical asset to be financed by such loan, whichever is less," (§790.6(h))

The loan guaranty program became effective June 25, 1976 as stated in the Rules and Regulations of the Federal Register of May 26, 1976 (10 CFR 790). See Appendix H.

As stated in the Rules and Regulations (10 CFR 790), the objectives of the loan guaranty program are:

1. To encourage and assist the private and public sectors to accelerate development of geothermal resources in an environmentally acceptable manner by minimizing a lender's financial risk.

2. To develop normal borrower-lender relationships in order that financing be made available without guaranties at some future time.

Priorities assigned to different types of projects are as follows:

1. Projects with promise of rapid energy production from geothermal resources.
2. Projects designed to demonstrate or utilize new technologies or produce advanced technology components.
3. Projects that will demonstrate or exploit the commercial potential of new geothermal resource areas.
4. Lowest priority is given to projects initially proposing geological and geophysical exploration, or the acquisition of land or leases.

In addition, priority within each of these categories was given first to projects from which the Federal government receives royalty payments and second, to projects undertaken by small companies and private utilities.

A small utility is one whose total electric output did not exceed four million megawatt-hours; and, a small business is a concern independently owned and operated, is not dominant in its field of operation, does not have assets exceeding $9 million, does not have net worth in excess of $4 million, and does not have an average net income, after Federal income taxes, for the preceeding two years in excess of $400,000 (average net income to be computed without benefit of any carryover loss). (§790.5(i)&(j)).

According to the Rules and Regulations, some entities are not eligible for obtaining a loan guaranty: 1) A loan application which meets a lender's standards without a Federal guaranty will be regarded by the Administration as not eligible for a loan guaranty under this regulation (§790.4(c)). 2) Also ineligible are entities whose income is excluded from gross income for purposes of taxation as stated in Chapter I of the Internal Revenue Code of 1954. This would exclude publicly-owned electric utilities, including utilities owned by municipalities, and public utility districts. 3) a project for extraction or production of geothermal by-products or the disalination of geothermal brines is also ineligible.

The "Technical Amendments to the Geothermal Energy Research, Development, and Demonstration Act," signed into law by President Carter on February 25, 1978 ameliorates several of the problems existing with the current law and regulation (see Appendix I for the text of these amendments).

The Amendments specifically address the inclusion of direct utilization of geothermal resources for new or existing facilities. In addition, it raises the maximum loan guaranty to $100 million per project and $200 million per borrower, pledges the "full faith and credit of the United States" to payment of the guaranties, establishes borrowing authority to meet default payments, and allows for interim payment of principal and interest to avoid default on worthwhile projects.

Budgetary Allocations

The Geothermal Resources Development Fund was set up to provide the necessary funds for carrying out the program, including any interest assistance to the applicants. There were no budgetary appropriations in FY 1976. The budgetary appropriations and dollars authorized to guaranty are as follows:

	Budget Appropriation (millions of dollars)	Loan Guaranties Budget Authorization (millions of dollars)
FY77	30	200
FY78	15	100
Total	45	300

$200 million was originally requested for FY78 but in light of the present status of the program, it was deemed unnecessary and an additional $100 million was allowed. Currently there is about $286 million authorized for guaranties. The decrease accounts for the 3 guaranties made for $13.644 million.

A total amount of $300 million is authorized for loan guaranties and $45 million was appropriated for program costs including payment of interest, operating costs, and default payments. ERDA had requested backup funds in the ratio of 1 to 4 against the total expected amount of loan guaranties. This was reduced by the appropriations committee to 1:7. In other words, the amount of money appropriated will cover one failure for seven successful loans.

A detailed accounting of the Geothermal Resources Development Fund is provided in the Budget of the United States Government, Fiscal Year 1979, presented in Appendix J.

Current Status of the Geothermal Loan Guaranty Program

As of February, 1978, one year and eight months after the program became effective, nine applications have been submitted for loan guaranties. SAN originally expected 17 to 20 applications during FY77 (Annual Report), but received only six. For FY78, the USGS was told to expect 10 applications for their review, although SAN has estimated that 2 to 4 applications for electric generation (application may be for exploratory drilling, field development, power plant construction), and 1 to 2 for nonelectric utilization, totaling a possible six applications. A FY79 budget request was based on the assumption of receiving 20 applications per year.

Table 12 is a summary of applications, including a list of those "currently being prepared." Most of these applications have not yet been submitted as scheduled, but it is not all inclusive, as some applicants do not appear on the list. A total of 28 applications were projected by SAN for 1978 according to the list compiled in August, 1977. SAN now only expects a possible maximum of 10 applications in 1978.

Table 13 is a breakdown of the nine applications submitted to SAN. Republic Geothermal Inc.(RGI), of Santa Fe Springs, California was the first to be granted a loan guaranty. The loan was for $9.03 million to finance the drilling of

Table 12

GEOTHERMAL LOAN GUARANTY PROGRAM APPLICATIONS

APPLICANT	PROJECT Location	PROJECT Type	AMOUNT (SM)	EXPECTED DATE Sub-mission	EXPECTED DATE Recommen-dation
I. Applications Received					
A. APPROVED					
Republic Geothermal	East Mesa, CA	Electric	9.03	10-76	Approved
Geothermal Food Processors	Brady Hot Springs,NV	Vegetable Dehydration	2.80	3-77	Approved
Geothermal Kinetics/ McCulloch Oil Co.	Brawley, CA	Electric	1.75	2-77	Approved
B. AWAITING ADDITIONAL INFORMATION					
Geothermal Resources	Geysers, CA	Electric	7.7	10-76	
GeoCal	Honey Lake, CA	Electric	2.27	10-76	
City of Burbank	Multi-site	Electric	25.0	3-77	
Diablo Exploration	New Mexico	Electric	21.8	3-77	
RFL-NCPA	Geysers, CA	Electric	14.5	9-77	
C. BEING PROCESSED					
RGI/MAPCO	Westmorland, CA	Electric	21.0	9-77	

II. APPLICATIONS CURRENTLY BEING PREPARED

APPLICANT	PROJECT Location	PROJECT Type	AMOUNT (SM)	EXPECTED DATE Sub-mission	EXPECTED DATE Recommen-dation
VTN	New Mexico	Power Plant	6.0	2-78	5-78
Geothermal Power Company	Utah	Electric	7.0	3-78	6-78
O'Brien Energy	Milford, UT	Electric	25.0	1-78	4-78
U.S. Geothermal	Broneau, ID	Electric	15.0	1-78	4-78
CU-4 Venture	Geysers, CA	Electric	18.0	1-78	4-78
Agriculture Group Ind.	Calistoga, CA	Hydroponics	2.0	11-77	2-78
Earth Energy	Geysers, CA	Electric	15.0	3-78	6-78
California Energy, Inc.	Geysers, CA	Electric	15.0	10-77	1-78
California Geothermal, Inc.	Geysers, CA	Electric	15.0	1-78	4-78
CU-3	Geysers, CA	Electric	12.0	12-77	3-78
CU-2	CA/UT	Power Plant	12.0	6-78	9-78
North State Growers	Susanville, CA	Non-electric	8.0	12-77	3-78
Technology International	Susanville Correctional Facility	Space Heating	0.8	1-78	4-78
Deuterium, Inc.	Geysers, CA	H_2S Scrubber	9.0	2-78	5-78
Geothermal Kinetics, Inc.	Powers Ranch, AZ	Electric	12.0	12-77	3-78
GEDCO/Thermal Power	Hawaii	Electric	25.0	6-78	9-78
NW Ground Covers	Klamath Falls, OR	Greenhouse	0.4	2-78	5-78
GeoCal	Honey Lake, CA	Hydroponics	2.5	11-77	2-78

Geothermal Kinetics, Inc.	Boggs Mountain, CA	Electric	8.0	2-78	5-78
RLK and Company	Timberline Lodge, OR	Space Heating	10.0	6-78	10-78
Republic Geothermal	Westmorland, CA	Electric	22.0	3-78	6-78
Argosy	Perrine Ranch, CA	Exploration	5.0	6-78	9-78
Republic Geothermal	East Mesa, CA	Power Plant	25.0	1-78	4-78
Geothermal Kinetics	ERDA Appl. #5, CO	Electric	5.0	12-77	3-78
Geothermal Kinetics	ERDA Appl. #6, MT	Electric	10.0	1-78	4-78
City of Susanville	Susanville, CA	Elec/Non-Elec.	18.0	12-77	3-78
Geothermal Kinetics	ERDA Appl. #9, CA	Electric	7.0	4-78	7-78
Geothermal Kinetics	ERDA Appl. #10, ID	Electric	10.0	4-78	7-78
Technology International	Susanville, CA	Space Heating	2.0	?-78	?-78
Technology International	Hot Lake Resort, OR	Space Heating	1.0	?-78	?-78
Technology International	LeGrande, OR	Space Heating	6.0	?-78	?-78
Technology International	Boise, ID	Space Heating	10.0	?-78	?-78
Technology International	Vale, OR	Space Heating	10.0	?-78	?-78
Whitewater Geothermal	ID	Space Heat/ Greenhouse	6.0	7-78	10-78
Geothermal Fisheries, Inc.	ID	Aquaculture	1.4	10-77	1-78
Garden Valley Geothermal	Garden Valley, ID	Space Heating	0.5	4-78	7-78

P.S. Ogden Power Company	Lakeview, OR	Space Heating	3.5	12-77	3-78
American Drilling and Grouting	New Mexico	Electric	9.0	1-78	4-78
III. POTENTIAL APPLICATIONS					
Geothermal Resources	Round Mountain, CA	Electric	15.0	mid-77	12-78
Geothermal Kinetics	ERDA Appl. #12, NM		8.0	early-78	mid-78
Geothermal Kinetics	ERDA Appl. #13, NV		12.0	early-78	mid-78
Geothermal Kinetics	ERDA Appl. #14, CA		9.0	early-78	mid-78
Diablo Exploration	Several projects		--	1978	1978
Aminoil	Several projects		--	1978	1978
Magma	Long Valley, CA	Electric	15.0	mid-77	1-78
Republic Geothermal	Imperial Valley, CA	Electric	15.0	mid-77	1-78
Coastal States Oil	CA	Electric	?	mid-77	late-78
Renewable Energy Systems	CA	Non-electric	?	mid-78	late-78
Morningside Heights	Boise, ID	Space Heating	2.0	mid-78	late-78
Sonadri	Carson City, NV	Electric	?	late-78	late-78
				late-78	

Source: San Francisco Operations Office, DOE, 1977.

Table 13

Applications Submitted for Loan Guaranties

NUMBER	DATE RECEIVED	PROJECT	LOCATION	TYPE	TOTAL COST	LOAN AMOUNT	INTEREST RATE	LENDER	DATE TO HQ / DATE APPROVED	TOTAL APPLICATION $
1	10-6-76	Dry Creek Exploration (GRI) w/Chevron Oil	Geysers	Expl-53MW	13.499	7.500	120%P +1/2%	Bank of America		$7.500
2	10-26-76	GeoCal (GeoProducts)	Honey Lake	Expl-55MW	3.654	2.269	125%P	Bank of Montreal		9.769
3	10-26-76	R-1975 Geothermal Energy Drilling Program (RGI)	East Mesa	Expl-36MW	12.045	9.030	120%P +1/2%	Bank of America	1/21/77 5/6/77	18.799
4	2-28-77	CU I Venture (McCulloch and Geothermal Kinetics)	Brawley	Expl-55MW	2.459	1.750	120%P	Bank of Montreal	8/6/77 9/30/77 (1/13/78)	20.549
5	3-2-77	So. Cal. Public Energy Corporation (Burbank)	24 sites	Expl-50MW Geo or 200MW Hybrid	34.188	25.000	6 1/2% to 1980 7% 1981-1985	Dean Witter, Trustee		45.549
6	3-4-77	Geothermal Food Processors	Brady Hot Springs	Food Dehydration Plant	3.815	2.864	P+2%	Nevada Nat'l Bank	8/6/77 9/30/77	48.128
7	3-8-77	Diablo Exploration	New Mex.	Expl-50MW	29.000	21.800	8.5%	Kidder Peabody, Trustee		70.212
8	9-14-77	RFL-NCPA	Geysers	Expl-66MW Field Dev.	19.322	14.489	8.75%	Berg & Co.		84.702
9	10-29-77	RGI/MAPCO Westmorland	Westmorland	Expl-55MW Field Dev.	28.981	21.0	8.85%(?)	Bank of America		105.702

eleven production wells and four reinjection wells at East Mesa in the Imperial Valley. RGI plans to develop the field and construct a 45 MW power plant on the site. The financing of the power plant will potentially be from another loan guaranty.

The second loan guaranty was granted to Geothermal Food Processors, Inc. (GFP), of Turlock, California. The project is for the design and construction of a vegetable dehydration plant at Brady Hot Springs, Nevada. Ten wells were previously drilled by Magma Power Company; four of these were considered useable for the project. According to GFP, utilizing geothermal fluids is replacing natural gas 100 percent, normally used for this type of venture. GFP expects to begin operation on September 1, 1978.

The third guaranty granted was for a joint venture between Geothermal Kinetics, Inc., of Phoenix, Arizona, and McCulloch Geothermal Corporation of Los Angeles, California (McCulloch Oil) called the CUI venture. The original application was for exploratory projects on three separate sites: Beryl and Lund in Utah, and South Brawley in the Imperial Valley, California. The Beryl and Lund projects were for completion of exploration work, drilling temperature gradient holes, and a test well at each site. The Brawley project was for drilling and testing of two wells. The loan guaranty granted was for the Brawley project only.

The Beryl and Lund sites were not approved, basically because there was a disagreement over the temperature of the resource. The USGS projected temperatures were not in agreement with those of the applicants. In summary, ERDA was not satisfied that the risk involved was low enough to warrant the loan guaranties.

This particular application has raised several issues and is of interest when evaluating the GLGP.

1. Multiple site applications and whether or not DOE will accept these; and do the projects have to be related in order to incorporate them into one application.

2) What collateral is acceptable other than that directly associated with the project and how is the value of that collateral to be determined.

3. Differences of opinion between USGS and other consultants.

4. Most important of all, whether or not the GLGP is going to be used for exploratory projects. The GLGP is supposed to be used for exactly this purpose. If little or no risk is involved, then what purpose does the GLGP serve? Apparently the government places a probability on the risk and if it does not fall within their criterion, it is rejected. Neither the law nor the regulations has stated that the approval of a project will be judged on the projected risk associated with it. Reasonable assurance of repayment is

a criteria, though the GLGP is supposed to assume risk, not dismiss it. How much risk should the GLGP assume?

5. CUI also raised the issue of who has the authority to "sign-off" on an application. The loan guaranty was originally approved on September 30, 1977, the last day of ERDA, by the Acting Administrator. There was an ensuing debate over this and was given final approval on January 13, 1978 by the DOE Deputy Secretary acting for the Secretary. This type of situation has done little to promote the program and the credibility of those involved and the government. (A DOE document assigning the duty to the Director of Procurement and Contracts Management had been issued on October 3, 1977.)

The Dry Creek/Chevron application (Dry Creek is a subsidiary of Geothermal Resources International) is still not complete. Dry Creek and Chevron have an agreement where Chevron would be the operator. Dry Creek is currently amending its application to deepen an existing well Chevron drilled. Delay was due to the difficulty Dry Creek had in obtaining proprietary data from Chevron. Chevron's concern was the protection of these proprietary data. This seems to have been resolved now and Dry Creek is hopeful for completion of the application.

GeoCal, a subsidiary of GeoProducts, submitted an application for development of a power plant at Honey Lake, California. There was a difference of opinion between the applicant and USGS concerning the temperature. The application is being held in obeyance but has been "informally rejected". GeoCal expects to submit an application for a hydroponics facility on the same property. GeoCal also submitted a proposal for the nonelectric Program Opportunity Notice (PON) (cost-shared program) which it did not receive. It was hoped that the amount of the PON would be used for partial financing of the hydroponics project and be deducted from the amount of the loan guaranty. There are conflicting opinions within SAN on the legality of such a procedure, although the regulations, §790.21(19) and §790.43(a), clearly allow it.

The Southern California Public Energy Corporation (City of Burbank, California) submitted an application for exploration and construction of an electric generating plant. A site has not yet been chosen and they would prefer to use a partially developed lease which would eliminate any of the leases they presently have access to. One possibility was a 500-750 MW hybrid power plant using geothermal (20-40 percent) and coal (60-80 percent). Burbank's demand is 250 MW and is seeking additional users to enter into an agreement; Pasadena, California is a possibility.

Diablo Exploration of Oakland, California submitted an application for exploration and eventual construction of a power plant in New Mexico. Diablo has an agreement with Public Service of New Mexico to sell electricity but is looking for an operator to conduct drilling and supply needed capital.

The Northern California Power Agency (NCPA), a group of 11 municipalities, and Resources Fund Limited (RFL), have an application for a drilling program possibly leading to construction of two power plants at the Geysers. There is a legal dispute concerning the property. NCPA is working on another application for construction of power plants on federal leases held by Shell Oil Company. Shell and NCPA have entered into an agreement whereby Shell will supply steam. NCPA assumed the Technical Amendments would be signed into law and must also negotiate a contract to transmit the electricity with Pacific Gas and Electric Company (PG&E) of San Francisco, California.

Republic Geothermal (RGI) and Mapco, Inc. of Tulsa, Oklahoma, have submitted an application for exploration and potential construction of a power plant at Westmoreland in the Imperial Valley, California. This is the second application for RGI. The application is undergoing evaluation by the various consultants and was sent to Headquarters (HQ) in November, 1977 for preliminary review.

Application Process and Review

A set of application guidelines may be obtained from the GLGP office at the DOE San Francisco Operations Office (SAN). There have been three publishings of these guidelines; June, September, and December, 1976, with changes in each. An applicant or any interested party should obtain the most recent edition of the guidelines.

The guidelines include a general description of the program and the procedures for applying, a copy of P.L. 93-410, Rules and Regulations (10 CFR 790), an application form (Appendix K), and a description of the information required by the borrower and lender.

The SAN-GLGP staff assists the applicants in preparation of the application and makes a recommendation to the Manager of SAN for approval or nonapproval of the project. The GLGP staff is divided into five specialized areas: management, finance, marketing, geology, and legal.

The applicant supplies data including: a) environmental reports, b) geological, geophysical, and geochemical data, well data, c) utilization process, d) financial information about the firm, e) project economics, f) management capabilities of the firm, g) a milestone plan describing the project goals, h) marketability of the resource, and i) legal data concerning the projects assets, leases, pending litigation, patents, permits, and the structure of the organization.

The lender supplies financial and management information, and legal documents: a) a description of the management experience of staff associated with the project, b) current audited financial statements, c) loan agreement, and d) lender's assessment of borrower's loan application.

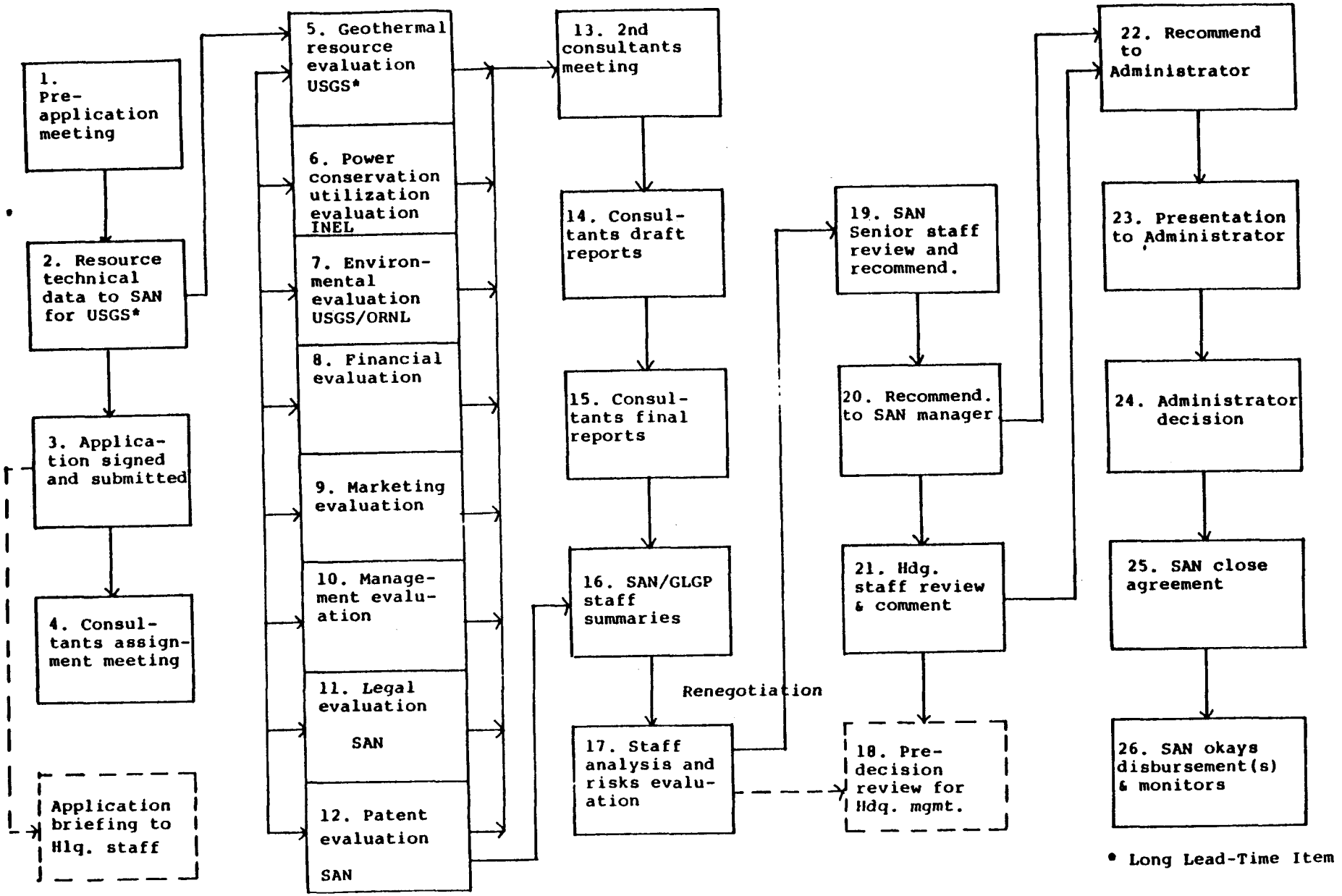
These requirements are presented in detail in the application guidelines and regulations. Appendix L represents a draft of a Loan Guaranty Agreement.

Figure 3 represents the stages an application follows. The United States Geological Survey (U.S.G.S.) conducts an assessment of the resource and supervises field work if a guaranty is granted. The USGS evaluates the level of risk associated with a particular area. This evaluation is based on temperature at depth, permeability, and fluid chemistry when a well has been drilled. The USGS must decide whether or not data submitted by the applicant are complete or not for the evaluation.

The applications are sent to other consultants for technical, economic, and environmental evaluations:

- Idaho National Engineering Laboratory (INEL), Idaho Falls, Idaho - technical and economic evaluation.
- Oak Ridge National Laboratory, Oak Ridge, Tennessee - environmental evaluation.

Figure 3. Flow Chart of Application Processing



Source: San Francisco Operations Office, 1977.

- Stanford Research Institute, Wilsey & Ham, Arthur Young, or National Economic Research Assoc. (NERA) - economic evaluation.

The consultants employed for the economic evaluation vary and additional firms are under consideration.

A loan application contains the following sections:

1. Recommendation Package
2. Staff Analysis
3. Loan Guaranty Agreement
4. Statement of Negative Determination
5. Administrator's Statement of Findings
6. Memo: Administrator to Manager
7. Application
8. General Overview of Project
9. Staff Summaries

   legal
   environmental
   geo resource/utilization
   financial
   marketing
   management
   patents
   USGS report - resource assessment
   ORNL or USGS report - environment
   INEL (EG&E) report - technical and economic
   economic report
   supporting legal information

After the consultants and GLGP staff submit their reports and evaluation of the project, the package undergoes a Senior Review by the SAN staff. Finance, Procurement, Environment, and General Counsel review the application, make comments, recommendations, and point out problems or the need for additional material.

After the "in-house review" is conducted, a recommendation is sent to the SAN Manager. The program package with the recommendation of the SAN Manager, is sent to Headquarters (HQ) in Washington. It is still not clear at what stage the package should be forwarded to HQ. SAN recently sent the fourth application to HQ in advance of the completion of the review, hoping to speed up the time spent in reaching a final decision.

Under ERDA, the Division of Geothermal Energy (DGE) managed the program. No application has undergone any review since the transition to DOE. The management of the program was changed to Resource Applications. They have not determined how the program will be handled and are still working up a workload schedule.

In DGE, the position of the Chief of the Loan Guaranty Branch was filled for the first application only (RGI). For the review of the second and third applications (CUI and GFP), the position was temporarily filled by a staff member from Solar, Geothermal, and Advanced Energy Systems.

A total of four applications were sent to HQ. The first three (RGI, CUI, and GFP) were sent from SAN with recommendations for approval. The fourth application was sent in November, 1977 before any recommendation was made or consultant's reports completed. Any questions concerning the application could be taken care of before SAN sent a recommendation.

The RGI, GFP, and CUI applications were sent to HQ and then distributed by one central staff person to HQ personnel. The fourth application was sent directly to persons reviewing the project. Basically, the copies were given to the following groups:

1. Office of Energy Financing, Office of the Controller (OC)
2. General Counsel (GC)
3. Environment and Safety (AES)
4. Division of Geothermal Energy (DGE) of Solar, Geothermal, and Advanced Energy Systems (ASGA).

Within DGE, several staff members from various groups reviewed the applications, including: 1) Resource Utilization, 2) Resource Assessment, 3) Environmental, 4) Utilization Technology. Other DGE staff members were also asked to review the applications. General Counsel does a general legal evaluation including contractual agreements, titles, ownership

of assets and collateral, and National Environmental Policy Act (NEPA) of 1969 issues. The Office of Energy Financing of Controller's Office (OC) determines the risk associated with the proposed project, whether the equity is sufficient and the applicant has incurred risk also. OC also determines whether there exists "reasonable assurance" that the loan can be repaid. If project assets or cash flows are insufficient for repayment, OC evaluates any additional collateral. Other areas examined by the various divisions determine whether or not there exist: a) environmentally acceptable means of exploration and development, an Environmental Impact Assessment (EIA) is prepared for this purpose, b) whether the resource is sufficient to support the proposed commercialization project, and c) technical feasibility of the proposed project.

These are some of the major areas examined but this list is not all inclusive of the types of questions raised during the reviewing of the applications. An application is not always in its completed form. Consultant reports and environmental impact reports may be delayed. These delays are not insignificant and add time to the review process.

The review was originally scheduled to take from 90 to 120 days (3-4 months). Applicants have expressed desires for this to be shortened, preferably to 3 months.

Table 14 represents the amount of time an application has taken from start to finish to process.

Table 14

Application Processing

	First contact to submission of application	SAN	HQ	Total
East Mesa (Republic Geothermal)	6	4	3	13
GFP	9	6	2	17
CUI	7	5	6	18
Totals	22	15	11	48
Average	7 1/3	5	3 2/3	16

Average time spent in government - 8.66 months.

Source: SAN, 1977.

Under ERDA, the Assistant Administrator for Solar, Geothermal, and Advanced Energy Systems (ASGA), the Assistant Administrator for Environment and Safety, Controller, and General Counsel (GC) had responsibility to agree to disagree with SAN's recommendation. The Administrator had the authority to overrule the above mentioned decisions and had final approval or disapproval authority for geothermal loan guaranties. All four parties in the past did not concur with the recommendation for approval by SAN on the three applications.

Under DOE it is not yet clear who will have this authority. The program management is now with Resource Applications and the Director of Procurement and Contracts Management has authority for the final decision.

Prior to the ERDA-DOE transition, papers were being generated on how to more effectively process and review the applications and draft a policy and procedure for this purpose. The first loan guaranty was approved in May, 1977. And since that time, almost one year ago, it has not yet been resolved. The ERDA-DOE transition can account for some of the delay but primarily it is politics, power, and personalities involved. The role and responsibilities of the Controller, Assistant Secretary Environment, Assistant Secretary Energy Technology, Assistant Secretary Resource Applications, General Counsel and Director of Procurement and Contracts Management are not at all clear. Until this is resolved, the reviewing of any loan guaranty applications will be an extremely time consuming process.

In summary, several reasons exist for delays in the processing of the applications:

1. There exists no formal procedure for reviewing the applications,
2. USGS does not have the time, considering their workload, to meet the prescribed 3-week deadline (dependent on leasing schedule),

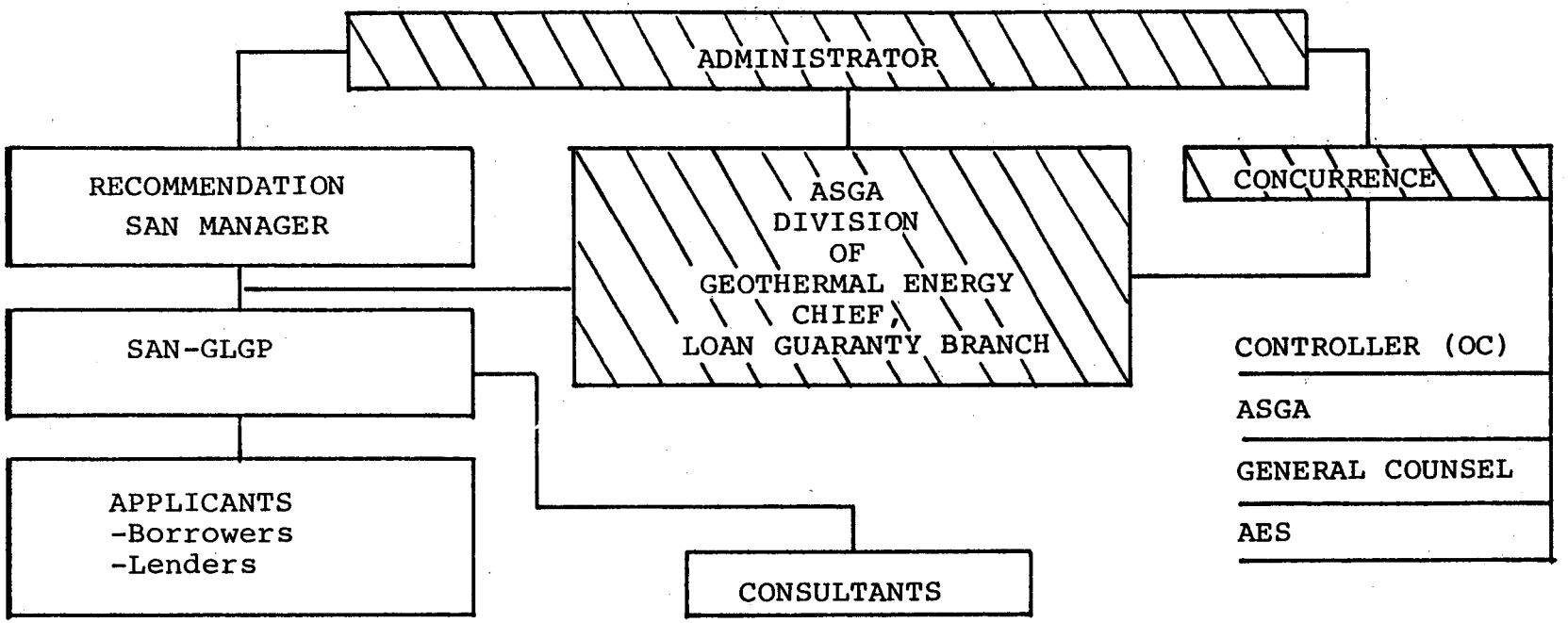
3. Some personnel at HQ and USGS do not give the loan guaranty program reviews equal consideration along with their other responsibilities.
4. application quality varies extensively and often additional information is required, and
5. it has not been determined who has authority for the decision to approve or disapprove a loan guaranty.

Figure 4 illustrates the concurrence chain under ERDA and Figure 5 is the situation under DOE at the time this paper was written (March, 1978).

In addition, many policy issues regarding the GLGP have not yet been resolved.

1. What qualifies as the 25 percent equity share; is the market value of historic cost of any assets to be used in determining this?
2. Resolving differences of opinion between SAN and HQ.
3. How to handle multiple-site applications.
4. Are lease acquisition and exploration (wild-catting) going to be allowed for loan guaranties?
5. Should greater responsibility be given to SAN?

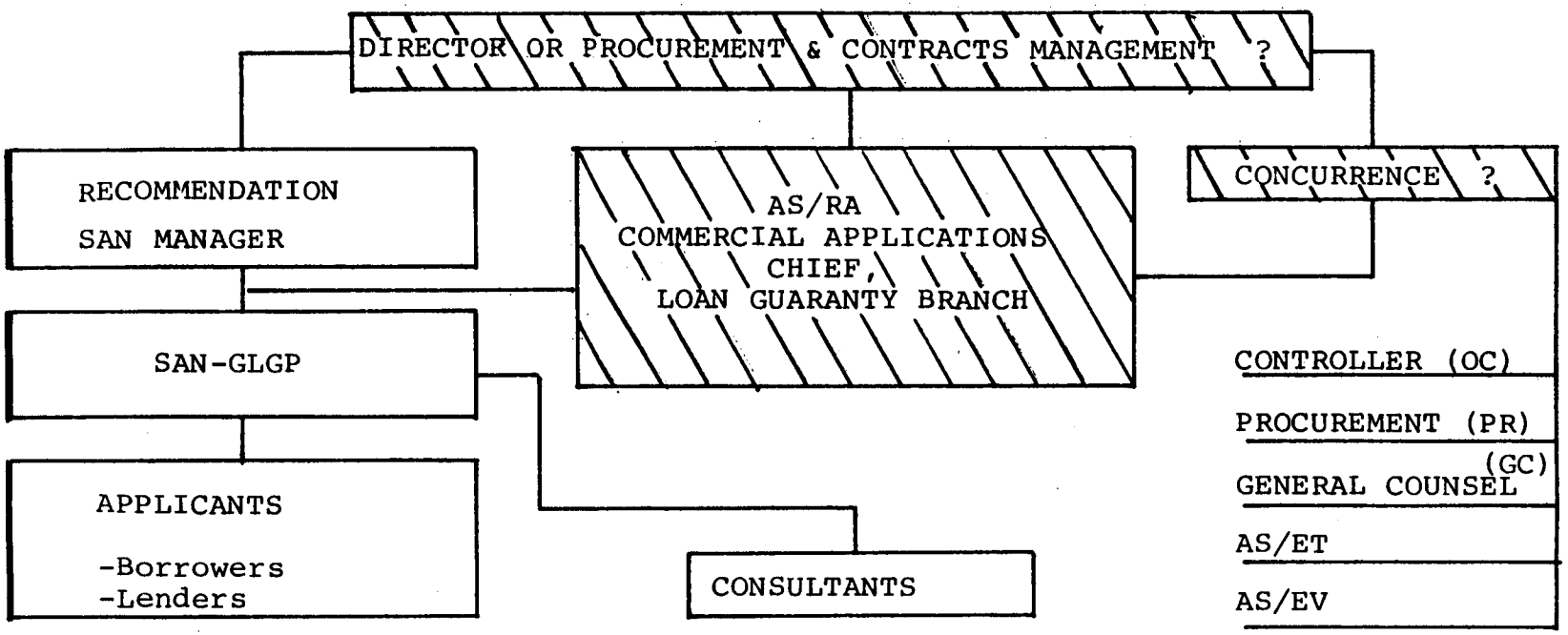
Figure 4. Geothermal Loan Guaranty Program Flow Diagram
Energy Research and Development Administration (ERDA),
June, 1976-September, 1977



SAN -San Francisco Operations OFfice
ASGA -Assistant Administrator for Solar, Geothermal, and Advanced Energy Systems
AES -Assistant Administrator for Environment and Safety

Lined areas represent Headquarters, Washington, D.C.

Figure 5. Geothermal Loan Guaranty Program Flow Diagram
Department of Energy (DOE), as of February, 1978.



SAN -San Francisco Operations Office
AS/RA-Assistant Secretary Resource Applications
AS/ET-Assistant Secretary Energy Technology
AS/EV-Assistant Secretary Environment

Lined areas represent Headquarters, Washington, D.C.

EXTERNALITIES AFFECTING THE GEOTHERMAL LOAN GUARANTY PROGRAM

The Geothermal Loan Guaranty Program is directed at lowering the financial barriers to geothermal development. There exist several factors that have not allowed for capital flow into geothermal resource development. These factors, with time and experience, would probably be eliminated and definitely less constraining. Reservoir uncertainties, unproved technology, economic performance, and historically conservative attitudes of utilities and bankers have led to a high risk situation and a lack of confidence in the utilization of geothermal resources.

The Geothermal Loan Guaranty Program cannot be of service if the barriers to submitting an application for a loan guaranty are prohibitive. These problems have been recognized by the government and industry, but it is crucial to acknowledge the environment in which the loan guaranty is expected to function. Even with current or near current technologies, geothermal resources cannot be duly exploited without the elimination and streamlining of these "externalities."

If a firm cannot acquire leases and drilling permits, no amount of financial assistance will be of significance. The affects of these external factors on the Geothermal Loan Guaranty Program are outlined in this chapter.

General Overview

The author has determined the following areas which have had an impact on the performance of Geothermal Loan Guaranty Program.

1. Government policy, attitude, political environment, delay in passing legislation.
2. Tax treatment: intangible drilling cost write-offs and depletion.
3. Legal issues: definition and ownership of the resource.
4. ERDA-DOE transition: organizational change impact on the GLGP.
5. Government supports affecting the GLGP; Demonstration and Reservoir Case History Programs.
6. Permit acquisition: time and expense.
7. Lease acquisition: acreage limitation, delays, bonus bidding, leasehold size, reclassification.
8. Environmental reporting requirements and regulations: federal, state, and local.
9. State and local development of legal and regulatory issues.
10. Steam pricing: based on costs of alternative fuel prices.

11. Contractual agreements to sell electricity to utilities or to transmit electricity through utility systems.
12. Utility rate structure and regulatory constraints.
13. Cost factors.
14. Innovation, education, and general public awareness of geothermal resources.
15. Industry misconceptions of the GLGP: need for information dissemination.

Many of these items cited are of a more general nature in that they affect the geothermal industry whether or not there exists a loan guaranty program; however, some are specifically detrimental to the GLGP. The relationship between these factors and the GLGP illustrates their potential impact on the GLGP.

The ERDA-DOE Transition

The ERDA-DOE transition and reorganization (P.L. 95-91, Department of Energy Organization Act) of 10/1/77, has not yet been completed. Divisions within DOE are unsure as to which has authority and what functions it is expected to perform for the Geothermal Loan Guaranty Program.

Under ERDA, the Division of Geothermal Energy of the Solar, Geothermal, and Advanced Energy Systems Division, was responsible at Headquarters (HQ), Washington, D.C., for administering the review of applications from the San Francisco Operations Office. The Administrator of ERDA had

final authority to sign for approval or disapproval of a loan guaranty. A DOE Interim Management Directive (IMD) dated Sept. 13, 1977, "DOE Organization" authorized the Director of Procurement and Contracts Management (PR) as the one who..."negotiates and administers all contracts and grants, cooperative agreements, and loan guarantees at headquarters and oversees those performed in the field." Another IMD dated October 3, 1977, "Continuity of Operations, Authority Delegations, and Order of Secretarial Succession in the Department of Energy," contained the following authority delegation to the Director of Procurement and Contracts Management:

> "Enter into, approve, and take such other action as may be necessary and appropriate with respect to any contractual arrangement, interagency agreement, grant, loan guarantee, or other similar action committing the Department of Energy (DOE) to applicable laws, policies, regulations, and procedures. Such action shall include determinations and decisions except those determinations and decisions required by law or regulation to be made by other authority;..." Signed James R. Schlessinger, Secretary of Energy, effective October 1, 1977 (IMD No. 0204, U.S. DOE).

These delegations clearly stated that the Director of Procurement and Contracts Management has authority for the GLP. The DOE Fact Book of Organization and Functions published on September 13, 1977 states the Assistant Secretary for Resource Applications has "program responsibility." An ERDA division, Commercial Applications, now under DOE's

Resource Applications, employs a staff position of Chief, Geothermal Loan Guaranty Program, originally under DGE during ERDA.

The Secretarial delegation of authority to the Controller does not mention loan guaranty programs, however, the DOE Fact Book includes "administer financing studies for loan guarantees" as a function of this office.

It has not, as of the writing of this report, been determined what responsibilities for the Geothermal Loan Guaranty Program will be delegated to the following three divisions: Controller, Procurement, and Resource Applications (Commercial Applications). Each of these offices has generated proposals on how to deal with this. Resource Applications would like the Assistant Secretary (AS/RA) to be delegated the final authority. The loan guaranty approved on January 13, 1978, was signed by the Deputy Secretary of DOE and not by the Director of Procurement and Contracts Management; one wonders how effectively a program can function under such confusion.

In addition to the problem of defining roles and functions, some of the key personnel have changed even since October 1, 1977, DOE's birthday. Many of the Assistant Secretarial positions, including Resource Applications, were not confirmed by Congress until early 1978, several

months later. Changing staff and offices has afflicted the GLGP, not only in the ERDA-DOE changeover, but also before DOE.

The person having authority for approving has changed three times, although the Acting Administrator of ERDA signed for all three loan guaranties and the Deputy Secretary of DOE signed again for the CUI venture. The Manager of the San Francisco Operations Office has changed hands at least three times since June 1976, startup for the GLGP. The Director of DGE changed twice and the position of Chief, Geothermal Loan Guaranty Program, was vacated during the review process of two of the three applications and filled temporarily by a member of the staff of Solar, Geothermal, and Advanced Energy Systems. That position, now in Commercial Applications was returned to the original Chief of the Loan Guaranty Program.

The DOE organization has shifted program responsibility and therefore created confusion and lack of management for the program. The program has suffered in terms of time, and credibility or confidence by the applicants.

SAN has had to deal with new personnel, to educate and negotiate with each change, to familiarize them with the program. More destructive has been the lack of continuity and structure. With whom does the responsibility lie, to whom does the application get sent, with whom should SAN negotiate, who has to be satisfied at Headquarters? These questions have not been satisfactorily answered.

Leasing

Leasing activity has been hindered by government regulations and slow processing of lease applications.

Barriers to leasing include acreage limitations of 20,480 acre maximum per state, reclassification of overlapping non-competitive lease applications, and regulations that allow for exploration without permits on unleased land. If non-competitive lease applications overlap by 50 percent or more, the land is reclassified as a KGRA and thus cancels the applications and competitive bids must be made.

There exists means to circumvent some of these: land holding companies, (increase to 51,200 acres is pending), and irregular shaped acreage in lease applications. An operator takes a risk if he should do exploratory work on unleased property and as a result of his efforts the acreage is reclassified as a KGRA. It is now open to competitive bonus bidding, thereby the operator loses the eccnomic advantage and increases competition for the property.

In addition, due to reclassification regulations, Gerald Kitchen of Amax, Inc., points out:

> "...If an operator intends to include federal acreage in his land package, the reclassification problem requires that he puts the brakes on his exploration project--even on adjacent private lands--until the leases are issued." (Geothermal Resources Council Short Course No. 4, 1976).

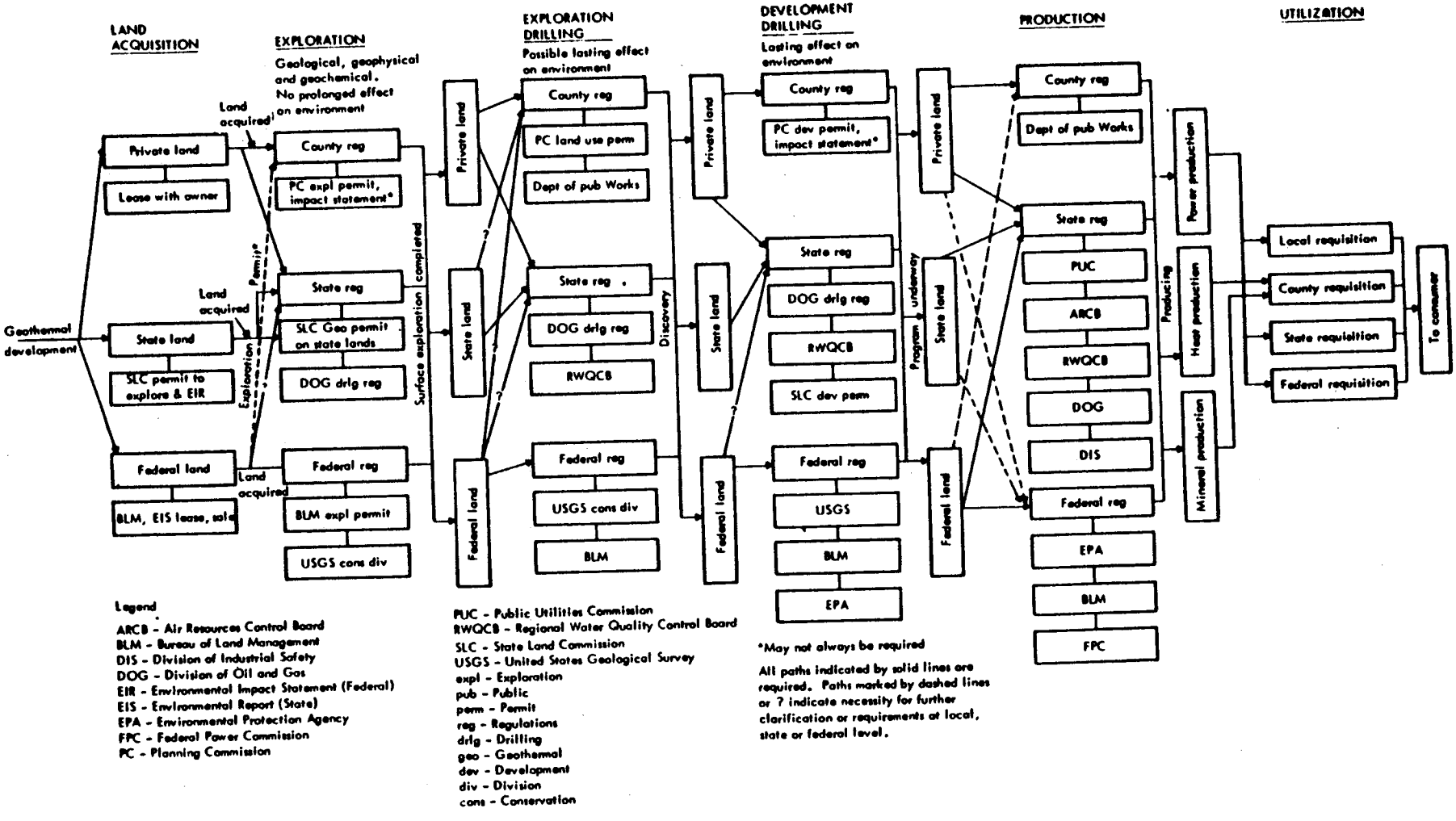
In order to conduct exploratory work on a federal lease the operator must adhere to the various regulatory requirements involving permits and environmental reports. The procedures outlined here cover only the federal requirements; state and local regulations to obtain permits and submission of environmental reports must also be adhered to.

Environmental Regulations

Figure 6, Flow Chart of Critical Path in Geothermal Exploration, identifies the various agencies, and requirements for six phases of geothermal development. In order to conduct initial exploration prior to leasing, a pre-lease exploration permit must be acquired from the Bureau of Land Management (BLM). A firm files a Notice of Intent to Conduct Geothermal Resource Exploration in order to obtain the permit. The BLM must prepare an Environmental Analysis Record (EAR) and a post-lease Environmental Analysis (EA). An application for a Permit to Drill must be obtained from the USGS and a Plan of Operation is submitted for surface or well work.

Much delay and expense is involved in these requirements where the BLM and/or USGS has been slow to complete these requirements, resulting in more time lost and a potential increase in costs to the operator. Equipment and labor must be scheduled to conduct the work, making the streamlining of permitting requirements vital to development.

Figure 6. Flow Chart of Critical Path in Geothermal Exploration.



Source: Howard, J.H., editor, Present Status and Future Prospects for Nonelectrical Uses of Geothermal Resources, 1975, p. 101.

> "The lack of both environmental data and standards slows the environmental approval process. Moreover, the approval process is further slowed by lengthy, complex and often apparently inconsistent rules, laws, and regulations at federal, state, and local levels. The overlay of jurisdiction of the responsible agencies further compounds the process, and has caused much unnecessary duplication of industrial effort in preparation of environmental statements. The uncertainty of ultimate approval and the time involved in obtaining approval have been cited by the industry as major deterrents to geothermal investment." (ERDA Vol. 2: Program Implementation).

In some geographic localities the number of permits required ranges from 40 to 70; a staggering amount of time and money is devoted to this. The applicants and potential applicants for a loan guaranty most often cite the environmental reporting requirements as the major problem area. Table 15, Federal Regulations Applicable to Geothermal Resource Development Projects, is a list of eight federal laws involving environmental, leasing, and various other regulations. It is hoped this list will impress the reader with the magnitude and complexity of the issue.

Demonstration Program

The Geothermal Demonstration Program is possibly affecting the GLGP by creating competition for applications. The demonstration program is possibly being used at the expense of the GLGP.

Table 15

Federal Regulations Applicable to Geothermal Resource Development Projects

1) Geothermal Steam Act of 1970 (Public Law 91-581, 84 Stat. 1566).

2) Clean Air Act of 1970 (Public Law 91-604, 42 USC 1857 et seq.)

3) Federal Water Pollution Control Act Amendement of 1972 (Public Law 92-500, 86 Stat. 861).

4) Norse Control Act of 1972 (Public Law 92-574, 86 Stat. 1234).

5) Coastal Zone Management Act of 1972 (Public Law 92-583).

6) Endangered Species Act of 1973 (Public Law 93-205, 87 Stat. 884).

7) Geothermal Energy Research, Development, and Demonstration Act of 1974 (Public Law 93-410, 88 Stat. 1079).

8) Federal Nonnuclear Energy Research and Development Act of 1974 (Public Law 93-557, 88 Stat. 1878).

Source: Guidelines to the Preparation of Environmental Reports for Geothermal Development Projects, February 1977.

These two programs are aiming toward the same goals using different means; and it may be that one is preferable for developing the resource. The loan guaranty program will have longer and further reaching impact than the demonstration program in that it develops the financial communities knowledge of the resource and the capital requirements. The Demonstration Program may make possible an otherwise uneconomic project but this does not necessarily encourage

additional power plants. If the project is uneconomic without federal subsidy, it will not be undertaken without these funds. If the project is economic without these funds but the obstacle is capital acquisition, the GLGP can be used in its place. The author doubts very much that any firm would use borrowed money when it can obtain 30 to 50 percent of the costs without having to pay them back. Unless power plants are economic, they will not be built no matter how many demonstration plants exist.

Several of the arguments in favor of the demonstration program over the GLGP for power plant construction are erroneous. The proported delay of a "decade or two," if the demonstration program was abandoned, has no substance and will not be the case.

The same holds true for the view that the GLGP "...will have little applicability as a financial vehicle for constructing power plants..." This was based on the thinking that only utility companies would be building power plants and did not need the guaranty to raise capital. It is now demonstrated that several small firms, in cooperation with the larger firms are applying for loan guaranties to construct power plants.

No loan guaranties have been granted as yet for this type of project but the prospect of this occuring is encouraging. If the government has enough faith in the

viability of such a project to give away tens of millions of dollars, one would think the government should risk at least the same amount for a loan guaranty where there exists an opportunity for repayment.

The Geothermal Loan Guaranty Program has had to function and co-exist with these various "externalities." The impact of these factors needs to be recognized. The situation must be corrected if we expect the program to have any impact on developing geothermal resources. Much has been devoted to the more obvious and conventional barriers in the literature. The ERDA-DOE transition, low priority among DOE staff, and demonstration program are less known factors, whose impact is as great or greater in damaging the performance of the program.

EVALUATING THE GEOTHERMAL LOAN GUARANTY PROGRAM: ATTITUDES AND PERSPECTIVES

The perspective of industry, lending institutions, and the utilities of the GLGP are vital to its success and implementation of any change in the operation or requirements. Views generally held by these groups are presented here. With each geographic location, within each company, depending on the resource and the utility, views of the GLGP differ. Some see it as a tool for exploration and others believe its only viable use will be in the construction of power plants. Others feel that exploration and wildcatting should not be a part of the program, citing its high risk and the availability of capital for exploration through other means.

Discussed here are the perspectives of the industry first, which are separated into two main groups: large integrated firms including major oil companies, and smaller independent firms. These two groups vary in their analysis of the program.

Secondly, utility companies are discussed, whose views vary depending on their need and size. Thirdly, lending institutions, who generally are in agreement about the program. Finally, the author will evaluate the program from an outsider's vantage point having been exposed to all of the above mentioned groups.

Industry Evaluation

It is generally agreed that not much has happened in the development of geothermal energy. The industry believes that intangibles and depletion write-offs and better federal leasing practices will stimulate development of geothermal resources. Geothermal drilling funds compete with oil and gas funds, where favorable tax writeoffs exist. However, legislation is pending to allow for IDC's.

The U.S. House of Representatitives, Sub-committee on Energy Research, Development, and Demonstration held hearings and solicited comments from the industry regarding the Loan Guaranty Program. The general consensus of opinion was favorable and enthusiastic with respect to the need for the program.

The larger firms never saw it as a viable tool for themselves, they cite the following reasons for this: the 25 percent equity requirement is unappealing, political

climate and fear of defaulting being bad public relations. The large firms are prime rate borrowers which represents cheaper capital than the Loan Guaranty Program could offer.

To the smaller firm, the Loan Guaranty Program may offer cheaper money, permits retention of full control and ownership of interests. This may also have a positive effect on the firms' rate of return. Many feel that without the GLGP they would not be able to go ahead with projects. The high leverage, long-term loans are attractive to these firms.

The larger firms are becoming involved in the GLGP, through contracts to supply the resource and/or by agreeing to be the operator, while the smaller firms make the applications for a loan guaranty. This arrangement has not yet been worked out in a loan guaranty but the industry is hopeful that DOE will approve. The large firms do not care for building and operating a power plant and have little desire to become involved in the "utility business." The following remain obstacles for this type of arrangement: price of electricity, price of steam, transmitting the electricity, utility involvement and possibly purchase. Enthusiasm in no way resolves these problems.

According to the industry representatives and lenders contacted, the guidelines are clearly written and easy to understand. No one had any difficulty with these, but found that the newest edition was an improvement over the previous ones.

One of the problems in getting people to respond to inquiries regarding the program is that they have not thoroughly familiarized themselves with the program. Only the applicants have been able to respond directly to these aspects of the program. Much of the industry is becoming familiarized with the program through the efforts of lenders in promoting the program. Many firms are not yet at a point where they feel advantage can be taken of the program.

There exists a diversion of opinion on what is the best use for loan guaranties. The law provides that all phases of development, including lease acquisition, exploration, field development, and power plant construction can qualify for a loan guaranty. Some believe its best use is for capital intensive construction and not exploration, while others feel it is most useful in exploration. Those who believe the GLGP should be used for wildcatting, usually smaller firms holding leases, are not pleased with priorities the regulations have set.

High risk and high drilling costs are associated with exploration ventures. One view is that, due to high risk and the incurred costs, no loan guaranties should be made for this purpose; it would end up subsidizing the industry because of the little possibility for repayment. The other view is that this is exactly what the program's function should be.

The high risk and costs are exatly what is inhibiting new discoveries and without discovery, the exploitation of geothermal resource potential is impossible. Developing proven resources is less risky and will be undertaken by resource firms if there is a purchaser for the resource. Guarantying exploration activity will probably mean greater probability of default; but that this should be the purpose of the program. They feel that if the government is not willing to accept the risks, then the program will fail. Possibly a limited dollar amount should be placed on guaranties for exploration but these activities need to be guaranteed.

This divergence of opinion and philosophy surrounding the use of loan guaranties also exists between SAN and HQ. Section 201(d) of P.L. 93-410 requires that there exists "reasonable assurance of repayment of the loan." Repayment may be from project assets or other collateral, or funds generated from cash flows associated with the project. The "reasonable assurance of repayment" presents another variance in interpretation between SAN and HQ. SAN believes the GLGP is to assume greater risk than normally undertaken in business ventures while HQ has a more conservative interpretation of the allowable risk for granting loan guaranties.

Basically, it is agreed that the GLGP will assist the smaller firms and not the larger integrated firms who have little or no financial problems.

Applicants agree that the government and GLGP staff have learned a lot in a short time but are not yet proficient in handling the various types of projects and financial arrangements. The GLGP is inefficient compared to inhouse financing by a firm and the cost is greater. However, the GLGP lowers the risk substantially to the borrower and this has great appeal.

Problems associated with the GLGP from the applicants' point of view are:

1. Cost of preparing an application
2. Reviewing time
3. Environmental requirements
4. 25 percent equity (for some)
5. Consultants may be incompetent and possibly delay review

The need to shorten the time in reviewing an application is vital. The cost of an application, $40,000-$100,000 and more, is too high. Information and environmental reports ordinarily not needed add to the high costs. As the process is streamlined and requirements defined and understood, this cost will likely be reduced. But, even with the high cost, all agree they will use the GLGP again.

In summary, the industry generally believes that the GLGP will be used by smaller firms which have trouble raising capital.

Utility Evaluation

The utility industry has its specific considerations when evaluating the GLGP. The utility business is a regulated industry and the rate structure and capital availability does not allow for participation in the GLGP. Utilities are not interested in using the Loan Guaranty Program as they have not committed themselves to geothermal energy. Lack of confidence in the reservoir, capital allocated for conventional fossil-fueled plants, high risk, all contribute to the policies of the utility industry. They are, however, interested in making contractual agreement for purchasing electricity with possibly purchasing the power plant after it has been proven.

Some utilities prefer to finance projects entirely with sale of revenue bonds and maintain a low debt/equity ratio. However, several municipal utilities have shown interest in the GLGP (Susanville, Burbank, and NCPA). Their interest in the GLGP arise because of the lower risk and high leverage but are not interested in making a profit, only in supplying customers with a cheaper source of power. NCPA believes it can offer a lower price when generating its own electricity.

The utility industry is also divided into two camps. Depending on demand, location, alternative energy sources and economics each utility considers the GLGP. Of those

spoken to, none except the three municipal utilities of Burbank, Susanville, and NCPA is likely to use the program.

Lending Institutions

Commercial banks and brokerage firms are very interested in lending with the GLGP. Figure 7 is a breakdown of types of institutions and their interest in loan guaranty programs. Commercial banks do not like to engage in long-term (greater than 10 years) debt financing. Projects such as power plant construction will have to be financed with a long-term debt. Therefore, the secondary capital market, security brokers, are interested in purchasing this long-term debt from the banks and selling them on the open market as a government security.

The GLGP is very attractive to the financial community and feel the greatest problems are in the time consuming and delaying negotiations and review processes.

The GLGP is looked upon as any other type of finance and investment arrangement would be and the loan is analyzed using the same criteria as those without a government guaranty. Financial institutions assess the project as they would any other investment in terms of risk and meeting necessary goals for project success. None were willing to finance a geothermal project without the guaranty. Lenders agree that the GLGP is a tool for the smaller firms. The banks are fully aware

Figure 7. Lending Institutions and Their Interest in ERDA's Loan Guaranty Programs.

	Primary Lenders	Conduit to Secondary Market	Secondary Market Purchasers	No Interest
Commercial Banks	X			
Savings & Loan Associations			X	
Mutual Savings Banks			X	
Credit Unions			X	
Life Insurance Companies	X		X	
Private Pension Funds			X	
State & Local Government Employee Retirement Funds			X	
Other Insurance Companies	X			
Finance Companies				X
Real Estate Investment Trusts				X
Open-end Investment Companies				X
Money Market Funds				X
Security Brokers and Dealers	X	X		
Individuals			X	

Source: Smith, Russell, et al, Financial Incentives Research and Lending Market Impact Analysis, 1977, p. 3-9.

that they risk little or nothing in terms of dollars. They feel responsible and would not lend on a project they knew was going to default; but there is nothing to stop them from doing this under the GLGP.

Author's Evaluation

The program has not met its original expectations, nor has it met the objectives for which it was instituted. There remains about six more years but if the slow start and poor preparation are indications of what will be for the remainder of the GLGP, the industry will not respond.

The GLGP may make an unprofitable project profitable because of the high leverage and retention of full interest. The program is useful for those types of projects and also for a smaller firm that cannot raise the needed capital internally. It can be especially significant for field development and power plant construction where large sums of money are needed.

The financial community will not make a loan on these projects without the guaranty. The market for the GLGP is excellent and several banks are very interested in promoting the program.

The program has a number of enormous problems which must be alleviated before there will be an increase in the number of applicants.

The lack of response to the program may be attributed to elements directly related to it: a) operating procedures, b) rules and regulations, c) application requirements, d) cost in dollars and time in preparing an application, e) processing and reviewing procedures, f) lack of well-defined criteria for obtaining a guaranty, and g) different interpretations and philosophies among DOE divisions. More significant are the external factors that have hindered the development of the geothermal industry, regardless of the availability of loan guaranties: legal, institutional, technical, economic, and political barriers. The uncertainties associated with the resource due to lack of historical experience and the problems in developing a new industry have affected, to some degree, the utilization of the loan guaranty program. The environmental regulations and reporting requirements do not prevent or limit the use of the program but impedes efficiency, is time consuming, and constrain geothermal resource exploration and development regardless of available financing. If these procedures are not streamlined and made more efficient, the industry will neither realize its potential nor meet the goals the federal government has set. The loan guaranty program is impeded by the general lack of activity in the industry due to these obstacles and not necessarily by the lack of desire or need to use such a program.

The processing and reviewing of loan guaranty applications has been a major problem for the program. There is a great need to establish a process of reviewing and approving applications. The reviewing has been a time-consuming effort and no procedure has been implemented to expect an improvement will be forthcoming. SAN and HQ are not in agreement of what each other's role should be in the program. It has not yet been determined which divisions of DOE will have responsibilities for loan guaranties. Some personnel at HQ believe that they need to review the applications because the SAN review is inadequate. They feel that the applications sent to HQ do not supply sufficient data and many questions need to be answered before they can make any recommendations. Although the applications are reviewed at HQ, it has not yet been established whether or not their concurrence with the recommendation from SAN is necessary for approval. It is also necessary to establish the authority who has final approval and whether non-concurrence by another party can be overruled.

Since only three applications have undergone this review, it is difficult to be conclusive in making a determination on the adequacy of SAN's review. Two applications were put into one review package, CUI and GFP, and apparently these were rushed in order to finish the process before the ERDA-DOE transition. Therefore, the quality of the senior staff review may have suffered.

The SAN staff had to look at new issues not previously encountered. The legal review staff had no previous dealings with title search, leasing practices, environmental legalities, corporate issues, etc. The staff was geared to procurement and government contracts and not the workings of a loan guaranty program. This seems to be a problem at all levels. It is a new type of program and has never been used before the GLGP. Procedures defining the purpose and scope of the review had not been drafted. Preparation for the review of loan guaranty applications was either minimal or non existent. Time lost here has also added to the overall ineffectiveness of the program.

The quality of the applications and the information submitted have been a big problem. This can account for some of the lost time in reviewing applications. The applicants, not always familiar with geothermal resources, come from different industries. They do not always have expertise available for the technical or resource information and therefore do not always know what is required. Many of the applicants are not engineers or scientists, nor are they competent in the finance and banking aspects. Applicants may try to submit less than is required. The GLGP represents, for some, an easy way to make money, and are trying to put together deals to take advantage of the program. This is

a problem for the program and unless applications for legitimate projects are submitted by responsible parties, the program will have little impact or credibility. The applicant may not understand what is needed or may wish to hold back information. For this reason, the quality of applications is highly variable.

There is also a need for a policy on the stage of exploration at which an application should be submitted. The applicants should be aware of what type of exploration is acceptable for obtaining a loan guaranty.

The USGS staff works very closely with SAN and has had no contact with HQ. In discrepancies concerning resource assessment between the applicant and USGS, the USGS assessment is honored. Professional disagreement among geologists, geophysicists, etc., is not uncommon and this problem has not been resolved with respect to the GLGP. Consideration is being given for using private industry for this job. There exists feeling in government and industry that the USGS is not the most efficient means of handling the evaluation and that they do not deal with risk and business decisions much needed in the evaluation.

Time constraints have also posed a problem for USGS. The workload at the USGS is heavy and it does not allow enough time for the GLGP to be completed in the time SAN would like,

three weeks; when leasing schedules come up time is more constrained according to the USGS.

Several issues evolve around the use of consultants. The consultants had to demonstrate their capabilities, but it is not clear which of them will be used. The information required for submission to the consultants and what was expected in return seems to have been a problem. The possibility of using private industry to do all of the reviewing is being contemplated. A policy must be established on possible conflicts of interest in this regard.

Because priority is given to small firms, according to the U.S. Department of Commerce's publication of government procurements (February 1978), "$21 million in guaranties is reserved exclusively for small companies," but not limited to this amount. This raises the issue of who will be the benefactor of the loan guaranty program. The question of whether the small independent firm or the large integrated firm acquiring loan guaranties is most efficient and necessary. The implications of each are different as is their impact on the development of the geothermal industry. The question of if the program increases competition by lowering the barriers to entry is outside the scope of this paper, but must be considered by government agencies, especially in light of other guaranty programs. The GLGP program has not

been in operation long enough to see where it will be most used and by whom.

Problems and ensuing delays have affected the Dry Creek, GeoCal, Burbank, Diablo, and NCPA applications. The author has drawns some conclusions about the fate of these applications based on personal contact with some of the parties and the author's own analysis of the situation. It is doubtful that the GeoCal, Diablo or NCPA/RFL applications will be completed. Long delays for Dry Creek and Burbank are eminent. In summary, considering the status of these applications and the length of time they have been at SAN, none seem very promising.

Problems of the GLGP

Numerous issues concerning the GLGP and therefore its ability to have an impact on geothermal development are listed below:

1. Mismanagement of the program, lack of financial and legal expertise.
2. Promotion, education, and, in general, public relations for increasing interest need to be further exploited.
3. Differences of opinion between consultants.
4. Differences of opinion between HQ and SAN.
5. Lack of communication between HQ and SAN.

6. Friction and areas of conflict between SAN and HQ.
7. High cost of application ($40,000-$100,000 and higher).
8. Time in reviewing applications.
9. Lack of established and standardized procedures for reviewing applications.
10. Equity: What qualifies and determination of value of property (leases) and other assets.
11. Quality of applications.
12. Changing staff.
13. Long concurrence chain.
14. Industry concern about proprietary information and loan being non-recourse, associated only with the assets of the projects.

Where are the Applicants?

Some feel that it is only a matter of time before the GLGP "takes off," while others think this program is not what is needed because the firms who have the capital and expertise to develop the resource will not use the GLGP.

The following are cited as reasons for the lack of response to the program:

1. equity is difficult to raise for some applicants,
2. reluctance to get involved with federal government,
3. high cost of applications,

4. waiting to see response to applications pending, and
5. concern about nonrecourse and proprietary data.

The author feels these arguments lack substance. The well-established resource companies have enough capital sunk into leases to constitute the equity requirement. Response to cost-shared programs is far greater and this involves disclosure of proprietary data. It seems if money is free, the incentive is greater.

There exist many situations external to the program itself that are obstacles to its impact. The potential for such a program seems greater than its actual performance, although these problems may not have received the amount of deserved attention until such a need arose. Possibly the GLGP has had an impact on some of these "external" factors and thereby will promote development of geothermal resources.

The GLGP is a subsidy for the industry. The government is helping to promote private industry by committing themselves to repay loans in default. It is extremely attractive economically and financially. The firm does not have to use its own funds for a project financed in this way. This allows capital flow into other projects and also reduces the risk to the firm. The program has not brought about any developments or projects that would not have been financed by other means, although the GLGP may have speeded up the process.

CONCLUSIONS AND RECOMMENDATIONS

The Geothermal Loan Guaranty Program has not had an impact on developing geothermal resources in the short term, although it could potentially stimulate development of geothermal energy. The impact could be more than the addition of electricity, it could mean increased awareness of the potential and utilization of the resource, improvements in technical areas, and the lessening of the reliance on fossil-fuels, especially petroleum.

With only three loan guaranties approved and an additional six, of which five have been at SAN for over a year, the impact and activity are minimal. The program was off to a bad start from the beginning and problems have continued hindering its performance. The staff had little or no prior exposure to geothermal resources and the GLGP was the first loan guaranty program for energy resources. The preparation for implementing the program was not sufficient. Government officials claims this was due to the newness of the program, needed flexibility, and unknowns concerning applicants, projects, and needs.

The use of this type of support is increasing and needs to be examined for its potential success and impact on the development of energy resources and technologies. External factors, operation and management of these programs will determine their ability to meet the expected objectives and goals.

The Geothermal Loan Guaranty Program has not met the expected $200 million per year in loan guaranties or 20 applications per year expected to be received by the San Francisco Operations office in Oakland, California administering the program. Table 12, Geothermal Loan Guaranty Applications, was used for budgetary purposes and is very optimistic. Some of the applications may never be submitted; applicants have many prerequisites prior to submission of the application. If the applications are submitted, it does not insure a loan guaranty will be granted or that the project is feasible. A false, optimistic impression of the use of the program may be gotten from this list.

The GLGP is plagued by the general state of the industry, the lack of activity, and the many legal, institutional, and technical barriers.

The GLGP may have negative impact on geothermal development. The GLGP may delay the normal process of exploration

and development by offering more attractive financing arrangement. If a firm can use borrowed money with a lower risk, possibly they would delay a project until such time that they could obtain a federal loan guaranty.

The GLGP may also make it more difficult to obtain capital by conventional means. If lenders can make loans with federal guaranties, they may be reluctant to make them without the guaranty. The author understands that at this time lenders have stated they will not make loans for geothermal projects but possibly the GLGP would delay the establishing of lending without guaranties. This could be of significance especially if the program is extended beyond 1984.

The introduction of other loan guaranty programs, with greater budget appropriations, may increase the competition to obtain loans under the GLGP.

The GLGP may be having an indirect impact on geothermal development. By its very existence, it is generating greater interest and industry may be taking a closer look at the resource than before. The GLGP may also lower the barriers to entry and increase competition by increasing the number of firms in the geothermal industry.

The low priority afforded geothermal resources and the GLGP in government and private sectors contributes to the

lack of response to the program. A need for promotion and education of the GLGP exists. Apparently SAN did not conduct a mass mailing of the newer guidelines, as some industry representatives did not receive them. A mass mailing of the guidelines would be an effective way to educate the industry and promote the program. This need is often demonstrated by the misconceptions held about the GLGP. These include: a) uncertainty that this is a non-recourse loan, one associated only with the assets of a particular project, b) concern about maintaining proprietary information confidential, and c) belief that only leases with deep wells will be considered for a loan guaranty.

If the latter is correct, it is in complete noncompliance with the law (P.L. 93-410) which specifically states lease acquisition and exploration, including thermal gradient and geophysical surveys, are allowable under the GLGP. The GLGP rules and regulations are not consistent with the purpose outlined in the legislation (P.L. 93-410). This act did not assign priorities and clearly stated the GLGP was to be used for lease acquisition and wildcatting. The author believes these will not be approved for loan guaranties by HQ.

The Geothermal Loan Guaranty Program differs from the demonstration program in that the capital subsidy is free

for a demonstration and not for a loan guaranty. The loan guaranty is directed at capital markets in trying to bring about a normal environment for lending in geothermal utilization. The objectives of the GLGP and the demonstration program is similar in that they are both directed at stimulating the industry but it remains as seen and is debatable which will prove more effective. There also exist differences between the two which are suppoed to serve different objectives. The proponents of the demonstration plant believe it will be a prelude to the GLGP, as it is believed the Reservoir Case History Program will also function.

It is the opinion of the author that if the construction of power plants using geothermal resources is profitable, private industry will build them; and if it proves to be unprofitable, they will not. The demonstration program does little to improve the economics and also accomplishes little toward resolving the legal, political, and institutional problems that plague the industry. It also does not obliterate barriers to capital formation in this industry. Even if technical and reservoir uncertainties are laid to rest, many issues must be resolved before we will see large scale use of geothermal resources. The author proposes that given the abatement of the institutional barriers, the granting of tax subsidies, the streamlining of environmental

requirements and leasing procedures, the industry would stand on its own without the direct subsidy a demonstration plant represents.

If projects economics are more attractive and competition increases for capital--if management can get a higher rate of return from coal leases and still exploit their geothermal leases with lower risk and little of their own money--firms will begin to use to GLGP. Once one firm uses it and thereby gain a competitive advantage, others will follow.

The impact of the GLGP on geothermal exploration and development has been negligible so far. In order to evaluate the impact of the GLGP, it should be determined whether or not projects financed with a federal loan guaranty would have been undertaken without the guaranty. It must also be determined what is meant by impact and the significance of any change in status. It may be that any additional use of geothermal energy with the use of the GLGP constitutes an impact. The author is of the opinion that most of the projects undertaken with a GLGP would have, at some later time, been done without a federal loan guaranty.

Beside speeding up the small amount of activity in the industry, the GLGP has had a positive impact on lenders. The GLGP has made the financial community aware of the

potential market for capital in geothermal and become familiar with the resource and its unique qualities.

The impact of the GLGP on geothermal exploration and development will continue to be negligible until the problems surrounding the program and the resource are aleviated.

Conclusions

It is this author's opinion that if the government really wants to promote geothermal development, it should stop creating new programs until either improvements or termination of the ones already existing occur. The federal government, through the Department of Energy, should cease subsidizing the industry. If the legal and institutional barriers were lowered, capital flow into geothermal would be evident. Capital availability would be in the more conventional manner and not through government programs. Government intervention has made it uneconomic for firms to dare invest their own equity in a venture when their competition is being subsidized.

Government activity in geothermal should be limited to research and development for exploration methods, drilling technology, data management and dissemination, leasing, streamlining regulations, and promoting formulation of state and local legislation. Business and government do not operate with the same objectives and constraints. Government

actions can be attributed to political ambitions, national interest, and social benefit; this is not to say that industry disregards these facts but more often seeks larger market shares, integration, increased profits, prestige, and more often deals with real risk situations and real dollars.

Let government support research aggressively, especially on unconventional sources of energy. But the government should "keep out of the development and production phases of energy supply."

Recommendations

The author has attempted to make recommendations believed to be helpful in making the GLGP a better program and attracting applicants. The author proposes these be implemented for the remaining life of the program and that it not be extended beyond September 3, 1984. Several issues must be resolved and policies formulated. These issues are presented herewith in order to stimulate discussion hopefully leading to their resolution.

1. Promotion, public relations, and education need to be further exploited.

SAN conducted seminars for potential borrowers and lenders almost two years ago, during the summer of 1976; possibly this should be repeated. Emphasis at conferences,

seminars, etc., should be on how an applicant can meet the criteria, what the requirements are, and problems, not simply a general overview. Specifics must be addressed. There should be a mass mailing of promotional material and application guidelines. Misconceptions could be eliminated through this means.

2. A schedule of events should be outlined by which SAN will have increased authority and also reduces the number of people reviewing the applications. Review conducted by SAN staff and outside consultants, and then only by the Office of the Controller and possibly General Counsel at HQ would reduce review time substantially. The proximity of the reviewers would also facilitate the process.

3. A policy should be formulated determining what stages of geothermal development the GLGP will be used for: lease acquisition, exploratory drilling, development drilling, or power plant construction. A percentage of available dollars of budgetary authority should be allocated to each category in order to reach an optimal solution that will generate the greatest benefit for the given level of cost. Alternative non-electric utilization could possibly be part of an application if temperatures prove to be insufficient for electric generation.

4. There is too little communication between SAN and HQ. SAN should be advised of all policy decisions and discussion concerning the GLGP. Areas of conflict and the friction and competitive attitude between the two over this program must be eliminated. This has slowed down any progress toward resolving the problems the program has.

5. Policy issues must be decided in the following areas:

   a. Multiple site applications: do these have to be related projects or dependent?

   b. Will market value or cost of leases and other assets qualify as the equity share?

6. Establish procedures and guidelines for reviewing at HQ. The same staff should see all applications; they should not be "farmed out" to different staffs with each application.

7. Concurrence and final approval authority must be assigned. This authority should be given to the Deputy Secretary or some other staff who would be able to overrule a nonconcurrence of the Assistant Secretaries. The author does not believe all parties need to concur with a recommendation in order to reach a final decision on a project.

8. The Division of Geothermal Energy should disassociate itself from the GLGP. Only those divisions who were given

authority under DOE organization can work to change and improve the program and therefore should be the only ones involved in this process.

9. The Institutional Barriers Panel of the Geothermal Advisory Council should concern itself with the larger problems of legal issues, leasing policies, legislation, and environmental regulations which would also impact the GLGP. There is little or nothing they can or should do with the GLGP. Too many issues need resolving before major institutional changes can occur.

10. A policy decision on the resolution of differences of opinion between SAN, HQ, applicants, and consultants is needed. If a project is rejected on the basis of a poor evaluation of the project in any one area (i.e., management, economics, technical, reservoir temperature, etc.), a third evaluation should be made by an outside party, not by the government's or applicant's consultants.

11. A policy on conflict of interests with respect to applicants and consultants. For example, if a private firm is enlisted to evaluate an application and an employee or client has interests or the firm applying for a loan guaranty, another consultant should be sought.

12. Consultants to be used for evaluating applications must be chosen and be consistent with each one. Private firms may be engaged for this rather than the USGS and ORNL.

The use of the USGS seems questionable considering their time and workload constraints within which they work. It is also suggested that private industry be engaged because they have better access to information and deal with risk and investment as an everyday occurrence. Private industry deals and thinks in terms of real dollars and government has less tendency toward this.

The Geothermal Loan Guaranty Program has until September, 1984, about five and one-half years, to get organized and have an impact on geothermal exploration and development. If change in policy and review procedures and the organizing of DOE do not take place soon, the GLGP will never "take off." The author does not foresee an increase in the number of applications or loan guaranties in the next year or two. This is due to the fact that organization and implementation take a long time in the federal government and preparation of applications is also a time consuming endeavor.

Loan guaranties are a new form of government support in the energy field and many issues warrant further investigation: the impact on capital markets and investments, the effect on allocation and development of resources, interest rates, and competition.

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LIST OF APPENDICES

APPENDIX A

GAO QUESTIONNAIRE

1. Do you believe the development of geothermal resources in the U. S. is proceeding at a reasonable rate?

   1. /_/ Yes
   2. /_/ No
   3. /_/ No opinion

   If no,

   /_/ Too slow

   /_/ Too fast

2. Through legislation in 1974 and 1975, ERDA was assigned the responsibility for accelerating the development of geothermal resources in the U. S. To what degree has ERDA achieved this goal?

   /_/ To a great extent

   /_/ To a moderate extent

   /_/ To a slight extent

   /_/ No progress

   /_/ ERDA really can't accelerate development

   /_/ No opinion

3. What "should be" the Federal Government's primary role in developing geothermal energy? (Select the one which best represents your thoughts)

   a. /_/ have primary responsibility for demonstration, technology development, and commercialization of geothermal resources. More concern being given to national energy needs than to economic feasibility.

   b. /_/ be a partner in geothermal development with other levels of Government and private industry. Sharing in the responsibility for demonstration, technology develmopment and commercialization of geothermal resources.

c. ☐ have a supportive position. Assisting private industry upon request or when the need for assistance is identified. Having an active role in geothermal development primarily by providing an environment conducive to commercialization by making regulatory changes and providing certain financial incentives.

d. ☐ have only a regulatory role. Establishing a well-defined framework within which private industry must operate. Leaving all other aspects of development to the private sector.

e. ☐ not become involved in geothermal development. Let private industry develop geothermal resources on its own.

f. ☐ No opinion

4. Responsibility for geothermal resource assessment in the United States resides with the U. S. Geological Survey (USGS). How effective has USGS resource assessment work been?

☐ Very effective

☐ Moderately effective

☐ Slightly effective

☐ Not effective

☐ Shouldn't be USGS responsibility

☐ No opinion

5. If you have had prior experiences with oil and gas resource development, how would you compare or rate USGS' assessment work in these areas with its geothermal assessments?

☐ Superior to oil and gas effort

☐ Same as oil and gas efforts

☐ Inferior to oil and gas efforts

☐ No opinion

6. ERDA has projected 3,000 megawatts of electric power production from geothermal resources by 1985. What is your opinion of the potential for electric power production from geothermal by 1985 and 2000?

1985	2000
☐ 0 - 1000 MW	☐ 0 - 1000 MW
☐ 1,001 - 2000 MW	☐ 1,001 - 3,000 MW
☐ 2,001 - 4,000 MW	☐ 3,001 - 6,000 MW
☐ 4,001 - 6,000 MW	☐ 6,001 - 10,000 MW
☐ 6,001 - 10,000 MW	☐ 10,001 - 100,000 MW
☐ 10,001 or more MW	☐ 100,001 - 200,000 MW
☐ No opinion	☐ 200,001 or more MW
	☐ No opinion

7. What do you anticipate the contribution from your leases will be to this electric power production by 1985 _____MW, and by 2000 _____MW?

8. Below are listed some of the major problems identified by various studies as issues delaying the development of geothermal resources Please indicate how these issues impact on your development of geothermal resources.

Issue	Significantly	Moderately	Slightly	Not at all	No opinion
Land leasing (acreage limitation, unitization,etc.)					
Permitting problems (drilling)					
Environmental (reporting, environmental technology)					
Technical barriers (hardware for power conversion, scaling, etc.)					
Tax laws (intangible drilling costs, depletion)					
Financial uncertainty & risk (capital, bank loans)					
Resource uncertainty (reservoir life, etc.)					
Exploration (finding the resource)					
Electric utilities (reluctancy to develop or support)					
Water use (obtaining water and pollution problems)					
Economics (geothermal not competitive with other energy sources)					

9. Who (what) do you use as your primary source of information to keep abreast of current geothermal developments and advancements?

   a ☐ ERDA

   b. ☐ USGS

   c. ☐ State Agency (specify) _____

   d. ☐ Research Institution (specify) _____

   e. ☐ Generated in-house (own research) _____

   f. ☐ Member of private industry (specify) _____

   g. ☐ Other (specify) _____

10. Do you believe there is a need for increased information dissemination by the Federal Government on new technologies and what the Federal Government is doing to advance geothermal?

   ☐ Considerable, hardly any information currently available

   ☐ Some, sufficient trade journals, etc., available

   ☐ Not at all - enough is available

   ☐ No opinion

11. What was the primary reason you or your company leased geothermal lands?

   a. ☐ development - electric power production

   b. ☐ development - nonelectric applications

   c. ☐ investment

   d. ☐ to explore and then lease to a developer

   e. ☐ other (specify)_____

12. Which types of geothermal resources are you leasing?

(Check more than one if necessary)

a. ☐ dry steam

b. ☐ hot water

c. ☐ hot dry rock

d. ☐ geopressured

e. ☐ magma

f. ☐ other (specify) _____

g. ☐ don't know

13. Please list how many acres of land your company has for geothermal development and approximately what percentage of these lands are within known geothermal resource areas (KGRA).

	Acreage	% within KGRA's
Federal		
State		
Private		
Other (specify)		
Total		

14. Approximately how much money have you or your company spent for geothermal development (excluding lease payments) in 1975, 1976, and 1977?

Amount	1975	1976	1977
Nothing	☐	☐	☐
Less than $10,000	☐	☐	☐
$10,000 to $99,999	☐	☐	☐
$100,000 to $299,999	☐	☐	☐
$300,000 to $499,999	☐	☐	☐
$500,000 to $999,999	☐	☐	☐
$1 million to $3 million	☐	☐	☐
Over $3 million	☐	☐	☐

15. Approximately how much money has been budgeted for 1978 (excluding lease payments)?

☐ Nothing

☐ Less than $10,000

☐ $100,000 - $299,999

☐ $300,000 - $499,999

☐ $500,000 - $999,999

☐ More than $1 million

16. Do you think there is a need for ERDA's geothermal loan guarantee program?

- ☐ Critical
- ☐ Moderate
- ☐ Slight
- ☐ No need
- ☐ Not familiar with program
- ☐ No opinion

17. Are you or your company unable to raise capital to finance development of geothermal resources?

- ☐ Yes
- ☐ No

18. Are you or your company planning to apply for a loan guarantee?

- ☐ Yes
- ☐ No
- ☐ Uncertain

19. Federal regulations allow lessees to pool their resources, referred to as unitization, for geothermal resource development. Do you plan to pursue unitization with other lessees to develop your geothermal leases?

- ☐ Yes
- ☐ No
- ☐ Not needed

20. Below are listed the various states of geothermal resource development. Since you are a lessee of geothermal lands, you have made it through the initial stage of development. Please indicate the stage of development you've reached on the majority of your land in each category by placing a check in the appropriate space.

	Type of Geothermal Lands			
	Federal	State	Private	Other
a. Land held with no additional development	____	____	____	____
b. Geological, geophysical, and geochemical testing being conducted or accomplished	____	____	____	____
c. Exploratory drilling underway or completed	____	____	____	____
d. Preparing or completed environmental reports and processing	____	____	____	____
e. Production wells being drilled or completed	____	____	____	____
f. Power plants underway or completed	____	____	____	____
g. Nonelectric uses underway or completed	____	____	____	____

21. How many exploratory wells have you drilled on all your leases?

- [ ] 0 - 2
- [ ] 3 - 5
- [ ] 5 - 7
- [ ] 7 - 9
- [ ] 10 or over

22. Do you think there is a need for ERDA to demonstrate the commercial viability of geothermal energy through selected demonstration projects?

- /__/ Critical need
- /__/ Moderate need
- /__/ Slight need
- /__/ No need
- /__/ No opinion

We realize that this questionnaire cannot provide information in the depth as that obtained from a personal interview or through narrative responses. Therefore, if you feel that there are issues raised in this questionnaire which need further clarification or if you have any additional comments you feel would be of interest to the Congress or any of the items within the questionnaire or related topics not covered, please feel free to express them. Any further information you can give us will be greatly appreciated.

Thank you.

APPENDIX B

DESIGNATED KGRA'S

KNOWN GEOTHERMAL RESOURCES AREAS (KGRA'S)
AS CLASSIFIED BY THE INDICATED AREA GEOLOGISTS
WESTERN AND CENTRAL REGIONS

WESTERN REGION

Alaska Area Geologist, Anchorage, Alaska

Alaska	No. of Acres
1. Geyser Spring Basin	20,960
2. Okmok Caldera	44,800
3. Pilgrim Springs	22,400
	88,160

Pacific Area Geologist, Menlo Park, California

Arizona	
1. Clifton	780
2. Gillard Hot Springs	2,920
	3,700

California	
1. Beckwourth Peak	2558
2. Bodie	640
3. Brawley	28,886
4. Coso Hot Springs	56,880
5. Dunes	7,680
6. East Mesa	38,365
7. Ford Dry Lake	7,687
8. Geysers-Calistoga	374,910
9. Glamis	25,505
10. Glass Mountain	33,287
11. Heber	58,568
12. Knoxville	14,702
13. Lake City-Surprise Valley	72,940
14. Lassen	78,642
15. Little Horse Mountain	1,196
16. Love Lady Ridge	6,239
17. Mono-Long Valley	460,256
18. Randsburg	12,880
19. Saline Valley	3,200
20. Salton Sea	95,824
21. Sespe Hot Springs	7,034
22. Wendel-Amedee	17,932
23. Witter Springs	18,152
	1,423,963

Idaho		No. of Acres
1.	Bruneau	5,120
2.	Castle Creek	79,722
3.	Crane Creek	4,342
4.	Island Park	28,539
5.	Mountain Home	9,520
6.	Raft River	30,209
7.	Vulcan	3,836
8.	Yellowstone	14,164
		175,452

Nevada		
1.	Baltazor	5,617
2.	Beowawe	33,224
3.	Brady-Hazen	98,508.22
4.	Colado	640
5.	Dixie Valley	38,347.71
6.	Darrough Hot Springs	8,363.18
7.	Double Hot Springs	29,326
8.	Elko Hot Springs	8,960
9.	Fly Ranch	20,758.66
10.	Fly Ranch Northease	7,680
11.	Gerlach	26,326
12.	Gerlach Northease	7,971
13.	Hot Springs Point	8,549
14.	Kyle Hot Springs	2,561
15.	Leach Hot Springs	12,846.21
16.	Moana Springs	5,120
17.	Monte Neva	10,302
18.	Pinto Hot Springs	8,015
19.	Ruby Valley	5,743
20.	Rye Patch	801
21.	Salt Wells Basin	19,232
22.	San Emidio Desert	7,678
23.	Silver Peak	5,117
24.	Soldier Meadow	5,966
25.	Steamboat Springs	8,911.12
26.	Stillwater-Soda Lake	225,260
27.	Trego	7,013
28.	Wabuska	11,520
29.	Warm Springs	3,812
30.	Wilson Hot Springs	1,294
		635,462.10

Oregon	No. of Acres
1. Alvord	176,835
2. Belknap-Foley Hot Springs	5,066
3. Breitenbush Hot Springs	13,445
4. Burns Butte	640
5. Carey Hot Springs	7,579
6. Crump Geyser	85,663
7. Klamath Falls	50,300
8. Lakeview	12,165
9. McCredie Hot Springs	3,659
10. Mount Hood	8,671
11. Newberry Crater	31,284
12. Vale Hot Springs	22,998
13. Summer Lake Hot Springs	13,631
	431,936

Washington	
1. Kennedy Hot Springs	3,311
2. Mount St. Helens	29,754
3. Indian Heaven	2,547
	35,612

CENTRAL REGION

Central Rocky Mountain Area Geologist, Denver, Colorado

Colorado	
1. Alamosa County	6,761
2. Mineral Hot Springs	5,765
3. Poncha	3,200
4. Valley View Hot Springs	5,099
	20,825

Utah	
1. Cove Fort-Sulphurdale	24,874
2. Crater Springs	17,321
3. Lund	3,840
4. Monroe-Joseph	16,364
5. Navajo Lake	2,522
6. New Castle	2,636
7. Roosevelt Hot Springs	29,791
8. Thermo Hot Springs	26,019
	123,367

Northern Rocky Mountain Area Geologist, Casper, Wyoming

Montana	No. of Acres
1. Boulder Hot Springs KGRA	6,343
2. Corwin Springs	20,349
3. Marysville	19,200
4. Yellowstone	12,763
	58,655

Southern Rocky Mountain Area Geologist, Roswell, New Mexico

New Mexico	
1. Baca Location No. 1	168,761
2. Gila Hot Springs	3,202
3. Kilbourne Hole	25,134
4. Lightning Dock	23,552
5. Lower Frisco Hot Springs	5,760
6. San Ysidro	1,915
7. Socorro Peak	89,715.81
8. Radium Springs	9,813
	327,852.81

GRAND TOTAL	3,324,984.91
NUMBER OF KGRA'S	106

APPENDIX C

LEASE SALES AS OF DECEMBER 31, 1977

NONCOMPETITIVE GEOTHERMAL LEASING
MONTHLY SUMMARY STATUS REPORT

As of: December 31, 1977

STATE	APPLICATIONS FILED BLM	FILED FS	FILED SUBTOTAL	WITHDRAWN	REJECTED	AWAITING(1) ACTION BLM	AWAITING(1) ACTION FS	AWAITING(1) ACTION OTHER	REFUSED	LEASES ISSUED BLM	ISSUED FS	ISSUED SUBTOTAL	ACRES BLM	ACRES FS	ACRES SUBTOTAL
ALASKA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ARIZONA	57	67	124	5	34	17	55	0	8	4	1	5	5,228	1,920	7,148
CALIFORNIA	674	397	1,071	344	287	260	169	0	1	10	0	10	17,098	0	17,078
COLORADO	86	73	159	58	15	7	34	0	2	43	0	43	50,245	0	50,245
IDAHO	564	317	881	193	152	164	208	26	26	111	1	112	188,564	2,560	191,124
MONTANA	33	55	88	42	25	1	11	3	0	6	0	6	10,687	0	10,687
NEVADA	1,399	13	1,412	466	312	129	15	0	78	409	3	412	724,876	4,434	729,309
NEW MEXICO	574	42	616	284	64	146	27	0	10	85	0	85	153,742	0	153,742
OREGON	657	378	1,035	249	262	189	218	12	0	102	3	105	140,248	5,709	145,957
UTAH	497	106	603	122	141	57	35	14	16	208	10	218	367,754	12,806	380,559
WASHINGTON	0	277	277	86	49	42	100	0	0	0	0	0	0	0	0
WYOMING	19	121	140	45	16	56	19	0	0	0	4	4	0	7,448	7,448
EASTERN STATES	0	12	12	0	1	0	0	0	0	0	11	11	0	19,744	19,744
TOTALS	4,560	1,858	6,418	1,894	1,358	1,068	891	55	141	978	33	1,011	1,658,422	54,621	1,713,041

(1) Applications awaiting action for the following reasons:

23	Awaiting KGRA report from USGS
10	Pre-lease plan of development
386	Pending preparation of EAR (BLM only)
891	Awaiting comment of other agencies
35	Lease forwarded for signature
669	Processing (Adjudication) - BLM

(2) 203 Leases relinquished or terminated (335,554 Acres)
27 Leases partially relinquished (23,816 Acres)
Total (359,370 Acres)

NONCOMPETITIVE GEOTHERMAL LEASING
MONTHLY SUMMARY STATUS REPORT
APPLICATIONS AWAITING ACTION

As of December 31, 1977

STATE	AWAITING KGRA REPORT FROM USGS	AWAITING PRE LEASE PLAN OF DEV. FROM APPLICANT	PENDING PREP OF EAR (BLM ONLY)	AWAITING COMMENT OF OTHER AGENCIES Other	AWAITING COMMENT OF OTHER AGENCIES FS	LEASE FOR SIGNATURE BY APPLICANT	PROCESSING (ADJUDICATION) BLM	TOTALS
ALASKA	0	0	0	0	0	0	0	0
ARIZONA	0	0	16	0	55	0	1	72
CALIFORNIA	13	0	21	0	169	0	226	429
COLORADO	0	0	0	0	34	0	7	41
IDAHO	2	0	123	0	208	24	41	398
MONTANA	0	0	0	0	11	3	1	15
NEVADA	0	0	10	0	15	0	119	144
NEW MEXICO	0	0	96	0	27	0	50	173
OREGON	5	0	109	0	218	7	80	419
UTAH	3	10	2	0	35	1	55	106
WASHINGTON	0	0	0	0	100	0	42	142
WYOMING	0	0	9	0	19	0	47	75
EASTERN STATES	0	0	0	0	0	0	0	0
SUB TOTAL	23	10	386	0	891	35	669	
TOTAL								2,014

GEOTHERMAL LEASE SALE SUMMARY

As of April 30, 1977

Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
1/22/74 Geysers, Calif.	12	8,735	12	8,735	10	7,969	10	7,969	$5,045,247	$1,367.52	$ 633.10	Shell Oil Co. Thermogenics, Inc. Union Oil Co. Signal Oil Co. Occidental Pet.	42
1/22/74 East Mesa, Calif.	14	[illegible]	5	9,210	5	9,210	5	9,210	653,133	169.79	70.91	Magma Power Co. Republic Geothermal, Inc.	5
1/22/74 Mono-Long Valley, Calif.	7	22,785	3	5,403	3	5,403	3	5,403	632,818	290.90	115.41	Chevron Oil Co. Getty Oil Co. Republic Geothermal, Inc.	10
5/29/74 Geysers, Calif. (Reoffered)	2	786	2	786	2	786	2	786	2,275,000	3,282.74	2,894.40	Natomas Co. Occidental Pet.	8
6/4/74 East Mesa, Calif. (Reoffered)	9	20,900	1	2,560	1	2,560	1	2,560	8,371	3.27	3.27	Republic Geothermal, Inc.	1
6/27/74 Vale, Ore.	1	1,347	1	1,347	1	1,347	1	1,347	13,831	10.26	10.26	Republic Geothermal, Inc.	4
7/30/74 Roosevelt Hot Springs, Utah	12	23,392	12	23,392	12	23,392	12	23,392	877,189	128.03	37.49	Union Oil Co. Phillips Pet. Co. Getty Oil Co.	29

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Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
9/11/74 Brady-Hazen, Nevada	8	[illegible]	5	6,735	4	4,254	2*	4,254	29,109	10.15	6.97	Geothermal Resources, Int'l Magma Power Co. Southern Union Production Co.	6
12/18/74 Beowawe, Nev.	8	16,338	5	11,828	5	11,828	5	11,828	671,257	203.77	56.74	Chevron Oil Co. Getty Oil Co.	12
12/18/74 Hot Springs Point, Nev.	3	5,341	2	4,701	2	4,701	2	4,701	240,894	53.84	51.24	Chevron Oil Co.	4
12/18/74 Brady-Hazen, Nev.	4	8,274	2	5,[illegible]74	2	5,074	2	5,074	88,912	20.00	17.52	Natomas Co.	3
1/20/75 Clifton, Ariz.	1	[illegible]	0	0	0	0	0	0	0	-	-	-	0
3/3/75 Cove Fort-Sulphurdale, Utah	10	[illegible]	9	19,409	9	19,409	9	19,409	2,676,123	361.87	137.88	American Geothermal Energy, Inc. Union Oil Co.	11
4/8/75 Fly Ranch, Nev.	7	24,479	4	8,751	4	8,751	4	8,751	41,290	7.77	4.71	Natomas Co. Sun Oil Co. Calvert Drilling Co.	5

* 3 accepted units combined into one lease

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Lease Sale Date and KGRA	Units Offered No.	Units Offered Acreage	Units Bid On No.	Units Bid On Acreage	Units Accepted No.	Units Accepted Acreage	Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
5/15/75 Kilbourne Hole, New Mexico	12	24,278	9	18,477	9	18,477	9	18,477	$ 359,683	$ 31.26	19.47	Anadarko Production Co.	12
5/20/75 Alamosa County, Mineral Springs Poncha and Valley View, Colorado	8	11,271	3	5,036	3	5,036	3	5,036	13,377	3.17	2.70	Phillips Pet. Co. Anschutz Corp.	3
5/22/75 Mickey Hot Springs, Ore.	14	30,348	6	14,999	3	7,320	3	7,320	44,213	10.25	5.88	Al-Aquitane Exploration LTD. Phillips Pet. Co. Getty Oil Co.	15
5/29/75 Alvord Hot Springs, Ore.	14	26,930	6	12,643	6	12,643	6	12,643	90,714	17.90	7.18	Republic Geothermal, Inc. Chevron Oil Co.	8
6/3/75 Beran Lake, Hot Springs, Oregon	16	35,609	8	17,809	5	11,019	5	11,019	44,678	29.50	6.05	NAPCO, Inc. (Tulsa) Getty Oil Co. Southern Union Production Co. Union Oil Co. of California	21

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Lease Sale Date and KGRA	Units Offered No.	Units Offered Acreage	Units Bid On No.	Units Bid On Acreage	Units Accepted No.	Units Accepted Acreage	Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
6/12/75 Thorne, Lund, Navroo-Joseph, Roosevelt (Reoffered) and Cove Fort-Sulphurdale (Reoffered), Utah	18	30,368	5	6,762	5	6,762	5	6,762	29,495	15.12	4.36	Chevron Oil Co. Thermax Co. Western Geothermal, Inc. Gary W. Seltzer	8
6/18/75 Mountain Home - Bruneau, Idaho	5	7,676	2	2,600	2	2,600	2	2,600	5,530	2.13	2.13	Anschutz Corp.	2
6/23/75 Lake City-Surprise Valley, Calif.	16	34,591	5	10,584	5	10,584	5	10,584	134,533	21.53	12.71	Getty Oil Co. Dow Chemical Co. Southern Union Production Co.	6
6/26/75 Stillwater-Soda Lake, Nevada	21	47,157	6	13,259	6	13,259	6	13,266	241,711	45.12	18.23	Phillips Pet. Co. Chevron Oil Co. Union Oil Co. of California Phillips Pet. Co. & Chevron Oil Co. (Joint Bid)	7

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Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
6/31/75 Crump Geyser, Oregon	18	35,974	4	9,462	4	9,462	4	9,462	37,016	5.12	3.91	Chevron Oil Co.	4
9/29/75 Steamboat Springs, Wabuska and Fly Ranch, Nevada	7	12,910	4	7,188	4	7,188	4	7,188	109,152	32.31	15.19	Phillips Pet. Co. and Gulf Oil Co. (Joint Bid), Southern Union Production Co.	6
9/29/75 Vale Hot Springs, Oregon	6	12,574	3	7,046	3	7,046	3	7,046	80,177	16.16	11.38	Union Oil Co., Geothermal Resources International	4
11/3/75 Castle Creek, Idaho	9	20,924	8	18,364	8	18,364	8	18,364	158,932	35.60	8.65	Nancy P. Anschutz Geothermal Resource International, Inc. Anschutz Corp. Dow Chemical Co. Phillips Pet. Co.	21
1/20/76 Fly Ranch Gerlach San Emidio, Nevada	17	33,524	5	10,106	5	10,106	5	10,106	146,732	28.47	14.52	Sonoco Energy Development Co. Chevron Oil Co.	6
2/3/76 Crater Springs, Lund, Monroe-Joseph and Thermo, Utah	18	36,936	13	29,969	13	29,969	13	29,969	96,689	7.28	3.22	Geothermal Resources International, Inc. Chevron Oil Co. Charles L. Golding Southern Union Production Co. Republic Geothermal, Inc.	23

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Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
3/3/76 Still Water-Soda Lake-Wilson Hot Springs, Nevada	16	35,192	1	1,294	1	1,294	1	1,294	4,776	3.69	3.69	Chevron Oil Co.	1
4/20/76 Darrough Hot Spring, Dixie Valley, Silver Peak, Nevada	19	45,642	8	17,340	8	17,340	8	17,340	174,312	28.89	10.05	Republic Geo. Sunoco Energy Al Aquitaine Explor. Magma Power	11
5/18/76 Lightning Dock New Mexico	6	13,371	4	9,023	4	9,023	4	9,023	41,550	8.11	4.60	Amax Explor., Inc. Phillips Pet. Co. Earth Power Co.	7
6/15/76 Desoure Brady-Hazen, H.S. Point & San Emidio Desert Nevada	27	52,098	7	13,698	7	13,698	7	13,698	92,545	12.91	6.75	So. Union Prod. Co. W.O & Ruth M. Darley Union-Magma	7
6/23/76 Crane Creek Castle Rock Mountain Home Idaho	5	9,043	2	3,941	2	3,941	1	1,381	27,006	17.28	6.85	Laura J. Spangler So. Union Prod. Co.	2

Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
8/18/76 Monte Nevada Colado Ruby Valley Rye Patch, Nevada	8	12,047	2	3,220	2	3,220	2	3,220	377,349	101.28	86.13	Union Oil Co.	6
9/23/76 Summer Lake, Oregon	4	7,521	2	4,674	2	4,674	2	4,674	13,393	3.91	2.87	So Union Prod. Co. Chevron Oil Co.	2
10/19/76 Leach Hot Springs Colado Nevada	6	12,886	6	12,886	6	12,886	6	12,886	54,145	7.98	4.20	Aminoil USA Inc. Getty Oil CO.	6
10/27/76 San Ysido Kilbourne Hole Lightning Dock New Mexico	11	11,423	5	5,065	5	5,065	5	5,065	13,352	3.27	2.63	Phillips Pet Co. Aminoil USA Inc.	5
11/17/76 Raft River Idaho	2	4,001	0	0	0	0	0	0	0	0	0	NO BIDS	0

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As of December 31, 1977

Lease Sale Date and KGRA	Units Offered		Units Bid On		Units Accepted		Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
	No.	Acreage	No.	Acreage	No.	Acreage							
12/14/76 Kyle, Nevada	4	8,204	1	2,400	1	2,400	1	2,400	8,114	3.38	3.38	Chevron Oil Co.	1
1/18/77 Boulder, Montana	1	1,608	0	0	0	0	0	0	0	0	0	NO BIDS	0
4/15/77 Alamosa County Mineral Hot Springs, Valley View, Colorado	5	6,235	0	0	0	0	0	0	0	0	0	NO BIDS	0
5/17/77 Pinto Hot Spgs., Warm Spgs. Nev.	5	9,287	1	1,312	1	1,312	1	1,312	11,282	8.60	8.60	Getty Oil Co.	1
5/25/77 Baca No. 1 New Mexico	17	29,375	11	18,050	11	18,050	11	18,050	574,425	133.76	31.82	Amax Exp. Inc. Phillips Pet. Co. Aminoil USA	22
6/9/77 Burns Butte, Oregon	1	640	0	0	0	0	0	0	0	0	0	NO BIDS	0
7/19/77 Balta Zar and Dixie Valley KGRA, Nevada	13	21,235	10	14,254	10	14,254	10	14,254	240,031	40.67	16.84	Earth Power Republic Geo. Millican Oil	17
9/14/77 Geysers Calistoga KGRA's California	3	2,937	2	2,857	2	2,857	2	2,957	780,451	603.00	273.18	Shell Oil Co.	5

As of December 31, 1977

Lease Sale Date and KGRA	Units Offered No.	Units Offered Acreage	Units Bid On No.	Units Bid On Acreage	Units Accepted No.	Units Accepted Acreage	Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
9/20/77 Radium Springs San Ysidro & Baca No. 1, New Mexico	12	17,968	8	11,197	8	11,197	8	11,197	233,618	37.51	20.86	Chevron USA, Inc. Texaco, Inc. Aminoil USA, Inc. Amax Expl., Inc.	15
9/27/77 Cove Fort, Sulphurdale, Crater Springs, Monroe-Joseph, Newcastle & Thermo Hot Spring, Utah	9	16,308	7	12,788	7	12,788	6	11,138	668,826	156.55	52.30	Union Oil Co. W. H. Hunt Aminoil USA, Inc.	25
11/17/77 Raft River, Mtn. Home, Idaho	11	21,020	4	6,986	4	6,986	3	5,103	30,453	5.10	4.36	Union Oil Co. of Calif. & Magma Energy, Inc. Raft River Elec. Coop.	4
11/29/77 Socorro Peak & Lightning Dock, New Mexico	19	34,654	10	18,820	10	18,820	0	0	281,171	60.05	14.94	Hoover H. Wright Aminoil USA Sunoco Energy Dev. Corp. Amax Expl., Inc.	18

As of December 31, 1977

Lease Sale Date and KGRA	Units Offered No.	Units Offered Acreage	Units Bid On No.	Units Bid On Acreage	Units Accepted No.	Units Accepted Acreage	Leases Issued (No.)	Acreage Under Lease	Total of Accepted High Bids	Highest Per Acre Bid	Average Price Per Acre	High Bidder(s)	No. of Bids Received
12/13/77 Brady Hazen Salt Wells Basin, Nevada	22	49,314	7	14,117	7	14,117	0	0	200,671	52.66	14.21	Thermal Power Co. Phillips Pet. Co. Supron Energy Corp. James R. Keighley Magma Power Co. & Union Oil Co. of Calif.	10
TOTALS	523	1,001,305	248	466,257	239	448,721	218	412,251	18,573,512	N/A	41.39	N/A	449

APPENDIX D

DRILLING IN THE WESTERN UNITED STATES 1975-77

Summary by States, 1975 Geothermal Drilling, Western U.S.

State	Region	Area	Operator	Wells	Prod.	Susp.	Adb.	Footage
California	Imperial Valley	Brawley	Union	3	3	0	0	19,337
		East Mesa	Republic Geothermal	3	3	0	0	25,030
		East Heber	Republic Geothermal	1	0	1	0	11,015
		Heber	Chevron	3	0	3	0	10,374
	The Geysers	(Main Geysers)	Union	10	0	0	1	81,208
			Pacific Energy	3	9	1	1	31,991
		Castle Rock Spring	Burmah (Aminoil)	8	1	1	0	60,279
			Shell	3	7	0	0	23,894
	Lake County	Crump Geyser	San Juan	1	3	0	1	7,510
Nevada	Churchill Co.	Brady H.S.	Magma	2	0	0	0	7,915
	Eureka Co.	Beowave	Magma	1	2	0	1	5,447
	Lyon Co.	Fernley	Magma	1	0	0	1	3,668
	Eureka Co.	Hot Springs Pt	Chevron	1	0	1	0	2,335
	Washoe Co.	San Emidio	Chevron	1	0	1	0	4,013
Idaho	Cassia Co.	Raft River	Ida. Nat. Eng. Lab.	2	2	0	0	10,077
Utah	Beaver Co.	Roosevelt H.S.	Phillips	6	5	1	0	31,198
New Mexico	Jemez Mts.	Valles Caldera	Union	2	1	0	1	12,507
Hawaii	Is. of Hawaii	Pahoa	Hawaii Geothermal Proj.	1	1	0	0	6,445
				52				

Source: Geothermal Energy Magazine, June 1976.

Summary by Operator, 1975 Geothermal Drilling, Western U.S.

Operator	Wells Drilled	Producible	Suspended	Abandoned	Observation	Total Footage Drilled
Union	15	13	0	2		113,052
Burmah (Aminoil)	8	7	1	0		60,279
Republic Geothermal	4	3	1	0		36,045
Pacific Energy	3	1	0	2		31,991
Phillips	6	5	1	0		31,198
Shell	3	3	0	0		23,894
Magma	4	2	0	2		17,030
Chevron	5	0	0	0	5	(16,722) 1/
Ida Natl. Eng. Lab.	2	2	0	0		10,977
San Juan	1	0	0	1		7,510
Hawaii Geothermal Proj.	1	1(?)	0	0		6,445
Totals	46	37	2	7		338,421
1/ Observations holes			(7)			(355,143)

Source: Geothermal Energy Magazine, June 1976.

Summary by States, 1976 Geothermal Drilling, Western U.S.

State	Region	Area	Operator	Wells	Prod.	Susp.	Abd.	Obs.	Footage
Calif.	Imperial Valley	Westmorland	Republic Geothermal	6	6	0	0	0	40,916
		Brawley	Union	2	2	0	0	0	16,411
		East Mesa	Magma Power	2	2	0	0	0	41,851
		Heber	Union	5	2	0	0	3	29,633
			Chevron	1	0	0	0	1	7,089
	The Geysers	Main Geysers	Union	14	14	0	0	0	122,675
			Aminoil	2	2	0	0	0	30,967
			Pacific Energy	1	1	0	0	0	10,550
			McCulloch	1	1	0	0	0	10,153
		Castle Rock	Aminoil	3	1	2	0	0	21,963
			Shell	1	1	0	0	0	5,626
		Middletown	Aminoil	1	0	1	0	0	11,561
			Chevron	1	0	1	0	0	9,232
			Shell	1	0	0	1	0	8,250
		Cloverdale	Shell	1	0	1	1	0	10,431
		Mt. Konocti	Magma Power	1	0	0	0	0	6,660
		Calistoga	AMAX	3	0	1	0	3	5,868
	Mono Co.	Long Valley	Republic Geothermal	1	0	0	0	0	6,920
	Inyo Co.	Coso Hot Springs	Battelle Pac. NW Lab.	1	0	0	0	1	1,352
Nevada	Churchill County	Desert Peak	Phillips	2	2	0	0	0	7,342
		Stillwater	Union	3	0	1	0	3	11,654
	Lander Co.	Beowave	Chevron	1	0	0	1	0	5,680
Oregon	Klamath Co.	Klamath Falls	Thermal Power	1	0	0	0	0	5,842
Idaho	Cassia Co.	Raft River	Idaho Nat. Eng. Lab.	2	2	0	0	0	8,991
	Ada Co.	Boise	Idaho Nat. Eng. Lab.	2	0	0	0	2	3,188
Utah	Beaver Co.	Roosevelt	Phillips	1	1	0	0	0	7,513
			Thermal Power	2	2	0	0	0	7,362
	Millard Co.	Cove Fort	Union	1	0	0	1	0	1,151
	Iron Co.	Beryl Junction	McCulloch	2	0	1	1	0	17,921

Source: Geothermal Energy Magazine, May 1977.

Summary by Operator, 1976 Geothermal Drilling, Western U.S.

Operator	Wells Drilled	Produ-cible	Sus-pended	Aban-doned	Obser-vation	Total Footage Drilled
Union	25	18	0	1	6	181,524
Aminoil	6	3	3	0	0	54,491
Republic Geothermal	7	6	1	0	0	47,836
McCulloch	3	1	1	1	0	28,074
Shell	3	1	0	2	0	24,307
Chevron	3	0	2	0	1	22,001
Magma	3	2	1	0	0	21,511
Phillips	3	3	0	0	0	14,855
Thermal Power	3	2	0	1	0	13,204
Idaho Nat. Eng. Lab.	4	2	0	0	2	12,179
Pacific Energy	1	1	0	0	0	10,550
Amax	3	0	0	0	3	5,868
Battelle Pac. NW Lab	1	0	0	0	1	1,352
Total	65	39	8	5	13	437,752

Source: Geothermal Energy Magazine, May 1977.

Summary by States, 1977 Geothemral

Drilling, Western U.S.

State	Region	Operator	Wells	Prod.	Injections	Sus.	Absd.	Obs.	Footage
Calif.	Imperial Valley	Union	1	1					9,609
		Chevron	1			1			7,930
		Republic	5	4	1				29,421
		Magma	1		1				3,095
	The Geysers	Union	16	13		1	2		
		McCulloch	2	1		1			
		Aminoil	11	5		2	4		65,843
		Shell	7	2		1	4		50,850
		Republic	1			1			7,376
	Inyo Co.	CER Corp	1			1			4,845
Nevada	Pershing Co.	Phillips	1			1			1,853
	Churchhill Co.	Chevron	1			1			4,975
		Oxy Geothermal	1					1	3,000
Utah	Iron Co.	McCulloch	1			1			5,867
	Beaver Co.	Thermal Power	1			1			6,107
		Republic Geothermal	1			1			7,288
Idaho	Washington Co.	Phillips	1			1			8,001
	Owyhee Co.	Phillips	1			1			9,340
New Mexico	Sandoval Co.	LASL	2						1,735

Source: Courtney Isselhardt, Republic Geothermal, Inc., (draft) 1978.

Summary by Operator, 1977 Geothermal Drilling, Western U.S.

Operator	Wells Drilled	Produce	Suspended	Abandoned	Observation	Total Footage Drilled
Union	18	14	1	3	0	139,010
McCulloch	3	1	2	0	0	18,880
Navy (CER Corp)	1	0	1	0	0	4,845
Phillips	3	0	3	0	0	19,194
Chevron	2	0	2	0	0	12,905
Oxy Geothermal	1	0	0	0	1	3,000
Thermal	1	0	1	0	0	6,107
Aminoil	11	5	2	4	0	65,843
Shell	7	2	1	4		50,850
Republic	7	4	2	0		44,085
Magma	1	0	0	0	0	3,085
LASL	(?) 2	—	—	1	—	1,735
Totals	57	26	15	12	1	(369,549)

Source: Courtney Isselhardt, Republic Geothermal, Inc., (draft) 1978.

APPENDIX E

FIRMS INVOLVED IN GEOTHERMAL DEVELOPMENT

Oil Companies: majors and independents

Union Oil of California

Chevron Oil Company - Standard Oil of California - Chevron Resources Company

Natomas

Phillips Petroleum Company

Aminoil

Petro-Lewis

Shell Oil Company

Gulf Oil Company

Occidental Petroleum

Sun Oil

Mapco, Inc.

Getty Oil

McCulloch Oil

Geothermal Enterprises:

Thermogenics, Inc.

Thermal Power Company

Geothermal Resources International, Inc.

Earth Power Corporation

Magma Power Company

Thermex

Republic Geothermal, Inc.

Geothermal Kinetics, Inc.

Hunt Energy Corporation

Geothermal Enterprises continued

Thermal Resources, Inc.

Diablo Exploration

California Energy Co., Inc.

Others: Large Integrated Firms

Anadarko Production Co.

Amax Exploration, Inc.

Anschutz Corp.

Dow Chemical Co.

Morton-Norwich Products

Utah International, Inc.

Municipalities:

Burbank

Susanville

Northern California Power Agency

Engineering Firms:

Ben Holt Co.

Bechtel Corporation

Morrison-Knudsen

Rogers Engineering

VTN Consolidated

Utilities

Pacific Gas and Electric, San Francisco, California.

Pacific Power and Light, Portland, Oregon.

Sierra Pacific, Reno, Nevada.

Utah Power and Light

San Diego Gas and Electric, San Diego, California.

Public Service of New Mexico, Albuquerque, New Mexico.

Southern California Edison, Rosemead, California.

California State Department of Water Resources, Sacremento, California.

Imperial Irrigation District, Imperial, California.

Arizona Public Service, Phoenix, Arizona.

APPENDIX F

ERDA BUDGET FOR FY 76-78

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

FY 1978 BUDGET REQUEST

ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION PROGRAMS

	BUDGET OUTLAYS (IN MILLIONS)				
			1978		
	1976	1977	January	February	April
I. Energy RD&D Programs					
Conservation	$ 45	$ 125	$ 139	$ 244	$ 249
Fossil Energy	242	445	500	519	531
Solar Heating and Cooling	15	61	61	86	90
Solar Electric and Other	48	122	173	164	170
Geothermal Energy	30	49	68	68	78
Fusion Power Development	211	328	431	392	392
Liquid Metal Fast Breeder Reactor	441	595	736	651	589
Nuclear Fuel Cycle and Safeguards	143	300	491	474	458
Other Fission	85	117	135	135	146
Special Foreign Currency Funds	0	2	3	3	3
Subtotal	1,260	2,144	2,737	2,736	2,706
II. Supporting Research					
Environmental and Biomedical Research	142	181	198	200	201
Basic Energy Sciences	118	137	162	162	162
Subtotal	260	318	360	362	363
III. Financial Incentive Activities					
Geothermal Resources Development Fund	0	4	7	7	7
Alternative Fuels Demonstration Program	0	0	3	3	3
Subtotal	0	4	10	10	10
Total Energy Research, Devel. & Demo. Prog.	$1,520	$2,466	$3,107	$3,108	$3,079

Source: Budgetary Implications of the President's Energy Policy, April 20, 1977, Overview and Perspective.

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

FY 1978 BUDGET REQUEST

	BUDGET AUTHORITY (IN MILLIONS)				
			1978		
	1976	1977	January	February	April
I. Energy Research, Development & Demonstration					
Conservation	$ 76	$ 161	$ 158	$ 318	$ 325
Fossil Energy	426	483	598	640	657
Solar Heating and Cooling	39	86	45	90	96
Solar Electric and Other	76	204	260	215	224
Geothermal Energy	31	55	88	88	101
Fusion Power Development	246	428	513	433	433
Liquid Metal Fast Breeder Reactor	505	686	855	656	483
Nuclear Fuel Cycle & Safeguards	167	357	636	611	587
Other Fission	84	140	148	148	161
Special Foreign Currency Funds	7	0	2	2	2
Subtotal	1,657	2,600	3,303	3,201	3,069
II. Supporting Research					
Environmental and Biomedical Research	156	189	210	215	216
Basic Energy Sciences	132	156	175	175	175
Subtotal	288	345	385	390	391
III. Financial Incentive Activities					
Geothermal Resources Development Fund	0	30	30	30	30
Alternative Fuels Demonstration Program	0	0	295	300	300
Subtotal	0	30	325	330	330
Total Energy Research, Devel. & Demo. Prog.	$1,945	$2,975	$4,013	$3,921	$3,790

Source: Budgetary Implications of the President's Energy Policy, April 20, 1977, Overview and Perspective.

APPENDIX G

GEOTHERMAL ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT OF 1974 (P.L. 93-410)

Public Law 93-410
93rd Congress, H. R. 14920
September 3, 1974

An Act

To further the conduct of research, development, and demonstrations in geothermal energy technologies, to establish a Geothermal Energy Coordination and Management Project, to provide for the carrying out of research and development in geothermal energy technology, to carry out a program of demonstrations in technologies for the utilization of geothermal resources, to establish a loan guaranty program for the financing of geothermal energy development, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

Geothermal Energy Research, Development, and Demonstration Act of 1974.
30 USC 1101 note.

SECTION 1. This Act may be cited as the "Geothermal Energy Research, Development, and Demonstration Act of 1974".

FINDINGS

30 USC 1101.

SEC. 2. The Congress hereby finds that—

(1) the Nation is currently suffering a critical shortage of environmentally acceptable forms of energy;

(2) the inadequate organizational structures and levels of funding for energy research have limited the Nation's current and future options for meeting energy needs;

(3) electric energy is a clean and convenient form of energy at the location of its use and is the only practicable form of energy in some modern applications, but the demand for electric energy in every region of the United States is taxing all of the alternative energy sources presently available and is projected to increase; some of the sources available for electric power generation are already in short supply, and the development and use of other sources presently involve undesirable environmental impacts;

(4) the Nation's critical energy problems can be solved only if a national commitment is made to dedicate the necessary financial resources, and enlist the cooperation of the private and public sectors, in developing geothermal resources and other nonconventional sources of energy;

(5) the conventional geothermal resources which are presently being used have limited total potential; but geothermal resources which are different from those presently being used, and which have extremely large energy content, are known to exist;

(6) some geothermal resources contain energy in forms other than heat; examples are methane and extremely high pressures available upon release as kinetic energy;

(7) some geothermal resources contain valuable byproducts such as potable water and mineral compounds which should be processed and recovered as national resources;

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(8) technologies are not presently available for the development of most of these geothermal resources, but technologies for the generation of electric energy from geothermal resources are potentially economical and environmentally desirable, and the development of geothermal resources offers possibilities of process energy and other nonelectric applications;

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(9) much of the known geothermal resources exist on the public lands;

(10) Federal financial assistance is necessary to encourage the extensive exploration, research, and development in geothermal resources which will bring these technologies to the point of commercial application;

(11) the advancement of technology with the cooperation of private industry for the production of useful forms of energy from geothermal resources is important with respect to the Federal responsibility for the general welfare, to facilitate commerce, to encourage productive harmony between man and his environment, and to protect the public interest; and

(12) the Federal Government should encourage and assist private industry through Federal assistance for the development and demonstration of practicable means to produce useful energy from geothermal resources with environmentally acceptable processes.

DEFINITIONS

30 USC 1102. SEC. 3. For the purposes of this Act—

(1) the term "geothermal resources" means (A) all products of geothermal processes, embracing indigenous steam, hot water, and brines, (B) steam and other gases, hot water and hot brines, resulting from water, gas, or other fluids artificially introduced into geothermal formations, and (C) any byproduct derived from them;

(2) the term "byproduct" means any mineral or minerals which are found in solution or in association with geothermal resources and which have a value of less than 75 percent of the value of the geothermal steam and associated geothermal resources or are not, because of quantity, quality, or technical difficulties in extraction and production, of sufficient value to warrant extraction and production by themselves;

(3) "pilot plant" means an experimental unit of small size used for early evaluation and development of new or improved processes and to obtain technical, engineering, and cost data;

(4) "demonstration plant" means a complete facility which produces electricity, heat energy, or useful byproducts for commercial disposal from geothermal resources and which will make a significant contribution to the knowledge of full-size technology, plant operation, and process economics;

(5) the term "Project" means the Geothermal Energy Coordination and Management Project established by section 101(a);

(6) the term "fund" means the Geothermal Resources Development Fund established by section 204(a); and

(7) the term "Chairman" means the Chairman of the Project.

TITLE I—GEOTHERMAL ENERGY COORDINATION AND MANAGEMENT PROJECT

ESTABLISHMENT

30 USC 1121. SEC. 101. (a) There is hereby established the Geothermal Energy Coordination and Management Project.

Membership. 88 STAT. 1080 88 STAT. 1081 (b) (1) The Project shall be composed of six members as follows:

(A) one appointed by the President;

(B) an Assistant Director of the National Science Foundation;

(C) an Assistant Secretary of the Department of the Interior;

(D) an Associate Administrator of the National Aeronautics and Space Administration;

(E) the General Manager of the Atomic Energy Commission; and

(F) an Assistant Administrator of the Federal Energy Administration.

(2) The President shall designate one member of the Project to serve as Chairman of the Project.

(3) If the individual appointed under paragraph (1)(A) is an officer or employee of the Federal Government, he shall receive no additional pay on account of his service as a member of the Project. If such individual is not an officer or employee of the Federal Government, he shall be entitled to receive the daily equivalent of the annual rate of basic pay in effect for level IV of the Executive Schedule (5 U.S.C. 5315) for each day (including traveltime) during which he is engaged in the actual performance of duties vested in the Project. Compensation. 80 Stat. 461; 83 Stat. 863.

(c) The Project shall have overall responsibility for the provision of effective management and coordination with respect to a national geothermal energy research, development, and demonstration program. Such program shall include—

(1) the determination and evaluation of the resource base;

(2) research and development with respect to exploration, extraction, and utilization technologies;

(3) the demonstration of appropriate technologies; and

(4) the loan guaranty program under title II.

(d)(1) The Project shall carry out its responsibilities under this section acting through the following Federal agencies:

(A) the Department of the Interior, the responsibilities of which shall include evaluation and assessment of the resource base, including development of exploration technologies;

(B) the National Aeronautics and Space Administration, the responsibilities of which shall include the provision of contract management capability, evaluation and assessment of the resource base, and the development of technologies pursuant to section 102(b);

(C) the Atomic Energy Commission, the responsibilities of which shall include the development of technologies; and

(D) the National Science Foundation, the responsibilities of which shall include basic and applied research.

(2) Upon request of the Project, the head of any such agency is authorized to detail or assign, on a reimbursable basis or otherwise, any of the personnel of such agency to the Project to assist it in carrying out its responsibilities under this Act.

(e) The Project shall have exclusive authority with respect to the establishment or approval of programs or projects initiated under this Act, except that the agency involved in any particular program or project shall be responsible for the operation and administration of such program or project.

PROGRAM DEFINITION

SEC. 102. (a)(1) The Chairman, acting through the Administrator of the National Aeronautics and Space Administration, is authorized and directed to prepare a comprehensive program definition of an integrated effort and commitment for effectively developing geothermal energy resources. Such Administrator, in preparing such comprehensive program definition, is authorized to consult with other Federal agencies and non-Federal entities. 30 USC 1122.

Transmittal to President and Congress. Interim reports.

(2) The Chairman shall transmit such comprehensive program definition to the President and to each House of the Congress. Interim reports shall be transmitted not later than November 30, 1974, and not later than January 31, 1975. Such comprehensive program definition shall be transmitted as soon as possible thereafter, but in any case not later than August 31, 1975.

Inventory schedule and objectives, transmittal to President and Congress.

(3) As part of the comprehensive program definition required by paragraph (1), the Chairman, acting through the Geological Survey, shall transmit to the President and to each House of the Congress a schedule and objectives for the inventorying of geothermal resources.

(b) The National Aeronautics and Space Administration is authorized to undertake and carry out those programs assigned to it by the Project.

RESOURCE INVENTORY AND ASSESSMENT PROGRAM

30 USC 1123.

SEC. 103. (a) The Chairman shall initiate a resource inventory and assessment program with the objective of making regional and national appraisals of all types of geothermal resources, including identification of promising target areas for industrial exploration and development. The specific goals shall include—

(1) the improvement of geophysical, geochemical, geological, and hydrological techniques necessary for locating and evaluating geothermal resources;

(2) the development of better methods for predicting the power potential and longevity of geothermal reservoirs;

(3) the determination and assessment of the nature and power potential of the deeper unexplored parts of high temperature geothermal convection systems; and

(4) the survey and assessment of regional and national geothermal resources of all types.

(b) The Chairman, acting through the Geological Survey and other appropriate agencies, shall—

(1) develop and carry out a general plan for the orderly inventorying of all forms of geothermal resources of the Federal lands and, where consistent with property rights and determined by the Chairman to be in the national interest, of non-Federal lands;

(2) conduct regional surveys, based upon such a general plan, using innovative geological, geophysical, geochemical, and stratagraphic drilling techniques, which will lead to a national inventory of geothermal resources in the United States;

(3) publish and make available maps, reports, and other documents developed from such surveys to encourage and facilitate the commercial development of geothermal resources for beneficial use and consistent with the national interest;

(4) make such recommendations for legislation as may from time to time appear to be necessary to make Federal leasing policy for geothermal resources consistent with known inventories of various resource types, with the current state of technologies for geothermal energy development, and with current evaluations of the environmental impacts of such development; and

(5) participate with appropriate Federal agencies and non-Federal entities in research to develop, improve, and test technologies for the discovery and evaluation of all forms of geothermal resources, and conduct research into the principles controlling the location, occurrence, size, temperature, energy content, producibility, and economic lifetimes of geothermal reservoirs.

RESEARCH AND DEVELOPMENT

SEC. 104. (a) The Chairman, acting through the appropriate Federal agencies and in cooperation with non-Federal entities, shall initiate a research and development program for the purpose of resolving all major technical problems inhibiting the fullest possible commercial utilization of geothermal resources in the United States. The specific goals of such programs shall include— 30 USC 1124.

(1) the development of effective and efficient drilling methods to operate at high temperatures in formations of geothermal interest;

(2) the development of reliable predictive methods and control techniques for the production of geothermal resources from reservoirs;

(3) the exploitation of new concepts for fracturing rock to permit recovery of contained heat reserves;

(4) the improvement of equipment and technology for the extraction of geothermal resources from reservoirs;

(5) the development of improved methods for converting geothermal resources and byproducts to useful forms;

(6) the development of improved methods for controlling emissions and wastes from geothermal utilization facilities, including new monitoring methods to any extent necessary;

(7) the development and evaluation of waste disposal control technologies and the evaluation of surface and subsurface environmental effects of geothermal development;

(8) the improvement of the technical capability to predict environmental impacts resulting from the development of geothermal resources, the preparation of environmental impact statements, and the assuring of compliance with applicable standards and criteria;

(9) the identification of social, legal, and economic problems associated with geothermal development (both locally and regionally) for the purpose of developing policy and providing a framework of policy alternatives for the commercial utilization of geothermal resources;

(10) the provision for an adequate supply of scientists to perform required geothermal research and development activities; and

(11) the establishment of a program to encourage States to establish and maintain geothermal resources clearinghouses, which shall serve to (A) provide geothermal resources developers with information with respect to applicable local, State, and Federal laws, rules, and regulations, (B) coordinate the processing of permit applications, impact statements, and other information which geothermal resources developers are required to provide, (C) encourage uniformity with respect to local and State laws, rules, and regulations with respect to geothermal resources development, and (D) encourage establishment of land use plans, which would include zoning for geothermal resources development and which would assure that geothermal resources developers will be able to carry out development programs to the production stage.

(b) The Chairman, acting through the appropriate Federal agencies and in cooperation with non-Federal entities, shall implement a coordinated program of research and development in order to demonstrate the technical means for the extraction and utilization of the source base, including any byproducts of such base, and in order to

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accomplish the goals established by subsection (a). Research authorized by this Act having potential applications in matters other than geothermal energy may be pursued to the extent that the findings of such research can be published in a form for utilization by others.

DEMONSTRATION

30 USC 1125.

SEC. 105. (a) The Chairman, acting through the appropriate Federal agencies and in cooperation with non-Federal entities, shall initiate a program to design and construct geothermal demonstration plants. The specific goals of such program shall include—

(1) the development of economical geothermal resources production systems and components which meet environmental standards;

(2) the design of plants to produce electric power and, where appropriate, the large-scale production and utilization of any useful byproducts;

(3) the involvement of engineers, analysts, technicians, and managers from industry field and powerplant development, which shall lead to the early industrial exploitation of advanced geothermal resources;

(4) the provision for an adequate supply of trained geothermal engineers and technicians;

(5) the provision of experimental test beds for component testing an evaluation by laboratories operated by the Federal Government, industry, or institutions of higher education;

(6) the construction and operation of pilot plants; and

(7) the construction and operation of demonstration plants.

(b) In carrying out his responsibilities under this section, the Chairman, acting through the appropriate Federal agencies, and in cooperation with non-Federal entities, may provide for the establishment of one or more demonstration projects utilizing each geothermal resource base involved, which shall include, as appropriate, all of the exploration, siting, drilling, pilot plant construction and operation, demonstration plant construction and operation, and other facilities and activities which may be necessary for the generation of electric energy and the utilization of geothermal resource byproducts.

Cooperative agreements.

(c) The Chairman, acting through the appropriate Federal agencies, is authorized to investigate and enter into agreements for the cooperative development of facilities to demonstrate the production of energy from geothermal resources. The responsible Federal agency may consider—

(1) cooperative agreements with utilities and non-Federal governmental entities for construction of facilities to produce energy for commercial disposition; and

(2) cooperative agreements with other Federal agencies for the construction and operation of facilities to produce energy for direct Federal consumption.

(d) The responsible Federal agency is authorized to investigate the feasibility of, construct, and operate, demonstration projects without entering into cooperative agreements with respect to such projects, if the Chairman finds that—

(1) the nature of the resource, the geographical location, the scale and engineering design of the facilities, the techniques of production, or any other significant factor of the proposal offers opportunities to make important contributions to the general

knowledge of geothermal resources, the techniques of its development, or public confidence in the technology; and

(2) there is no opportunity for cooperative agreements with any utility or non-Federal governmental entity willing and able to cooperate in the demonstration project under subsection (c)(1), and there is no opportunity for cooperative agreements with other Federal agencies under subsection (c)(2).

(e) Before favorably considering proposals under subsection (c), the responsible Federal agency must find that—

(1) the nature of the resource, the geographical location, the scale and engineering design of the facilities, the techniques of production, or any other significant factor of the proposal offers opportunities to make important contributions to the general knowledge of geothermal resources, the techniques of its development, or public confidence in the technology;

(2) the development of the practical benefits as set forth in paragraph (1) are unlikely to be accomplished without such cooperative development; and

(3) where non-Federal participants are involved, the proposal is not eligible for adequate Federal assistance under the loan guaranty provisions of title II of this Act.

(f) If the estimate of the Federal investment with respect to construction and operation costs of any demonstration project proposed o be established under this section exceeds $10,000,000, no amount may be appropriated for such project except as specifically authorized by legislation hereafter enacted by the Congress.

Federal property interests, disposal.

(g)(1) At the conclusion of the program under this section or as soon thereafter as may be practicable, the responsible Federal agencies shall, by sale, lease, or otherwise, dispose of all Federal property interests which they have acquired pursuant to this section (including mineral rights) in accordance with existing law and the terms of the cooperative agreements involved.

Project by-products, disposal.

(2) The agency involved shall, under appropriate agreements or other arrangements, provide for the disposition of geothermal resource byproducts of the project administered by such agency.

SCIENTIFIC AND TECHNICAL EDUCATION

30 USC 1126.

SEC. 106. (a) It is the policy of the Congress to encourage the development and maintenance of programs through which there may be provided the necessary trained personnel to perform required geothermal research, development, and demonstration activities under sections 103, 104, and 105.

(b) The National Science Foundation is authorized to support programs of education in the sciences and engineering to carry out the policy of subsection (a). Such support may include fellowships, traineeships, technical training programs, technologist training programs, and summer institute programs.

(c) The National Science Foundation is authorized and directed to coordinate its actions, to the maximum extent practicable, with the Project or any permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States, in determining the optimal selection of programs of education to carry out the policy of subsection (a).

(d) The National Science Foundation is authorized to encourage, to the maximum extent practicable international participation and cooperation in the development and maintenance of programs of education to carrying out the policy of subsection (a).

TITLE II—LOAN GUARANTIES

ESTABLISHMENT OF LOAN GUARANTY PROGRAM

30 USC 1141.

SEC. 201. (a) It is the policy of the Congress to encourage and assist in the commercial development of practicable means to produce useful energy from geothermal resources with environmentally acceptable processes. Accordingly, it is the policy of the Congress to facilitate such commercial development by authorizing the Chairman of the Project to designate an appropriate Federal agency to guarantee loans for such purposes.

(b) In order to encourage the commercial production of energy from geothermal resources, the head of the designated agency is authorized to, in consultation with the Secretary of the Treasury, guarantee, and to enter into commitments to guarantee, lenders against loss of principal or interest on loans made by such lenders to qualified borrowers for the purposes of—

(1) the determination and evaluation of the resource base;

(2) research and development with respect to extraction and utilization technologies;

(3) acquiring rights in geothermal resources; or

(4) development, construction, and operation of facilities for the demonstration or commercial production of energy from geothermal resources.

(c) Any guaranty under this title shall apply only to so much of the principal amount of any loan as does not exceed 75 percent of the aggregate cost of the project with respect to which the loan is made.

Terms and conditions.

(d) Loan guaranties under this title shall be on such terms and conditions as the head of the designated agency determines, except that a guaranty shall be made under this title only if—

(1) the loan bears interest at a rate not to exceed such annual per centum on the principal obligation outstanding as the head of the designated agency determines to be reasonable, taking into account the range of interest rates prevailing in the private sector for similar loans and risks by the United States;

(2) the terms of such loan require full repayment over a period not to exceed thirty years, or the useful life of any physical asset to be financed by such loan, whichever is less (as determined by the head of the designated agency);

(3) in the judgment of the head of the designated agency, the amount of the loan (when combined with amounts available to the qualified borrower from other sources) will be sufficient to carry out the project; and

(4) in the judgment of the head of the designated agency, there is reasonable assurance of repayment of the loan by the qualified borrower of the guaranteed indebtedness.

Limitation.

(e) The amount of the guaranty for any loan for a project shall not exceed $25,000,000, and the amount of the guaranty for any combination of loans for any single qualified borrower shall not exceed $50,000,000.

"Qualified borrower."

(f) As used in this title, the term "qualified borrower" means any public or private agency, institution, association, partnership,

corporation, political subdivision, or other legal entity which (as determined by the head of the designated agency) has presented satisfactory evidence of an interest in geothermal resources and is capable of performing research or completing the development and production of energy in an acceptable manner.

PAYMENT OF INTEREST

SEC. 202. (a) With respect to any loan guaranteed pursuant to this title, the head of the designated agency is authorized to enter into a contract to pay, and to pay, the lender for and on behalf of the borrower the interest charges which become due and payable on the unpaid balance of any such loan if the head of the designated agency finds— Contract authority. 30 USC 1142.

(1) that the borrower is unable to meet interest charges, and that it is in the public interest to permit the borrower to continue to pursue the purposes of his project, and that the probable net cost to the Federal Government in paying such interest will be less than that which would result in the event of a default; and

(2) the amount of such interest charges which the head of the designated agency is authorized to pay shall be no greater than the amount of interest which the borrower is obligated to pay under the loan agreement.

(b) In the event of any default by a qualified borrower on a guaranteed loan, the head of the designated agency is authorized to make payment in accordance with the guaranty, and the Attorney General shall take such action as may be appropriate to recover the amounts of such payments (including any payment of interest under subsection (a)) from such assets of the defaulting borrower as are associated with the project, or from any other surety included in the terms of the guaranty.

PERIOD OF GUARANTIES AND INTEREST ASSISTANCE

SEC. 203. No loan guaranties shall be made, or interest assistance contract entered into, pursuant to this title, after the expiration of the ten-calendar-year period following the date of enactment of this Act. 30 USC 1143.

GEOTHERMAL RESOURCES DEVELOPMENT FUND

SEC. 204. (a) There is established in the Treasury of the United States a Geothermal Resources Development Fund, which shall be available to the head of the designated agency for carrying out the loan guaranty and interest assistance program authorized by this title, including the payment of administrative expenses incurred in connection therewith. Moneys in the fund not needed for current operations may, with the approval of the Secretary of the Treasury, be invested in bonds or other obligations of, or guaranteed by, the United States. Establishment. 30 USC 1144.

(b) There shall be paid into the fund the amounts appropriated pursuant to section 304(c) and such amounts as may be returned to the United States pursuant to section 202(b), and the amounts in the fund shall remain available until expended, except that after the expiration of the ten-year period established by section 203, such amounts in the fund which are not required to secure outstanding

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guaranty obligations shall be paid into the general fund of the Treasury.

Financial reports, submittal to Congress.

(c) Business-type financial reports covering the operations of the fund shall be submitted to the Congress by the head of the designated agency annually upon the completion of an appropriate accounting period.

TITLE III—GENERAL PROVISIONS

PROTECTION OF ENVIRONMENT

30 USC 1161.

SEC. 301. In the conduct of its activities, the Project and any participating public or private persons or agencies shall place particular emphasis upon the objective of assuring that the environment and the safety of persons or property are effectively protected; and the program under title I shall include such special research and development as may be necessary for the achievement of that objective.

REPORTING REQUIREMENTS

Reports to President and Congress.
30 USC 1162.

SEC. 302. (a) The Chairman of the Project shall submit to the President and the Congress full and complete annual reports of the activities of the Project, including such projections and estimates as may be necessary to evaluate the progress of the national geothermal energy research, development, and demonstration program and to provide the basis for as accurate a judgment as is possible concerning the extent to which the objectives of this Act will have been achieved by June 30, 1980.

(b) No later than one year after the termination of each demonstration project under section 105, the Chairman of the Project shall submit to the President and the Congress a final report on the activities of the Project related to each project, including his recommendations with respect to any further legislative, administrative, and other actions which should be taken in support of the objectives of this Act.

TRANSFER OF FUNCTIONS

30 USC 1163.

SEC. 303. (a) Within sixty days after the effective date of the law creating a permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States (or within sixty days after the date of the enactment of this Act if the effective date of such law occurs prior to the date of the enactment of this Act), all of the research, development, and demonstration functions (including the loan guaranty program) vested in the Project under this Act, along with related records, documents, personnel, obligations, and other items to the extent necessary or appropriate, shall, in accordance with regulations prescribed by the Office of Management and Budget, be transferred to and vested in such organization or agency.

(b) Upon the establishment of a permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States, and when all research and development (and other) functions of the Project are transferred, the members of the Project may provide advice and counsel to the head of such organization or agency, in accordance with arrangements made at that time.

AUTHORIZATIONS OF APPROPRIATIONS

SEC. 304. (a) For the fiscal years ending June 30, 1976, and September 30, 1977, 1978, 1979, and 1980, only such sums may be appropriated as the Congress may hereafter authorize by law. 30 USC 1164

(b) There are authorized to be appropriated to the National Aeronautics and Space Administration not to exceed $2,500,000 for the fiscal year ending June 30, 1975, for the purpose of preparing the program definition under section 102(a).

(c) In addition to sums authorized to be appropriated by subsection (b), there are authorized to be appropriated to the fund not to exceed $50,000,000 annually, such sums to carry out the provisions of the loan guaranty program by the Project under title II.

Approved September 3, 1974.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 93-1112 (Comm. on Science and Astronautics) and No. 93-1301 (Comm. of Conference).
SENATE REPORT No. 93-849 accompanying S. 2465 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 120 (1974):
July 10, considered and passed House.
July 11, considered and passed Senate, amended, in lieu of S. 2465.
Aug. 20, Senate agreed to conference report.
Aug. 21, House agreed to conference report.

APPENDIX H

GEOTHERMAL LOAN GUARANTY PROGRAM RULES AND REGULATIONS

rules and regulations

Title 7—Agriculture

CHAPTER I—AGRICULTURAL MARKETING SERVICE (STANDARDS, INSPECTION, MARKETING PRACTICES), DEPARTMENT OF AGRICULTURE

PART 28—COTTON CLASSING, TESTING AND STANDARDS

Revision in Fees

Correction

In FR Doc. 76-14839 appearing on page 20680 in the issue of Thursday, May 20, 1976, the following corrections should be made:

1. On page 20682 in the second column, in item no. 5 the third line should read, "method for either zero or" and the seventh line should read "six specimens from a blended".

2. On page 20683, in item no. 24(a) in the third column the third line should read, "100-gram specimen".

Title 10—Energy

CHAPTER III—ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

PART 790—GEOTHERMAL ENERGY RESEARCH, DEVELOPMENT, DEMONSTRATION AND PRODUCTION

Federal Guarantees on Loans

On October 28, 1975, the Energy Research and Development Administration (ERDA) published in the FEDERAL REGISTER (40 FR 50100) a proposed regulation concerned with enabling lenders to obtain Federal guarantees on loans to qualified borrowers for purposes related to the commercial development of practical means to produce electric power and other forms of useful energy from geothermal resources in an environmentally acceptable manner.

Generally, the proposed regulation provided priorities and criteria which ERDA intends to apply to the consideration of applications for, and granting or denial of, Federal loan guarantees. Further the regulation provided illustrations of information to be developed by the borower and the lender, and to be supplied to ERDA, including a detailed description of the project for which the and guaranty are required and an affirmation by the lender supporting the necessity for the Federal guaranty.

In addition, the regulation contained illustrations of cost items which would be acceptable for inclusion in the computation of the aggregate cost of a project.

Interested persons and Federal agencies were asked to comment and a period extending from the date of publication of the proposed regulation to December 12, 1975, was allocated for such purpose. Approximately sixty responses to the request for comments were received from the public and other Federal agencies. Generally, these comments were directed to the subject of eligible loans and priorities; definitions; loan guaranty criteria; supporting information; project costs illustrations; and, environmental considerations.

The comments, which were thoughtful and provocative, were considered thoroughly and many of them are incorporated in this final regulation. Section 790.4(b) was amended to provide a preference for small public and private utilities and small independently owned and operated businesses (as defined in §§ 790.5 (i) and (j)), and § 790.32(f) was inserted to permit the Administrator to allocate a portion of the amounts available for guarantees to such borrowers. A new section, § 790.46, was inserted to provide for future coordination between ERDA and the Department of the Interior regarding matters involving the loan guaranty program and lease administration under the Geothermal Steam Act of 1970. Another section, § 790.47, was established to provide borrowers and lenders with an ability to appeal decisions of the Manager to ERDA's Board of Contract Appeals. The requirement at § 790.20 in the proposed regulation for lenders to have available during preliminary discussions with the Manager an assessment of all aspects of the borrower's loan application was amended to provide at § 790.21(a)(23) for the submission of such information together with other information submitted with the guaranty application. In addition, a number of other changes have been made to improve clarity.

Therefore, ERDA herewith publishes this Part 790 under which it will administer its geothermal loan guaranty program. Part 790 is added to 10 CFR Ch. III to read as follows:

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AUTHORITY: Sec. 105(a) of the Energy Reorganization Act of 1974, Pub. L. 93-438; Title II of the Geothermal Energy Research, Development, and Demonstration Act of 1974 Pub. L. 93-410; E.O. 11834 dated January 15 1975.

Subpart A—General Provisions

§ 790.1 Purpose.

The purpose of this regulation is to set forth policies and procedures under which lenders may obtain a Federal guaranty on loans related to the commercial development of practicable means to produce, with environmentally acceptable processes, useful energy from gothermal resources.

§ 790.2 Objectives.

The objectives of the Federal geothermal loan guaranty program are: (a) to encourage and assist the private and public sectors to accelerate development of geothermal resources with environmentally acceptable processes by enabling the Administrator of the Energy Research and Development Administration (ERDA), in the exercise of reasonable judgment, to minimize a lender's financial risk that is associated with the introduction of new geothermal resources and technology; and, (b) to develop normal borrower-lender relationships which will in time encourage the flow of credit so as to assist in the development of geothermal resources without the need for Federal assistance.

§ 790.3 Effective date.

This regulation is effective June 25, 1976.

§ 790.4 Eligible loans and priorities.

(a) The Administrator may enter into agreements to guaranty lenders against

the loss of principal and accrued interest on loans made by such lenders to qualified borrowers. Any such agreements shall be made subject to the application of priorities and preferential considerations for guarantees as set forth in paragraph (b) of this section and subject to criteria in § 790.6. Such agreements can be entered into only for the purposes of:

(1) Determination and evaluation of the commercial potential of geothermal resources;

(2) Research and development with respect to geothermal extraction and utilization technologies, including but not limited to the mitigation of adverse environmental effects;

(3) Acquisition of rights in geothermal resources; or,

(4) Development, construction, and operation of equipment or facilities for the demonstration or commercial production of energy (e.g., electric power, industrial or agricultural processes, or space heating) from geothermal resources.

(b) In complying with the objectives of the Federal geothermal loan guaranty program, the Administrator will give first priority consideration to those applications for projects having a plan of operations which show promise of quickly resulting in the development of useful energy from geothermal resources. Second priority consideration will be given to those applications for projects designed to demonstrate or utilize new technological advances or engage in the production of advanced technology components. Third priority will be given to projects that will demonstrate or exploit the commercial potential of new geothermal resource areas. The Administrator will give lower consideration to applications involving projects that initially propose geological and geophysical exploration, or the acquisition of land or leases. Within each category of priority as described herein, the Administrator will give preferential consideration to those applications in which the lender is providing a portion of the loan for which a guaranty is not requested. Additional preferential consideration within each priority category will be given to those applications involving, (1) projects from which the Federal government will receive royalty payments, and (2) projects to be carried out by small public and private utilities and small independently owned and operated businesses.

(c) A loan application which meets a lender's standard without a Federal guaranty will be regarded by the Administrator as not eligible for a loan guaranty under this regulation. No loan shall be guaranteed if the income from such loan or the income from obligations issued by the holder of such loan is excluded from gross income for the purposes of Chapter I of the Internal Revenue Code of 1954. In addition, a project which is devoted exclusively to the extraction or production of geothermal byproducts as defined in § 790.5(b), or is devoted exclusively to the desalination of geothermal brines will be regarded by the Administrator as not eligible for a Federal loan guaranty under this regulation.

§ 790.5 Definitions.

For purposes of this regulation:

(a) "Geothermal resources" means (1) all products of geothermal processes, embracing indigenous steam, geopressured fluids, hot water, and brines, (2) steam and other gases, hot water and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations, and (3) any byproduct derived from them;

(b) "Byproduct" means any mineral or minerals or gases which are found in solution or in association with geothermal or geopressured resources and which have a value of less than 75 percent of the value of the geothermal steam and associated geothermal resources or are not, because of quantity, quality, or technical difficulties in extraction and production, of sufficient value to warrant extraction and production by themselves;

(c) "Administrator" means the Administrator of the U.S. Energy Research and Development Administration (ERDA) or a representative authorized by the Administrator;

(d) "Manager" means the Manager of ERDA's San Francisco Operations Office, 1333 Broadway, Oakland, California 94616, or a representative authorized by the Manager;

(e) "Lender" means any legal entity formed for the purpose of or engaged in the business of lending money and having the capability of servicing the loan. Examples of lenders include, but are not limited to, commercial banks, savings and loan institutions, insurance companies, factoring companies, investment banking organizations, institutional investors, partnerships, venture capital investment companies, trusts, individuals, or entities designated as trustees acting on behalf of bondholders or other lenders;

(f) "Qualified borrower" (hereinafter referred to as the borrower) means any public or private agency, institution, joint venture, limited partnership, association, cooperative, partnership, corporation, individual, political subdivision, or other legal entity having authority to enter into a loan agreement. Examples of borrowers include, but are not limited to, leaseholders, landowners, public and private electric utilities, reservoir developers, drillers, suppliers, component and equipment manufacturers, research and development firms, engineers, patent holders, and licensees;

(g) A "loan" is an obligation involving a borrower and a lender, evidenced in writing, making available to the borrower money at a specified rate of interest for a limited period of time. The loan instrument may not be capable of conversion into an equity relationship with the borrower;

(h) "Project" means an undertaking by the borrower which when completed will result in an identifiable product, system, major component or study for which a market potentially exists. Examples of a project include, but are not limited to, test and production well drilling, power plant construction, equipment manufacturing, research and development, construction of transmission lines from a geothermal power plant, and other ventures to utilize geothermal heat to serve as an energy source for nonelectric applications, such as crop drying and greenhousing;

(i) A "small public or private electric utility, including its affiliates", is, as provided in 13 CFR 121.3-10(d)(11), a business concern primarily engaged in the generation, transmission and/or distribution of electric energy for sale whose total electric output for its preceding fiscal year did not exceed four million megawatt-hours; and,

(j) A "small business, including its affiliates", is, as provided in 13 CFR 121.3-11(a), a concern which is independently owned and operated, is not dominant in its field of operation, does not have assets exceeding $9 million, does not have net worth in excess of $4 million, and does not have an average net income, after Federal income taxes, for the preceding two years in excess of $400,000 (average net income to be computed without benefit of any carryover loss).

§ 790.6 Loan guaranty criteria.

In addition to meeting the requirements for eligibility set forth in § 790.4(a), a guaranty may be made only if the following conditions are met as determined by the Administrator upon the written recommendation by the Manager:

(a) The application is signed by an authorized official of the lender and the borrower;

(b) The loan is to be made to a qualified borrower;

(c) Except as provided in § 790.43, the guaranty as to principal shall apply only to so much of the principal amount of the loan as does not exceed 75 percent of the estimated aggregate cost of the project with respect to which the loan is made. However, there is no prohibition against the guaranty being equal to 100% of the loan to be made by the lender;

(d) The lender has set forth reasons why the loan would not be made to the borrower without a Federal loan guaranty;

(e) There is satisfactory evidence demonstrating that the lender is competent to administer loan terms and conditions, and is competent to administer terms and conditions in the guaranty agreement that are applicable to the lender;

(f) When the maximum permissible guaranty is requested as provided in paragraph (c) of this section, the lender has set forth those reasons it is unwilling to undertake a loan having less than the maximum permissible guaranty so as to permit the Manager to evaluate whether the preferential consideration provided in § 790.4(b) is applicable;

(g) The loan bears interest at a rate not to exceed an annual percent on the principal obligation outstanding as the Administrator determines, in consultation with the Secretary of the Treasury, to be reasonable, taking into account the range of interest rates and lending practices prevailing in the private sector for

similar loans and risks by the United States. However, it is expected that the borrower and lender will negotiate a mutually acceptable interest rate that recognizes the benefits to the lender from a Federal guaranty;

(h) The terms of such loan require full repayment over a period of no more than thirty years, or no longer than the expected average useful life of any major physical asset to be financed by such loan, whichever is less, as determined by the Administrator.

(i) The amount of the loan together with other funds available to the borrower will be sufficient to carry out the project;

(j) There is reasonable assurance of payment of interest and repayment of the guaranteed portion of the loan by the qualified borrower, such as evidence that there exists or will exist a market for the project's product or results that is sufficient to enable the borrower to repay the loan;

(k) The amount of a guaranty for any loan for a project does not exceed $25,000,000;

(l) The total dollar amount of guarantees made under this regulation for any combination of outstanding loans to any single qualified borrower does not exceed $50,000,000;

(m) The project is to be performed in the United States, its territories or possessions, or on property owned or leased by the United States outside the United States, its territories or possessions;

(n) The project is technically feasible and uses environmentally acceptable processes;

(o) There is sufficient evidence, such as is provided in a plan of operations, that the borrower will initiate and complete the project in a timely and efficient manner;

(p) There is a sufficiency of encouraging geophysical, geological, hydrological and geochemical data;

(q) The borrower agrees to make available on a timely basis any technical or economic information as specified in the guaranty agreement, and, subject to provisions in § 790.33 and § 790.20(b)(11), further agrees to the use of such information for public dissemination purposes;

(r) There is satisfactory evidence of the borrower's interest in geothermal resources;

(s) There is satisfactory evidence that the borrower is capable of completing the project in an acceptable manner;

(t) The project, whether conducted on Federal, State-owned, or private land, will be carried out with full regard to the use of environmentally acceptable processes in such a manner as to mitigate adverse environmental impact to the maximum extent practicable;

(u) The environmental risks of the project have been evaluated in accordance with § 790.23;

(v) The terms and conditions set forth in the loan agreement are acceptable to the Administrator; and,

(w) The borrower and any non-guaranteed lender agree in writing that: (1) the terms and conditions set forth in a non-guaranteed loan agreement relating to the project shall be acceptable to the Administrator, and (2) the non-guaranteed loan shall be subordinate to the guaranteed loan.

§ 790.7 Interest assistance.

With respect to any loan guaranteed pursuant to this regulation, the Manager may enter into an interest assistance contract with the borrower to pay, and to pay the lender for and on behalf of the borrower the interest charges which become due and payable on the unpaid balance of any such loan if the Manager finds:

(a) That the borrower is unable to meet interest charges, and that it is in the public interest to permit the borrower to continue to pursue the purposes of the project, and that the probable net cost to the Federal government in paying such interest will be less than that which would result in the event of a default;

(b) The amount of such interest charges which the Manager is authorized to pay is no greater than the amount of interest which the borrower is obligated to pay under the loan agreement; and

(c) The borrower agrees to repayment of interest charges paid by the Federal government including the payment of interest on such charges at an annual rate to be set by the Manager in consultation with the Department of the Treasury and stated in the interest assistance contract, and to the payment of any deferred user charge provided in § 790.31(b).

§ 790.8 Default payment.

In the event of any default by a borrower in making a payment in accordance with the loan agreement with respect to any loan guaranteed pursuant to this regulation, and except as provided in § 790.7, the Administrator will, as provided in § 790.37, authorize the Manager to make payment of principal and accrued interest in accordance with the guaranty. Thereupon, the Attorney General of the United States shall take such action as may be appropriate to recover the amounts of such payments (including any payment of interest under § 790.7) from such assets of the defaulting borrower as are associated with the project, (including patent and proprietary rights resulting from the project as provided in § 790.44) or from any other surety or security bond by or included in the terms of the guaranty. Any recovery achieved by the Attorney General which exceeds the amount paid to the lender in accordance with the guaranty agreement or interest assistance contract shall be returned to the borrower, unless the guaranty agreement provides otherwise.

§ 790.9 Period of guarantees and interest assistance.

No loan guaranty agreements will be made or interest assistance contracts entered into after September 3, 1984. Guaranty agreements in effect at that time will continue until the term of the loan is completed or until the guaranteed portion of the loan is repaid in full with accrued interest, whichever occurs first. Interest assistance contracts in effect on September 3, 1984, will remain in effect thereafter until the contract term expires or the contract is terminated in accordance with its provisions.

§ 790.10 Information for Governors.

The Administrator will, as appropriate, meet with Governors of directly affected States, regional associations of Governors, or heads of State agencies and commissions responsible for energy or environmental matters for the purpose of:

(a) Discussing the status of projects guaranteed under this regulation;

(b) Identifying means to remove or mitigate legal and regulatory barriers to the accelerated use of geothermal resources; or

(c) Evaluating plans to encourage growth in the geothermal industry.

Subpart B—Applications

§ 790.20 Filing.

(a) An application for a loan guaranty made under this regulation must be signed by the prospective borrower and lender or their authorized representatives and jointly submitted to the Manager who is responsible for processing the application. Information regarding the filing of applications may be obtained from the Manager.

(b) (1) Prior to receipt of a guaranty application, the Manager is authorized to conduct preliminary discussions with prospective lenders or borrowers wishing to obtain information or advice regarding eligibility for a loan guaranty and compliance with filing instructions including the submission of supporting information as illustrated in § 790.21.

(2) Subject to requirements of law and this regulation, trade secrets, commercial and financial information, geological, geophysical and geographical information and data (including maps) concerning wells which the borrower makes available to ERDA during the preliminary discussion or at any other time throughout the duration of the project on a privileged or confidential basis, will be so treated by ERDA and will not be publicly disclosed without the prior written approval of the borrower. In order to assist ERDA in carrying out this provision, information deemed by the borrower or lender to fall within one of the foregoing categories shall be identified and appropriately marked by the borrower or the lender.

(c) A guaranty application may be submitted for a project that is divided into stages or milestones which are utilized as the basis for assessing the practicability of proceeding to a subsequent phase. However, in the event of failure to proceed to a subsequent phase, the Government's liability, under the guaranty agreement, will extend only to the amounts disbursed by the lender and

approved by the Manager as provided in § 790.34.

§ 790.21 Supporting information.

(a) The lender and borrower shall provide information in support of the application such as prescribed by the Manager. The following items illustrate the range of information which may be needed, (dependent upon the type, complexity and cost of the project) so as to enable the Manager to prepare a recommendation for the Administrator's determination, as provided in § 790.6.

(1) Full description of the scope, nature, extent and location of the proposed project;

(2) A written affirmation by the lender supporting the necessity for a Federal loan guaranty;

(3) Evidence of the borrower's previous and current interest in exploiting the potential of geothermal resources;

(4) Evidence supporting the borrower's ability to complete the project;

(5) Interest rate to be charged by the lender;

(6) Period and amount of the loan and the percent of the project cost to be guaranteed;

(7) A detailed budget-type breakdown of both the estimated aggregate cost of the project and the amount to be borrowed;

(8) Evidence showing that the amount of the loan together with equity or other financing will be sufficient to carry out the project;

(9) The borrower's plan to pay interest charges and repay the loan, including assumptions regarding marketability of the project's results or product;

(10) The aggregate amount of guaranty commitments and/or guaranteed loans outstanding made to the borrower under the provisions of this regulation;

(11) Where relevant to the purpose of the loan guaranty, a copy of the borrower's title or lease agreement to the property, supported by title opinion or other locally acceptable evidence of the borrower's interest, on which the project is to be carried out;

(12) Subject to § 790.20 (b)(ii), technical information and reports, geophysical data, well logs and core data, financial statements, milestone schedules, and maps and charts;

(13) Information covering the management experience of each officer or key person in the borrower's organization who is to be associated with the project;

(14) A description of the borrower's management concept and business plan, or plan of operations, to be employed in carrying out the project;

(15) A description of the project's technical and economic feasibility;

(16) A description of the intended sources and amount of capital and its form (equity, loans from principals, loans from the lender, outside financing, or factoring) together with evidence of a commitment from these sources and a copy of each such agreement, and evidence of the financial ability of each source to honor its commitment;

(17) A copy of the loan agreement to be executed by the lender and borrower;

(18) A listing of assets associated or to be associated with the project, including appropriate data as to the useful life of any physical asset, and any other security for the loan and guaranty agreement;

(19) A description of other Federal financial assistance (e.g., direct loans, guaranteed loans, grants, contracts) available or expected to be made available to the borrower in connection with the project;

(20) A description of the processes and methods the borrower plans to utilize so as to comply with § 790.23(c);

(21) Copies of all applications when filed, and approvals when issued by Federal, State and local government agencies, for permits and authorizations to conduct operations associated with the project;

(22) A description of the borrower's organization and a copy of the business certificate, partnership agreement or corporate charter, by laws, and appropriate authorizing resolutions;

(23) The lender's written assessment of all aspects of the borrower's loan application in sufficient detail as would be completed by any prudent lender considering a loan without a guaranty, together with copies of investigations from credit bureaus, references, bank inquiries, and professional organizations;

(24) Written assurance from guaranteed and, when appropriate to the project, non-guaranteed lenders that the loan amounts as well as terms and conditions imposed by such lenders will not be altered in any significant respect without approval of the Administrator;

(25) A description of salaries (and other financial remuneration including profit sharing and stock options) to be paid to officers and employees of the borrower that are, or will be, directly associated with the project; and

(26) Evidence of consultation conducted by the borrower with appropriate agencies of any affected State regarding the proposed project.

(b) In addition to supporting information illustrated in (a) above, the Manager may independently obtain or may require the lender to include with the guaranty application the filing of information regarding the lender as deemed necessary by the Manager, including but not limited to:

(1) Description of the lender's organization and a copy of the business certificate, partnership agreement or corporate charter, by-laws, and appropriate authorizing resolutions;

(2) Copies of investigations obtained from credit bureaus, reference and bank inquiries, and professional associations;

(3) Descriptions covering the management experience of each officer or key person in the lender's organization who is or will be associated with the loan;

(4) A description of the management concept to be employed by the lender in surveillance of the loan; and

(5) When appropriate to the project, evidence of the lender's experience in surveying the financial aspects of complex technological projects.

(c) The Manager shall consider the application and other relevant information and shall be responsible for: (i) determining whether the application is in compliance with this regulation; (ii) assessing and evaluating the financial, technical, environmental, management, and marketing aspects of the project; and, (iii) recommending to the Administrator approval or nonapproval of the application. The Manager shall include with a recommendation for approval a proposed guaranty agreement containing appropriate terms and conditions pertinent to the project. The Manager will provide the borrower and lender with a written statement setting forth the basis for the Administrator's nonapproval of an application.

§ 790.22 Project cost illustrations.

(a) The cost elements set forth in paragraphs (b) and (c) of this section are only for the purpose of illustrating the manner by which the estimated aggregate cost of the project can be determined. It is expected that project costs will be accumulated in accordance with generally accepted accounting principles and practices which are consistently applied.

(b) Except as set forth in paragraph (c) of this section, reasonable and customary costs paid by the borrower that are directly connected to the project are generally permitted in computing the estimated aggregate project cost. These costs include, but are not limited to the following:

(1) Employees' salaries and wages, consultant fees and other outside assistance;

(2) Land purchase or lease payments, including reasonable real estate commissions;

(3) Engineering fees, surveys, plats, title insurance, recording fees and legal fees incurred in connection with land acquisition;

(4) Site improvements, site restoration and abandonment costs, access roads and fencing;

(5) Drilling of exploration wells, shallow heat-flow wells, and test, production and reinjection wells;

(6) Buildings, transmission lines, power plant equipment, and machinery;

(7) Taxes to be paid to Federal, State and local government agencies and other taxing authorities;

(8) Insurance and bonds of all types;

(9) Engineering, geological, architectural and legal fees paid in connection with drilling, machinery selection, design, acquisition and installation;

(10) Research and development necessary to complete the project;

(11) Professional services and fees necessary to obtain licenses and permits and to prepare environmental reports and data;

(12) Interest costs charged by the lender;

(13) Interest payments to other lenders;

(14) Costs incurred by the borrower prior to approval of the guaranty agree-

ment that are directly in connection with the project;

(15) Technical and socio-economic information dissemination costs;

(16) Costs to provide safety and environmental protection equipment, facilities and services;

(17) Travel and transportation costs;

(18) Bond financing costs and trustee fees;

(19) Fees for royalties and licenses;

(20) Costs associated with acquiring geophysical and other technical data;

(21) Financial and legal services costs;

(22) Costs to comply with terms and conditions specified in the guaranty agreement or required by regulations and issuances by Federal, State and local government agencies; and,

(23) A contingency reserve.

(c) Costs which are not considered as project costs and are excluded from the guaranteed portion of the loan are illustrated below:

(1) Company organizational expenses;

(2) Parent corporation general and administrative expenses and other parent corporation assessments;

(3) Dividends and profit sharing to stockholders, employees and officers;

(4) Goodwill, franchises, or trade or brand name costs;

(5) Except as provided in 790.31, fees and commissions charged to the borrower for obtaining loans and Federal assistance;

(6) Loan commitment fees charged by lenders and finders' fees;

(7) Expenses not paid or incurred by the borrower;

(8) Normal operating expenses incurred after an initial period of start-up; and,

(9) Costs that are excessive or are not directly required to carry out the project.

(d) Independently, or at the direction of the Administrator, the Manager may cause to be performed a review of any or all cost elements included by the borrower in the estimated aggregate project cost. The borrower shall make available records and other data necessary to permit the Manager to carry out such review. In carrying out this responsibility, the Manager may utilize employees of Federal agencies or may direct the borrower to submit to a review performed by an independent public accountant or other competent authority.

(e) When costs incurred prior to the approval of the guaranty agreement, as provided in paragraph (b)(14) of this section, are included in the estimated aggregate project cost, the borrower will make available to auditors selected by the Manager financial and other records necessary to complete an audit of such costs if requested by the Manager.

§ 790.23 Environmental considerations.

(a) For a proposed project being actively considered for a loan guaranty for which an environmental statement or negative determination has been prepared by a responsible Federal official, the environmental statement or negative determination and supporting assessment will be utilized by the Manager and the Administrator in considering the environmental consequences of the project.

(b) With respect to each project being considered actively for a loan guaranty for which paragraph (a) of this section is not applicable, the Manager, in accordance with 10 CFR Part 711, shall assess the potential effect of all phases of the project on the human environment, including but not limited to fish and other aquatic resources, wildlife habitat and populations, aesthetics, recreation, air and water quality, land use, and other resources in the area. This assessment will additionally consider, when appropriate to the project, the potential impact on the environment from the construction of power plants and transmission lines which may later be required but are not included in the project.

(1) To aid in the above assessment the Manager may request the views and recommendations of Federal, State, and local government agencies, environmental and industrial organizations, and others; and, when appropriate, may hold public hearings after giving due notice.

(2) If, as a result of the above assessment, the Manager determines that the proposed project will have a potentially significant effect on the quality of the human environment, final action on the guaranty application shall be held in abeyance until an environmental statement in accordance with section 102 (2)(c) of the National Environmental Policy Act of 1969 has been prepared and issued by the responsible Federal official.

(3) If the Manager determines that the proposed project will not have a potentially significant effect on the quality of the human environment, a negative determination shall be prepared by the Manager and submitted, together with the assessment, to the Administrator prior to final action on the guaranty application. The negative determination together with documentation supporting that determination shall be kept on file by the Manager. Environmental assessments and negative determinations prepared in compliance with this regulation shall be placed in ERDA Public Document Rooms.

(c) Each loan guaranty agreement shall include the following general terms and conditions for the protection of the environment:

(1) the borrower shall comply with all applicable Federal, State and local requirements with respect to the control of air, land, water, and noise pollution. In the absence of requirements, the Manager, after consultation with appropriate Federal, State, and local government agencies, may recommend requirements for the Administrator's consideration and the borrower shall comply with such requirements as are approved by the Administrator.

(2) The borrower, in addition to any other action required by Federal, State or local requirements, or requirements established by the Administrator, or conditions set forth in leases issued by an agency of the Federal government, shall take the following specific actions: (For purposes of this paragraph the appropriate agency official means the Manager for projects conducted on private or State-owned land, and the Head of a Federal agency for projects conducted on any land administered by any agency of the Federal government.)

(i) Conduct operations in such a manner as to minimize disturbance to vegetation, drainage channels and streambanks, and employ such soil and resource conservation and protection measures as are deemed necessary by the appropriate agency official;

(ii) Remove or dispose of all waste generated in connection with the project in a manner acceptable to the appropriate agency official;

(iii) Take all reasonable precautions necessary to minimize to the maximum extent practicable land subsidence or seismic activity which could result from the project, including the taking of measures to monitor operations for land subsidence and seismic activity and, when requested by the appropriate agency official, make available records of all monitoring activities;

(iv) Take aesthetics into account in the planning, design, and construction of facilities;

(v) Employ such measures as are deemed necessary by the appropriate agency official to protect fish and wildlife and their habitat;

(vi) Conduct activities on known or suspected archeological; paleontological, or historical sites in accordance with specific instructions issued by the appropriate agency official;

(vii) Provide, in a timely manner, for the reasonable restoration of all disturbed lands, including the plugging of abandoned wells; and promptly employ corrective measures whenever adverse environmental effects exceed those expected; and,

(viii) Employ such other measures as are deemed necessary by the appropriate agency official to protect the quality of the human environment.

(d) For projects conducted on private or State-owned land:

(1) Assuring compliance with the requirements set forth in paragraph (b) of this section shall be the responsibility of the Manager, who may utilize experts from Federal agencies, National Laboratories or private firms, and shall have access to reports prepared by the borrower in compliance with requirements imposed by Federal, State and local government agencies.

(2) The borrower shall submit an annual report to the lender and the Manager giving a full account of actions taken to comply with the requirements set forth in paragraph (c) of this section.

(e) For projects to be conducted on any land administered by an agency of the Federal government:

(1) Assuring compliance with safety and operating procedures and environmental protection requirements shall be the responsibility of the appropriate Federal agency or a representative authorized by the Head of that agency.

(2) The borrower shall provide to the lender and the Manager a copy of each annual environmental compliance report prepared by the borrower in accordance with regulations issued by the appropriate Federal agency.

(f) Nothing in this regulation shall be construed to modify requirements imposed on the borrower or lender by Federal, State and local government agencies in connection with permits, licenses, or other authorization to conduct or finance geothermal activities.

§ 790.24 Mandatory purchase of flood insurance.

The Flood Disaster Protection Act of 1973 (Pub. L. 92-234) may require purchase by the borrower of flood insurance as a condition of receiving a guaranty on loans for acquisition or construction purposes in an identified flood plain area having special flood hazards. Questions emanating from borrowers or lenders regarding compliance with provisions of the Flood Disaster Protection Act and guidelines of the Federal Insurance Administration will be referred to the Manager. When the purchase of flood insurance is required, as finally determined by the Manager, such costs can be included by the borrower in the estimated aggregate project cost.

Subpart C—Servicing and Closing

§ 790.30 Loan servicing by lender.

Loan guaranty agreements approved in accordance with this regulation shall provide that:

(a) The lender shall exercise such care and diligence in the disbursement, servicing, and collection of the loan as would be exercised by a reasonable and prudent lender in dealing with a loan without guaranty;

(b) The loan agreement shall provide the customary period of grace for the making of any payment of principal or interest. However, the lender shall not grant to the borrower any further extension of time over and above any period of grace for the making of any payment in whole or in part under the loan agreement without the prior written consent of the Manager;

(c) The lender shall notify the Manager in writing without delay:

(1) That the first disbursement is ready to be made, together with evidence from the borrower that the project has commenced or is about to commence;

(2) Monthly, or at other agreed upon intervals, of the date and amount of each subsequent disbursement under the loan;

(3) Of any non-payment by the borrower of principal or interest as required by the loan agreement, if such non-payment is not cured within the grace period, together with evidence of appropriate notifications made by the lender to the borrower;

(4) Of any failure, known to the lender, by an intended source of capital to honor its commitment;

(5) Of any failure by the borrower, known to the lender, to comply with terms and conditions as set forth in the loan agreement or guaranty agreement; or,

(6) When the lender believes that the borrower may not be able to meet any future scheduled payment of principal or interest.

(d) In the event the lender retains the option to accelerate payment of the borrower's indebtedness, the lender shall not do so without the prior written consent of the Manager.

(e) If the guaranty agreement so provides, the loan agreement will permit the borrower to defer payments of principal until such time that income from the project is sufficient to meet this obligation.

(f) Lenders will submit to the Manager periodic financial statements that report the status and condition of each loan guaranteed under this regulation. The Manager will prescribe the frequency, format and content of such statements. However, a report on each loan guaranty agreement entered into under this regulation shall, as a minimum, be submitted to the Manager annually on the anniversary date of the guaranty agreement. Reports will be furnished to the Manager until such time as the guaranteed portion of the loan or interest assistance is repaid.

§ 790.31 User charge.

(a) A user charge will be collected annually from the lender imposed on the guaranteed portion of the loan and computed at a rate to be set forth in the guaranty agreement. The rate shall be imposed on the anticipated average amount of the guaranteed portion of the loan that is estimated to be outstanding during the year. The user charge may be passed to the borrower by the lender and in such instances may be included in the project cost.

(b) At the time the guaranty agreement is closed, as set forth in § 790.45(d), the lender shall present to the Manager payment of the first year's user charge. Subsequent payments of the charge will be made by the lender on the anniversary date of closing. If interest assistance is in effect, payments of this charge, if passed by the lender to the borrower, will be deferred for the term of the interest assistance contract.

(c) The Administrator annually will evaluate whether the user charge rate being imposed is sufficient to cover anticipated administrative, default and interest assistance costs and, when appropriate, establish a revised rate to be applied to new guaranty agreements.

§ 790.32 Geothermal Resources Development Fund.

(a) As provided in Sec. 204(a) of Pub. L. 93-410, there is established in the Treasury of the United States a Geothermal Resources Development Fund (hereinafter referred to as the Fund), which is available to the Administrator in carrying out the loan guaranty and interest assistance program contemplated by this regulation, including the payment of administrative expenses incurred in connection therewith.

(b) Appropriations to the Fund that are made available through legislation, repayments made by borrowers in accordance with terms and conditions of interest assistance contracts, or amounts returned to the United States through recoveries by the U.S. Attorney General as provided in § 790.8, and not disbursed in accordance therewith, shall, except as otherwise provided by law, be available to the Administrator for the payment to lenders of principal and interest on guaranty agreements and interest assistance contracts made in accordance with this regulation. In addition, balances in the Fund may be used for necessary administrative expenses incurred by ERDA or other Federal agencies acting pursuant to ERDA direction in carrying out the provisions of this regulation.

(c) In the event of a default, the Manager may enter into contracts as required to preserve the collateral for the loan and to complete unfulfilled environmental requirements. The cost of such contracts may be charged to the Fund.

(d) In the event that interest assistance payments and default payments exhaust balances in the Fund, the Administrator will promptly seek to obtain appropriations as are authorized.

(e) Moneys in the Fund not needed for current operations may, with the approval of the Secretary of the Treasury, be invested in bonds or other obligations of, or guarantees by, the United States.

(f) Not less than ten percent of the amount available for loan guarantees during a fiscal year will be allocated to guarantees on loans to small public and private utilities and small independently owned and operated businesses, as defined in § 790.5. The Administrator, in his discretion, may adjust the allocation reserved for small concerns. To the extent that guarantees on loans to qualified small concerns are not issued within six months following the beginning of each fiscal year, the uncommitted allocation of loan guarantees for small concerns at the discretion of the Administrator may become available on an unrestricted basis.

§ 790.33 Project monitoring.

The guaranty agreement shall provide that employees and representatives of ERDA shall, with the Manager's approval, have access to the project site. The lender, to the extent lawful and within its control, and borrower will assure availability of information related to the project as is necessary to permit the Manager to determine technical progress, soundness of financial condition, management stability, compliance with environmental protection requirements, and other matters pertinent to the guaranty.

§ 790.34 Loan disbursements by lender.

Unless otherwise provided in the guaranty agreement, the lender shall not make any disbursement on the loan until:

(a) It has followed notification requirements as set forth in § 790.30(c)(1)

and (2) and has received written notice from the Manager that disbursement is approved; and,

(b) It has received from the borrower satisfactory documentary evidence, as provided in § 790.35, that funds requested will be used to pay the borrower's costs incurred or to be incurred for the project.

§ 790.35 Satisfactory documentary evidence.

The borrower shall furnish to the lender a written statement in support of each request by the borrower for loan disbursements, setting forth in such detail as the lender or Manager may require the purposes for which disbursement is requested and an attestation that such disbursements will be used only for such purposes. Signature on the requesting document shall be made by a person authorized to order the expenditure of the borrower's funds.

§ 790.36 Withdrawal of guaranty.

(a) The Administrator, may, upon the written recommendation of the Manager, terminate the guaranty by written notice to the lender and the borrower if the Manager finds that:

(1) Initiation of activity on the project has not occurred within the period of time set forth in the guaranty agreement. Within sixty days after termination under this circumstance, the Manager shall reimburse to the lender the full amount of the user charge paid by the lender if the charge has not been passed to the borrower;

(2) There is non-compliance on the part of the borrower or the lender with material terms and conditions set forth in either the loan agreement or the guaranty agreement, other than those concerning initiation of activity as referred to in paragraph (a) (1) of this section; or,

(3) There is failure by the borrower to acquire capital from intended sources, as provided in § 790.21(a) (16), and the borrower is unable to acquire alternate sources within a reasonable time as may be approved by the Manager.

(b) If the borrower fails to acquire capital from intended or alternate sources, or fails to comply with material terms and conditions set forth in the loan or guaranty agreement, the Manager shall notify the borrower and the lender that the guaranty may be reduced to the amount that has been disbursed by the lender as of the date of the notice. Disbursements made by the lender after such notification is received will not be covered by a guaranty.

(c) If the lender fails to comply with any material term or condition set forth in the guaranty or loan agreement, the guaranty may be terminated. Notice of the Manager's finding that a material term has not been complied with shall be served by the Manager upon the borrower and the lender. Following notification, the borrower will be allowed reasonable time to acquire a substitute lender that is capable of complying with provisions in this regulation. If the borrower obtains a substitute lender satisfactory to the Administrator, a new guaranty agreement will be negotiated. Upon issuance of the new guaranty to the substitute lender, the original lender shall be reimbursed by the borrower for unpaid principal outstanding and accrued interest.

§ 790.37 Default and demand.

(a) If the borrower defaults in making payment of principal or interest within the time period allowed in § 790.30(c) (3) and the lender has complied with the requirements placed on it as set forth in §§ 790.30 and 790.34, the lender may make demand in writing upon the Manager for payment pursuant to the guaranty, subject to the conditions described in paragraphs (b), (c) and (d) of this section.

(b) The Manager shall, pursuant to the provisions of § 790.7, determine whether an interest assistance contract shall be executed. In the event that interest assistance is not warranted, the Manager shall so notify the Administrator and the lender. The lender shall make available without delay such documents and certifications as the Manager may reasonably require evidencing the lender's compliance with notification provisions of the guaranty agreement.

(c) Upon default by the borrower and notification by the lender, and to the extent that sufficient reserves exist in the Geothermal Resources Development Fund: (i) upon approval of the Administrator, the Manager shall, within sixty days after receipt of such documents, pay to the lender on a proportionate basis or in full, whichever the guaranty agreement provides, the guaranteed amount of unpaid principal and accrued interest outstanding at the date of default; and (ii) during the period beginning from receipt of such documents and until payment is made by the Manager, interest payable by the United States will accrue on the guaranteed debt at a rate to be determined by the Secretary of the Treasury taking into consideration current average market yields on outstanding short-term Treasury securities.

(d) The lender shall, concurrently with payment in full of all amounts guaranteed by the United States, assign to the United States and transfer and deliver to the Manager the loan documents, together with all collateral documents evidencing any and all security for and guarantees of the loan then held by the lender as set forth in the loan or guaranty agreement.

§ 790.38 Preservation of collateral.

Upon default by the borrower, the holder of collateral associated with the project shall take actions such as the Manager may reasonably require to provide for the care, preservation, and maintenance of such collateral so as to achieve maximum recovery upon liquidation of c collateral, security and guarantees for the loan. Except as provided in §§ 790.37 and 790.40, the lender shall not waive or relinquish, without the consent of the Manager, any collateral or guaranty for the loan to which the Government would be subrogated upon payment under the guaranty agreement to the lender.

§ 790.39 Treatment of payments.

When the lender holds a guaranteed and non-guaranteed portion of a loan, payments of principal made by the borrower in accordance with the loan agreement shall be applied by the lender to reduce the guaranteed and non-guaranteed portions of the loan on a proportionate basis.

§ 790.40 Assignment and incontestability.

(a) Except as may be required by law, the lender may assign to another lender rights and obligations under the loan or guaranty agreement only with the prior written consent of the Administrator.

(b) The lender may provide other lenders with participating shares in the loan without the prior consent of the Administrator. Written notice shall be given by the lender to the Manager and the borrower when participating shares are so provided. However, the original lender shall continue to be responsible for and perform the provisions of the guaranty agreement pertaining to the lender, unless the Administrator approves a substitute lender.

(c) The guaranty agreement shall be conclusive evidence that the guaranty and the underlying loan are in compliance with the provisions of Pub. L. 93-410 and this regulation, and that such loan has been approved and is legal as to principal and interest and other terms. Such a guaranty shall be valid and incontestable by the Government, except for fraud or misrepresentation by the holder of the obligation.

§ 790.41 Survival of guaranty agreement.

The guaranty agreement shall be binding upon the lender, the borrower and the Administrator and upon their successors and assigns and shall survive payment by the United States. No delay or failure of the Administrator or the Manager in the exercise of any right or remedy and no single or partial exercise of any such right or remedy shall preclude any further exercise thereof; and no action taken or omitted by the Administrator or the Manager shall be deemed a waiver of any such right or remedy.

§ 790.42 Security with respect to borrower's assets.

Each loan guaranteed under this regulation will be secured by liens or assignments of rights in assets associated with the project, or such other security specified in the guaranty agreement as may be reasonably required to protect the interests of the United States. Upon default by the borrower, as set forth i § 790.8, the Attorney General will seek recovery from the assets of the borrower that are associated with the project or specified in the guaranty agreement.

§ 790.43 Other Federal assistance.

(a) Nothing in this regulation shall be interpreted to deny or limit the borrower's right to seek and obtain oth Federal financial assistance (e.g., contracts, grants, direct loans or guarantee

loans). However, the total amount of Federal financial assistance, including guarantees made under this regulation, obtained by the borrower for the project, shall not exceed 75 percent of the estimated aggregate cost of the project to be undertaken by the borrower.

(b) After closing of the loan guaranty agreement, the borrower will not undertake any work in connection with the project (by contract or grant) for a Federal agency without the Manager's written finding that performance of the work will not adversely affect the borrower's ability to comply with pertinent terms and conditions in the loan and guaranty agreement.

§ 790.44 Patent and proprietary rights.

(a) Patents and other proprietary rights accruing to the borrower and resulting from the project will remain with the borrower, except as such rights shall be, in the case of default, treated as project assets in accordance with terms and conditions in the guaranty agreement.

(b) The guaranty agreement may provide that patents or other proprietary intellectual property rights utilized in or resulting from the project, which are owned or controlled by the borrower, shall be made available to other domestic parties upon reasonable terms and conditions which protect the confidentiality of information, if such action is determined by the Administrator to be in the public interest. This requirement will not be needed where the principal purpose of the loan to be guaranteed is to utilize generally available technology to determine and evaluate a new geothermal resource base, or the acquisition of rights in geothermal resources.

(c) Where the principal purpose of the loan is for research and development with respect to extraction and utilization technologies, or for the development or demonstration of new and unique facilities or equipment, the requirements for making patents and other proprietary intellectual property available to other domestic parties shall normally be included in the guaranty agreement unless the Administrator determines, upon the recommendation of the Manager, that such implementation would either seriously impair the borrower's ability to conduct the project, seriously impair the borrower's ability to maintain a marketplace posture, or be inconsistent with the borrower's pre-existing contractual obligations. The Administrator's determination on this matter shall include consideration of whether attainment of the objectives of the geothermal loan guaranty program, as set forth in § 790.2, will be adversely affected by this requirement.

§ 790.45 Closing.

The major activities leading to the closing of the guaranty agreement include the following:

(a) When an application for a loan guaranty has been approved by the Administrator, the Manager will so notify the lender and the borrower and provide them with a copy of the proposed guaranty agreement.

(b) A preclosing conference will be arranged by the Manager, if the lender or borrower requests one, to discuss the terms and conditions contained in the guaranty agreement.

(c) Requests by the lender or borrower for modification of the terms and conditions set forth in the guaranty agreement shall be submitted to the Manager, supported by such documentation and facts as would justify the requests.

(d) Immediately after agreement to terms and conditions, the Manager shall arrange with the lender and the borrower for the preparation and review of necessary documents and agree upon a date for execution of the guaranty agreement and payment of the user charge.

§ 790.46 Suspension, termination or cancellation of operations or production on federal land administered by the Secretary of the Interior.

(a) The Manager shall inform the Supervisor (as defined in 30 CFR 270.2(c)) when a loan guaranty is approved involving a Federal lease, so as to provide for future coordination of the loan guaranty program and lease administration.

(b) Under regulations issued by the Department of Interior, a leaseholder may, as provided in 43 CFR 3205.3–8 and 30 CFR 270.17, apply for suspension of operations or production, or both, under a producing geothermal lease (or for relief from any drilling or producing requirements of such a lease). When a loan guaranty has been issued under this regulation for a project to be conducted by a qualified borrower who is a lessee under the above cited regulation, the borrower shall submit the suspension application to the Manager, together with a statement setting forth complete information showing the effect of such suspension on the borrower's ability to comply with terms and conditions set forth in the loan agreement. The Manager will notify the borrower in those situations when approval of the application might cause default by the borrower. Except in cases where potential environmental safety or reservoir damage is imminent, the borrower shall obtain the Manager's approval prior to submitting a suspension application to the Supervisor.

(c) 43 CFR 3204.3 requires that each geothermal lease issued by the Department of the Interior provide for the readjustment of terms and conditions at not less than 10-year intervals beginning 10 years after the date geothermal steam is produced. When a guaranty under this regulation has been issued for a loan on a project to be conducted by a borrower who is a lessee, and the borrower files an objection to any proposed readjustment with the Authorized Officer (as defined in 43 CFR 3000.0–5(f)) a copy of the objection shall be submitted without delay by the borrower to the Manager. The Manager shall forward a copy of the objection to those lenders concerned, and shall consult with the Authorized Officer regarding any final action by the Authorized Officer which might terminate the lease. The Manager shall prepare an assessment on the effect of the proposed readjustment of lease terms and conditions that would substantially limit the borrower's ability to comply with the terms and conditions set forth in the loan agreement. The Manager shall forward his assessment in writing to the Administrator, the Authorized Officer and the Supervisor.

(d) Upon receipt by the lessee of notice of a proposed cancellation of a lease by the Authorized Officer, the lessee with a loan guaranteed under this regulation will provide the Manager and the lender with notice of such proposed action. Upon receipt of such notice the Manager will consult with the Supervisor and Authorized Officer for the purpose of determining whether the public interest can best be served by an acceptable alternative arrangement, such as obtaining assignments for a party qualified to hold geothermal leases who is a qualified borrower and who is willing to assume the original lessee's loan agreement and related undertaking, so that operation and production can continue.

(e) If default is likely to occur as a result of termination or cancellation of a lease, the Manager shall request the Supervisor or the Authorized Officer to rescind the lessee's privilege of removing assets from the premises, as provided in 43 CFR 3244.5.

§ 790.47 Appeals.

All decisions by the Manager relating to disputes arising under a guaranty agreement or loan agreement made under and entered into pursuant to this regulation shall be in writing. The borrower or lender, as applicable, may request the Manager to reconsider any such decision. If not satisfied with the final decision made by the Manager, the borrower or lender, upon receipt of such written decision, may appeal the decision within 30 days, in writing, to the Chairman, Board of Contract Appeals (EBCA), Energy Research and Development Administration, Washington, D.C. 20545. That Board when functioning to resolve such loan guaranty disputes, shall proceed in the same general manner as when it presides over appeals involving contract disputes. The decision of the Board with respect to such appeals shall be the final decision of the Agency.

Signed at Washington, D.C., this 25th day of May, 1976.

ROBERT C. SEAMANS, Jr.,
Administrator.

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APPENDIX I

AMENDMENTS TO THE GEOTHERMAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT

TITLE V—AMENDMENTS TO THE GEOTHERMAL ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT

Definitions.

SEC. 501. As used in this title—

(1) the term "Act" means the Geothermal Energy Research, Development, and Demonstration Act of 1974 (88 Stat. 1079); and

30 USC 1101 note.

(2) the term "Administrator" means the Administrator of the Energy Research and Development Administration.

30 USC 1121.

SEC. 502. Section 101(b) of the Act is amended—

(1) by striking out subparagraph (E) of paragraph (1) and inserting in lieu thereof the following:

"(E) the Assistant Administrator of the Energy Research and Development Administration for Solar, Geothermal, and Advanced Energy Systems;";

(2) by striking out the period at the end of paragraph (1) and inserting in lieu thereof a semicolon;

(3) by adding at the end of paragraph (1) the following new subparagraphs:

"(G) an Assistant Administrator of the Environmental Protection Agency;

"(H) an Assistant Secretary of Treasury; and

"(I) an Assistant Secretary of Agriculture."; and

Chairman.

(4) by striking out "one member of the Project" in paragraph (2) and inserting in lieu thereof "the Assistant Administrator of the Energy Research and Development Administration for Solar, Geothermal, and Advanced Energy Systems".

30 USC 1123.

SEC. 503. Section 103(b)(4) of the Act is amended by inserting the phrase "or administrative regulations" after "legislation", and by inserting ", environmental and taxing" after "leasing".

30 USC 1125.

SEC. 504. Section 105(e)(3) of the Act is amended by striking out the period and inserting in lieu thereof "or such assistance would not be adequate to satisfy the goals and requirements of the demonstration program under this section.".

Loan guaranty program, establishment.
30 USC 1141.

SEC. 505. Section 201(b) of the Act is amended by striking out "or" at the end of paragraph (3), by striking out the period at the end of paragraph (4) and inserting in lieu thereof "; or", and by adding at the end thereof the following new paragraph:

"(5) construction and operation of a new commercial, agricultural, or industrial structure or facility or modification and operation of an existing commercial, agricultural, or industrial structure or facility, when geothermal hot water or steam is to be used within or by such structure or facility, or modification thereto, for the purposes of space heating or cooling, industrial or agricultural processes, onsite generation of electricity for use other than for sale or resale in commerce, other commercial applications, or combinations of applications separately eligible under this title for loan guarantee assistance.".

SEC. 506. Section 201(b)(4) of the Act is amended by striking out "from" and inserting in lieu thereof "using". *Ante*, p. 86.

Extent of guaranty.

SEC. 507. Section 201(c) of the Act is amended by adding at the end thereof the following new sentence: "In the case of a guaranty for the purposes specified in subsection (b)(5), the aggregate cost of the project shall be deemed to be that portion of the total cost of construction and operation which is directly related to the utilization of geothermal energy within the structure or facility in question, except that the aggregate cost of the project with respect to which the loan is made may be the total cost including construction and operation in cases where the facility or structure has been located near a geothermal energy resource predominantly for the purpose of utilizing geothermal energy, or as determined by the Administrator the economic viability of the project is substantially dependent upon the performance of the geothermal reservoir.".

Limitation.

SEC. 508. Section 201(e) of the Act is amended—

(1) by striking out "$25,000,000" and inserting in lieu thereof "$100,000,000: *Provided*, That in the case of a guaranty under subsection (b)(5), the amount of the guaranty for any loan for a project shall not exceed $50,000,000";

(2) by striking out "$50,000,000" and inserting in lieu thereof "200,000,000"; and

Determination, transmittal to Speaker of House, President of Senate, and congressional committees.

(3) by inserting before the period at the end thereof the following: ", unless the Administrator determines in writing that a guaranty in excess of these amounts is in the national interest. Any such determination shall be submitted to the Speaker of the House and the Committee on Science and Technology of the House of Representatives, and to the President of the Senate and the Committee on Energy and Natural Resources of the Senate, accompanied by a full and complete report on the proposed project and guaranty. The proposed guaranty or commitment to guarantee shall not be finalized under authority granted by this Act prior to the expiration of thirty calendar days (not including any date on which either House of Congress is not in session) from the date on which such report is received by the Speaker of the House and the President of the Senate.

Finalization.

Interest payment consultation.

SEC. 509. Section 201 of the Act is further amended by adding at the end thereof the following new subsections:

"(g) With respect to any guaranty which is issued after the enactment of this subsection by, or in behalf of, any State, political subdivision, or Indian tribe and which is either guaranteed under, or supported by taxes levied by said issuer which are guaranteed under this title, and for which the interest paid on such obligation and received by the purchaser thereof is included in gross income for the purposes of chapter 1 of the Internal Revenue Code for 1954, as amended, the Administrator shall pay to such issuer out of the fund established by this title such portion of the interest on such obligations, as determined by the Administrator, in consultation with the Secretary of the Treasury, to be appropriated after taking into account current market yields (1) on obligations of such issuer, if any, or (2) on other obligations with similar terms and conditions, the interest on which is not so included in gross income for purposes of chapter 1 of said Code, and in accordance with such terms and conditions as the Administrator shall require in consultation with the Secretary of the Treasury.

26 USC 1 *et seq.*

"(h) The full faith and credit of the United States is pledged to the payment of all guaranties issued under this title with respect to principal and interest.

Guaranties, fees.

"(i) The Administrator shall charge and collect fees for guaranties in amounts sufficient in his judgment to cover applicable administrative costs and probable losses on guaranteed obligations, but in any event not to exceed 1 per centum per annum of the outstanding indebtedness covered by each guaranty. Fees collected under this subsection shall be deposited in the fund established by this title.

Capital market impact minimization.

"(j) The Secretary of the Treasury shall insure to the maximum extent feasible that the timing, interest rate, and substantial terms and conditions of any guaranty exceeding $25,000,000 will have the minimum possible impact on the capital markets of the United States, taking into account other Federal direct and indirect commercial securities activities.".

30 USC 1142.

SEC. 510. Section 202 of the Act is amended to read as follows:

"DEFAULT; PAYMENT OF INTEREST

"SEC. 202. (a) If there is a default by the borrower, as defined in regulations promulgated by the Administrator and set forth in the guarantee contract, the holder of the obligation shall have the right to demand payment of the unpaid amount from the Administrator. Within such period as may be specified in the guarantee or related agreements, the Administrator shall pay to the holder of the obligation the unpaid interest on, and unpaid principal of the guaranteed obligation as to which the borrower has defaulted, unless the Administrator finds that there was no default by the borrower in the payment of interest or principal or that such default has been remedied. Nothing in this section shall be construed to preclude any forebearance by the holder of the obligation for the benefit of the borrower which may be agreed upon by the parties to the guaranteed obligation and approved by the Administrator.

Rights, subrogation.

"(b) If the Administrator makes a payment under subsection (a) of this subsection, the Administrator shall be subrogated to the rights of the recipient of such payment as specified in the guarantee or related agreements including, where appropriate, the authority (notwithstanding any other provision of law) to complete, maintain, operate, lease, or otherwise dispose of any property acquired pursuant to such guarantees or related agreements, or to permit the borrower, pursuant to an agreement with the Administrator, to continue to pursue the purposes of the project if the Administrator determines this to be in the public interest. The rights of the Administrator with respect to any property acquired pursuant to such guarantee or related agreements, shall be superior to the rights of any other person with respect to such property.

Notification to Attorney General. Payment recovery.

"(c) In the event of a default on any guarantee under this title, the Administrator shall notify the Attorney General, who shall take such action as may be appropriate to recover the amounts of any payments made under subsection (a), including any payment of principal and interest under subsection (d), from such assets of the defaulting borrower as are associated with the project, or from any other security included in the terms of the guarantee.

Payments, contracts.

"(d) With respect to any obligation guaranteed under this title, the Administrator is authorized to enter into a contract to pay, and to pay, holders of the obligation, for and on behalf of the borrower, from the Geothermal Resources Development Fund, the principal and interest payments which become due and payable on the unpaid balance of such obligation if the Administrator finds that—

"(1) the borrower is unable to meet such payments and is not in default; it is in the public interest to permit the borrower to continue to pursue the purposes of such project; and the probable net benefit to the Federal Government in paying such principal and interest will be greater than that which would result in the event of a default;

"(2) the amount of such payment which the Administrator is authorized to pay shall be no greater than the amount of principal and interest which the borrower is obligated to pay under the loan agreement; and

Reimbursement.

"(3) the borrower agrees to reimburse the Administrator for such payment on terms and conditions, including interest, which are satisfactory to the Administrator.".

Notes or obligations, issuance to Treasury. 30 USC 1144.

SEC. 511. Section 204 of the Act is amended by redesignating subsection (c) as subsection (d) and inserting after subsection (b) the following new subsection (c):

"(c) If at any time the moneys available in the fund are insufficient to enable the Administrator to discharge his responsibilities under this title, he shall issue to the Secretary of the Treasury notes or other obligations in such forms and denominations bearing such maturities, and subject to such terms and conditions, as may be prescribed by the Secretary of the Treasury. This borrowing authority shall be effective only to such extent or in such amounts as are specified in appropriation Acts. Such authorizations may be without fiscal year limitations. Redemption of such notes or obligations shall be made by the Administrator from appropriations or other moneys available under this section. Such notes or other obligations shall bear interest at a rate determined by the Secretary of the Treasury, which shall not be less than a rate determined by taking into consideration the average market yield on outstanding marketable obligations of the United States of comparable maturities during the month preceding the issuance of the notes or other obligations. The Secretary of the Treasury shall purchase any notes or other obligations issued hereunder and for that purpose he is authorized to use as a public debt transaction the proceeds from the sale of any securities issued under the Second Liberty Bond Act, as amended, and the purposes for which securities may be issued under that Act are extended to include any purchase of such notes or obligations. The Secretary of the Treasury may at any time sell any of the notes or other obligations acquired by him under this subsection. All redemptions, purchases, and sales by the Secretary of the Treasury of such notes or other obligations shall be treated as public debt transactions of the United States.".

Redemption.

Interest rate.

31 USC 774.

Sale.

SEC. 512. Title II of the Act is further amended by adding at the end thereof the following new section:

"COMMUNITY IMPACT ASSISTANCE

30 USC 1145.

"SEC. 205. (a) The Administrator, for any project which has a guarantee under this title of not less than $50,000,000 and which will have an intended operating life of not less than five years to satisfy the purposes under this title for which the guarantee has been made, shall endeavor to insure that, taking into consideration appropriate local community action and all reasonably available forms of assistance under this section and other Federal and State statutes, that the impacts resulting from the proposed project have been fully evaluated by the borrower, the Administrator, and the Governor of the affected State, and that effective steps have been taken or will be taken in a timely manner to finance community planning and development costs resulting from such project under this section, if applicable under

State and local actions, review.

30 USC 191.

other provisions of law, or by other means. When the project will be located on leased Federal lands, the Administrator shall specifically review State and local actions under section 9(a) of the Mineral Leasing Act Amendments of 1976 (Public Law 94-377) and insure that any funds made available to the State pursuant to such section 9(a) are used to finance such planning and development costs before any Federal assistance under subsection (c) of this section is considered or authorized.

"(b) The Administrator, for projects not included under subsection (a), may in his discretion consider the community impacts which may result from such projects, and may take such actions, under authority directly available to him under other statutes or in coordination with other Federal agencies or the State, as he considers necessary and appropriate to insure timely and effective planning and financing for such community impacts.

"(c)(1) In order to discharge his responsibilities under subsection (a), and in accordance with such rules and regulations as the Administrator in consultation with the Secretary of the Treasury shall prescribe, and subject to such terms and conditions as he deems appropriate, the Administrator is authorized, for the purposes of financing essential community development and planning which directly result from, or are necessitated by, a project under subsection (a), to—

Payments, guarantees and commitments.

"(A) guarantee and make commitments to guarantee the payment of interest on, and the principal balance of, obligations for such financing issued by eligible States, political subdivisions, or Indian tribes,

"(B) guarantee and make commitments to guarantee the payment of taxes imposed on such project by eligible non-Federal taxing authorities which taxes are earmarked by such authorities to support the payment of interest and principal on obligations for such financing, and

Sums, advancement.

"(C) require that the qualified borrower receiving assistance for a project under this section advance sums to eligible States, political subdivisions, and Indian tribes to pay for the financing of such development and planning: *Provided*, That the State, political subdivision, or Indian tribe agrees to provide tax abatement credits over the life of the project for such payments by such applicant.

Tax abatement credits.

Limitation.

"(2) No guarantee or commitment to guarantee under paragraph (1) of this subsection shall exceed $1,000,000.

Defaults, tax payment.

"(3) In the event of any default by the borrower in the payment of taxes guaranteed by the Administrator under this section, the Administrator shall pay out of the fund established by this title such taxes at the time or times they may fall due, and shall have by reason of such payment a claim against the borrower for all sums paid plus interest.

Consultation.

"(4) If after consultation with State, political subdivision, or Indian tribe, the Administrator finds that the financial assistance programs of paragraph (1) of this section will not result in sufficient funds to carry out the purposes of this subsection, then the Administrator may—

Loans.

"(A) make direct loans to the eligible States, political subdivisions, or Indian tribes for such purposes: *Provided*, That such loans shall be made on such reasonable terms and conditions as the Administrator shall prescribe: *Provided further*, That the Administrator may waive repayment of all or part of a loan made under this paragraph, including interest, if the State or political subdivision or Indian tribe involved demonstrates to the satisfaction

Repayment, waiver.

of the Administrator that due to a change in circumstances there will be net adverse impacts resulting from such project that would probably cause such State, subdivision, or tribe to default on the loan; or

"(B) require that any community development and planning costs which are associated with, or result from, such project, and which are determined by the Administrator to be appropriate for such inclusion, shall be included in the aggregate costs of the project.

Grants.

"(5) The Administrator is further authorized to make grants to States, political subdivisions, or Indian tribes for studying and planning for the potential economic, environmental, and social consequences of projects and for establishing related management expertise.

Debt obligations, redemption. Consultation.

"(6) At any time the Administrator may, in consultation with the Secretary of the Treasury, redeem, in whole or in part, out of the fund established by this section, the debt obligations guaranteed or the debt obligations for which tax payments are guaranteed under this subsection.

"(7) When one or more States, political subdivisions, or Indian tribes would be eligible for assistance under this subsection, but for the fact that construction and operation of the project occurs outside its jurisdiction, the Administrator is authorized to provide, to the greatest extent possible, arrangements for equitable sharing of such assistance.

"(8) Such amounts as may be necessary for direct loans and grants pursuant to this subsection shall be available as provided in annual authorization Acts.

Federal share.

"(9) The Administrator, if appropriate, shall provide assistance in the financing of up to 100 per centum of the costs of the required community development and planning pursuant to this section.

Facility title vestment.

"(10) In carrying out the provisions of this section, the Administrator shall provide that title to any facility receiving financial assistance under this section shall vest in the applicable State, political subdivision, or Indian tribe, as appropriate, and in the case of default by the borrower on a loan guarantee made or committed under subsection (b) of this section, such facility shall not be considered a project asset for the purposes of section 202 of this Act.

Ante, p. 88.

"(11) The Administrator shall not use his authority under this subsection to provide Federal assistance unless any Federal funds transferred pursuant to section 9(a) of the Mineral Leasing Act Amendments of 1976 (Public Law 94-377) to the State from the lease of Federal land for or associated with the project have been or, with assurance, will be committed, to the maximum extent allowable under Federal statutes, to financing such essential community development or planning directly resulting from, or necessitated by, a project on leased Federal lands.".

30 USC 191.

APPENDIX J

GEOTHERMAL RESOURCES DEVELOPMENT FUND

BUDGET FOR FISCAL YEAR 1979

Geothermal Resources Development Fund

For carrying out the Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy Research, Development, and Demonstration Act of 1974, $15 million to remain available until expended: provided that the indebtness shall not exceed the aggregate of $300 million. Provided further, that after September 2, 1984, no part of this or any other appropriation for the purposes of the Loan Guarantee and Interest Assistance Program shall be available for obligation (Public Works for Water Power Development and Energy Research Appropriation Act, 1978)

Program and Financing
(in thousands of dollars)

Identification Code 89-0206-0-1-271

	1977 actual	1978 est.	1979 est.
Program by activities:			
Production, demonstration, and distribution (program costs, funded)	635	44,345	1,990
Change in selected resources (undelivered resources)	10	10	10
10.00 Total obligations (object class 25.0)	645	44,355	2,000
Financing:	1977	1978	1979
21.40 Unobligated balance available, start of year	--	29,355	-2,000
24.40 Unobligated balance available, end of year	29,355	2,000	--
40.00 Budget authority (appropriation)	30,000	15,000	--

	1977	1978	1979
Relation of obligations as outlays:			
71.00 Obligations incurred, net	645	42,355	2,000
72.40 Obligations balance, start of year	--	326	36,081
74.40 Obligations balance, end of year	-326	-36,081	-32,081
90.00 Outlays	319	6,600	6,000

Production demonstration and distribution - to make available the financial resources needed for commercial development of geothermal energy, DOE is administering a Federal loan guaranty program. The objectives of the loan guarantee program are: 1) to encourage and assist the private sector to accelerate development of geothermal resources by minimizing lender's financial risk associated with the introduction of new technology; and 2) to develop normal borrower-lender relationships that will in time encourage the flow of credit without the need for Federal assistance. Implementation of the loan guarantee program is coordinated closely with the Department of Interior's Geothermal Leasing Program and with DOE's research and development effort.

The Status of the loan guarantee program authority is provided below:

Loan Guarantees
(in thousands of dollars)

	1977 actual	1978 est.	1979 est.
Balance of aggregate authorization, start of year	--	190,950	215,950
Increase in aggregate authorization	200,000	100,000	--
Guarantees made	9,050	75,000	12,500
Balance of aggregate authorization, end of year	190,950	215,950	203,450

The new loan guarantees totaling $12,500 thousand planned for 1979 will be used to provide incentives for resource development and nonelectric projects.

Source: Executive Office of the President, Office of Management and Budget, Washington, D.C.

APPENDIX K

LOAN GUARANTY APPLICATION FORM

Form Approved
OMB No. 38R-0189

Form ERDA-634
(9-76)

U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

APPLICATION FOR LOAN GUARANTY

(Geothermal Projects)

Use additional sheets as necessary for items for which there is insufficient space.

For Government Use
PROJECT NAME:
PROJECT NUMBER:
DATE RECEIVED:
ERDA FIELD OFFICE:

I. NAME OF APPLICANTS

The following applicants request a Federal guaranty for a loan as hereinafter described:

1. LENDER	2. BORROWER
a. NAME	a. NAME
b. ADDRESS *(street and number; city, state and ZIP code)*	b. ADDRESS *(street and number; city, state and ZIP code)*
c. DESCRIPTION OF PRIMARY BUSINESS	c. TYPE OF ORGANIZATION: *(e.g., Corporation, Partnership, Etc.)*

II. AUTHORITY TO ACT

The lender and the borrower respectively authorize the individuals designated below to act in their behalf under the terms and conditions of any guaranty contract executed between ERDA and the lender and borrower:

1. FOR THE LENDER	2. FOR THE BORROWER
a. NAME TITLE	a. NAME TITLE
b. ADDRESS *(street and number, city, state and ZIP code)*	b. ADDRESS *(street and number, city, state and ZIP code)*
c. TELEPHONE	c. TELEPHONE

III. DESCRIPTION OF THE BORROWER

1. DATE BORROWING COMPANY WAS ESTABLISHED *(month, year)*	2. PRINCIPAL PLACE OF BUSINESS *(city, state)*

3. DESCRIPTION OF PRIMARY BUSINESS

4. IF THE BORROWER IS A SUBSIDIARY OR AFFILIATE OF ANOTHER ORGANIZATION, COMPLETE a–d BELOW

a. NAME OF PARENT OR AFFILIATE	b. ADDRESS
c. NAME AND TITLE OF CONTACT OFFICIAL FOR PARENT OR AFFILIATE	d. TELEPHONE

5. PRINCIPAL OFFICERS AND DIRECTORS OF THE BORROWER ASSOCIATED WITH THE PROJECT

Name Title

6. IF THE PROJECT IS A JOINT VENTURE OR GENERAL OR LIMITED PARTNERSHIP, COMPLETE a–e BELOW

a. NAMES OF ALL PARTNERS OR JOINT VENTURERS NOT LISTED IN I, 2 ABOVE:	b. ADDRESS
c. NAME AND TITLE OF CONTACT OFFICIAL FOR EACH PARTNER OR JOINT VENTURER LISTED IN III, 6, a:	d. TELEPHONE NO. OF CONTACT OFFICIAL

e. BRIEF DESCRIPTION OF THE SCOPE AND EXTENT OF ANY PARTNERS' OR JOINT VENTURERS' ROLE IN THE PROJECT:

IV. PROJECT DESCRIPTION

1. DATE PROJECT IS TO BE INITIATED	2. SCHEDULED COMPLETION DATE

3. BRIEF DESCRIPTION INCLUDING LOCATION AND CURRENT STATUS OF PROPOSED PROJECT

4. BRIEF DESCRIPTION OF ASSETS TO BE OFFERED AS SECURITY FOR THE GUARANTEED LOAN:

5. DATE CONTINUOUS OPERATING REVENUE FROM THE PROJECT IS ANTICIPATED TO BEGIN:	6. ANTICIPATED AVERAGE ANNUAL PRODUCTION OF USEFUL ENERGY *(in mw hours or equivalent):*

7. SOURCE OF PROJECT INCOME

a. Names and Addresses of Potential Customers	b. Name of Contact Official	c. Telephone No.

8. ESTIMATED PAYMENT OF ROYALTIES TO FEDERAL GOVERNMENT OVER LIFETIME OF PROJECT:

$

9. BRIEF DESCRIPTION OF METHOD OF CALCULATING ROYALTIES

V. PROJECT FUNDING

1. TOTAL ESTIMATED AGGREGATE COST OF PROJECT $	2. PORTION OF PROJECT COST TO BE FEDERALLY GUARANTEED: %	3. FACE AMT. OF PROPOSED LOAN: $	4. PORTION OF LOAN TO BE GUARANTEED: %	5. FACE AMT. OF GUARANTY COMMITMENTS: $

VI. LOAN TERMS *(attach complete amortization schedule)*

1. INTEREST RATE	2. LOAN DURATION *(years, months)*	3. PAYMENT OF INTEREST TO BEGIN *(date)*	4. PAYMENT OF PRINCIPAL TO BEGIN *(month, year)*	5. FREQUENCY OF PAYMENT: Interest: Principal:

6. DIRECT PROJECT COSTS INCURRED TO DATE:	7. LENDER'S NON-GUARANTEED PORTION OF THE LOAN:
$	$

8. OTHER LENDERS SHARING IN THE GUARANTEED LOAN:

Name and address of lender	Amount of loan shared ($)	Name of contact official	Telephone No.

VII. DESCRIPTION OF OTHER PROJECT FUNDING

1. Other Committed Sources of Non-Federal Funds

A.	a. COMPANY NAME	d. $ AMOUNT
		e. DATE AVAILABLE
	b. CONTACT OFFICIAL	f. FORM OF FUNDING
	c. TELEPHONE NO.	
B.	a. COMPANY NAME	d. $ AMOUNT
		e. DATE AVAILABLE
	b. CONTACT OFFICIAL	f. FORM OF FUNDING
	c. TELEPHONE NO.	

2. Amount and Source of Other Federal Assistance Available or Expected To Be Made Available:

A.	a. AGENCY NAME	d. $ AMOUNT
		e. DATE AVAILABLE
	b. CONTACT OFFICIAL	f. GRANT OR CONTRACT NO.
	c. TELEPHONE NO.	
B.	a. AGENCY NAME	d. $ AMOUNT
		e. DATE AVAILABLE
	b. CONTACT OFFICIAL	f. GRANT OR CONTRACT NO.
	c. TELEPHONE NO.	

VIII. ATTACHMENTS

This application will not be acted upon until all required attachments have been submitted.

List and identify all attachments made part of this application:

IX. PERSON AUTHORIZED TO ORDER EXPENDITURE OF THE BORROWER'S FUNDS:

NAME	SIGNATURE	TELEPHONE NO.
TITLE		

X. CERTIFICATIONS

a. The LENDER attests that the above loan will not be made without a Federal guaranty because:

b. The BORROWER described herein attests that he qualifies for preferential consideration as a small business entity as defined in 10 CFR 790.5(i) and (j): ☐ Yes ☐ No

c. The APPLICANTS affirm that they are the persons who executed the foregoing instrument; they have read the same and instructions and attachments and know the contents thereof; that the matters stated herein are true to their knowledge except such matters as are stated to be upon information and belief, and as to those matters they believe them to be true:

FOR THE LENDER: | **FOR THE BORROWER:**

(signature) *(date)* | *(signature)* *(date)*

The U.S. Code, Title 18, Section 1001, makes it a criminal offense to make a willfully false statement or misrepresentation to any department or agency of the United States as to any matter within its jurisdiction.

APPENDIX L

LOAN GUARANTY AGREEMENT

DRAFT

LOAN GUARANTY AGREEMENT

This AGREEMENT is entered into as of _____ pursuant to Title II of the Geothermal Energy Research, Development, and Demonstration Act of 1974 (P.L. 93-410) and the DOE Loan Guaranty Regulations contained in 10 CFR Part 790, be and between:

The United States Government (hereinafter referred to as the "Government"), acting through the Department of Energy (hereinafter referred to as "DOE"), _____ (hereinafter referred to as the "Borrower"), and _____ (hereinafter referred to as the "Lender").

WHEREAS: Borrower is planning a project for the use of geothermal resources in _____ for _____ (hereinafter referred to as the "Project"), which it is unable to finance through usual sources, and therefore, desires to secure a Government guaranty of certain loans to be made to it by Lender, and

WHEREAS: The Lender is prepared to lend money for such project if a suitable guaranty of the government can be secured.

NOW, THEREFORE, in consideration of the foregoing and the covenants contained herein, the parties agree as follows:

W I T N E S S E T H

WHEREAS, Borrower is planning a project for the commercial development of practicable means to produce, with environmentally acceptable processes, useful energy from Geothermal resources, in _____ (hereinafter referred to as "the Project"), and

WHEREAS, Borrower is able to supply a portion of the cost of the Project but needs to borrow a sum which does not exceed 75% of the aggregate cost of the Project, and its desired loan does not meet the standards of available lenders without the presence of a Federal guaranty, and

WHEREAS, DOE is prepared to provide such a guaranty of such loan on the terms and conditions outlined herein, and

WHEREAS, Lender is prepared to make such loan pursuant to such guaranty.

NOW, THEREFORE, in consideration of the foregoing and the covenants contained herein, the parties hereto hereby agree as follows:

SECTION 1: INTRODUCTION

1.1 Definitions. All terms used in this Guaranty Agreement shall have the meaning accorded to them in 10 CFR Part 790. Any terms not therein defined but which are defined herein or in the Loan Agreement shall have the meaning accorded to them herein or in the Loan Agreement. The following terms as used in the Guaranty Agreement shall have the following meanings:

A. "Guaranty" means this Guaranty Agreement.

B. "Loan Agreement" means the document to which this Guaranty constitutes Exhibit I and which in turn constitutes Exhibit A to this Guaranty.

C. "Manager" means manager of DOE's San Francisco Operations Office, or a representative who is duly and properly delegated in writing to act for him, a copy of which delegation is delivered to Borrower and to Lender, to perform the functions required of the Manager under the DOE Regulations.

D. "Background Patent" means a domestic patent showing an invention or discovery which is not a Subject Invention and which is owned or controlled by the Borrower at any time through the completion to this project:

(1) Which the Borrower, but not the Government, has the right to license to others; and

(2) Infringement of which cannot reasonably be avoided upon the practice of any specific process, method, machine, manufacture or composition of matter (including relatively minor modifications thereof) to continue or practice the results of this project.

E. "Secretary" means the Secretary of the United States Department of Energy or a representative authorized by the Secretary.

F. "Other Proprietary Rights" means rights in trade secrets relating to recorded information regardless of form or characteristics, or a scientific or technical nature. It may, for example, document research, experimental, developmental, or demonstration, or engineering work, or be usable or used to define a design or process, or to procure, produce, support, maintain, or operate material. It may be graphic or pictorial delineations in media, such as drawings or photographs, text in specifications or related performance or design type documents or computer software or printouts.

Examples include research and engineering data, engineering drawings, and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identification, and related information. It does not include financial reports, cost analyses, and other information incidental to project administration.

G. "Background Proprietary Rights" means other proprietary rights that were developed at private expense, and utilized or incorporated in the Project.

1.2 Guaranty.

DOE by this Agreement, and subject to the terms and conditions herein set forth, does hereby guarantee and promises to pay to Lender on demand, in writing, subject to DOE's rights under Section 4.5 of this Agreement, in the lawful money of the United States of America, the amount of unpaid principal approved by DOE to be disbursed and accrued interest owing to Lender by Borrower under the terms of the Loan Agreement. DOE's obligation to Lender under this Guaranty Agreement will arise only in the event that there has been a default (as defined in Section ___ of the Loan Agreement).

1.3 Purpose.

The purpose of the project is _____
_____
_____
_____

1.4 Term of Guaranty.

This Guaranty shall be effective _____, 19___, and shall expire upon the payment of all principal and interest owing to Lender by Borrower under the Loan Agreement (Exhibit A) unless sooner terminated in accordance with this Agreement; or as it may be mutually extended or terminated by the parties.

SECTION 2: THE LENDER'S COVENANTS

2.1 LENDER agrees that:

A. It shall exercise such care and diligence in the disbursement, servicing, and collection of the Loan as would be exercised by a reasonable and prudent lender in dealing with a loan without a guaranty;

B. It will not amend the Loan Agreement without prior written approval of the Manager;

C. Without the prior written consent of the Manger, it will not grant Borrower any further extension of time over and above any period of grace for the making of any payment in whole or in part under the Loan Agreement nor, except upon the occurrence of an event of default under the Loan Agreement, will it accelerate the scheduled payments under the Loan;

D. It will, within ____ working days after receipt by it of the financial statements required to be furnished to it pursuant to Section 4.1 (c) of the Loan Agreement, deliver or cause to be delivered to DOE copies of all such reports, together with a statement that the Bank has reviewed and evaluated the reports. The statement will include an opinion by an officer of the Lender regarding whether or not the financial statements indicate that the status and condition of the loan are such that the Borrower is in compliance with the terms of the Loan Agreement.

E. It will notify the Manager in writing:

(1) That the first disbursement on the Loan is ready to be made together with evidence from the Borrower that the Project has commenced or is about to commence;

(2) Of the date and amount of each disbursement under the Loan;

(3) Of any non-payment by Borrower of any principal or interest as required by the Loan Agreement, if such non-payment is not cured within the grace period, together with evidence of appropriate notifications made by it to the Borrower;

(4) Of any failure known to it by an intended source of capital to honor its commitment;

(5) Of any failure by the Borrower known to it, to comply with terms and conditions as set forth in the Loan Agreement or Loan Guaranty Agreement; and

(6) When it believes that the Borrower may not be able to meet any further scheduled payment of principal or interest.

2.2 Lender agrees that disbursements by Lender to Borrower under the Loan shall only be made pursuant to:

A. A written request from Borrower to Lender stating the purpose for which the disbursement is requested in such detail as the Manager may request, and

B. Receipt by Lender of an attestation (signed by a person authorized to order expenditure of Borrower's funds) that such disbursements will be used only for the purpose stated in the request and to the effect that funds requested will be used by Borrower to pay Borrower's costs incurred, or to be incurred for the Project, and

C. Prior receipt by Lender of a written Notice from the Manager that the disbursement is approved. (Copies of items furnished in A. and B. above must be sent by Lender to the Manager prior to approval.)

2.3 Upon the occurrence of an Event of Default under the Loan Agreement:

A. The Lender agrees to take such steps as may be commercially reasonable to preserve and maintain the collateral granted to it under Section ___ of the Loan Agreement, so as to achieve maximum recovery upon liquidation of the collateral.

B. Concurrently with payment in full of all amounts guaranteed by DOE, it will assign to the Government and transfer and deliver to the Manger the loan documents together with all collateral documents evidencing any and all security for the loan held by it.

2.4 Lender agrees not to waive or relinquish, without the prior written consent of the Manager, any collateral or guaranty for the Loan.

2.5 Lender agrees to pay DOE an annual user charge of one per cent (1%) of the anticipated average amount of the guaranteed portion of the Loan that is estimated to be outstanding during the year. The first year's charge, $_____, shall be paid upon execution of this Guaranty and subsequent payments shall be made by Lender annually on the anniversay date of the execution of this Guaranty. If the Borrower does not initiate the project within sixty (60) days after the execution of this Loan Guaranty Agreement, the Manager shall reimburse reimburse to the Lender the full amount of the user charge paid by the Lender if the charge has not been passed on to the Borrower. The user charge may be passed to the Borrower by the Lender and, in such instances, may be included in the project cost.

2.6 The Lender may not assign to another Lender rights and obligations under the Loan or this Loan Guaranty Agreement, without the prior written consent of the Secretary. The Lender, however, may provide another Lender with participating shares in the Loans without the prior written consent of the Manager. When participating shares are so provided, the Lender shall give written notice to the Manager and the Borrower. In the event there are participating shares, the original Lender shall continue to be responsible for and perform the provisions of the Loan Guaranty Agreement pertaining to the Lender unless the Manager approves a substitute lender.

2.7 Lender agrees and Borrower concurs that DOE or its duly authorized representatives shall have access to any and all of its records and documents relating to the Loan, for such time periods as Lender maintains such records in accordance with its standard operating procedures.

SECTION 3: BORROWER'S COVENANTS

3.1 The Borrower agrees that it will:

A. Initiate activity on the Project within _____ days after execution of this Agreement;

B. Obtain all necessary permits, licenses, and approvals necessary for the performance of the Project;

C. Comply with all laws and regulations applicable to the Project;

D. Comply with requirements of 10 CFR Section 790.23, and the specific language of 10 CFR Section 790.23 (C) is hereby incorporated by reference into this Agreement;

E. Comply with the following Federal Procurement Regulations which are listed below and by this reference incorporated into this Agreement:

(1) Clean Air and Water - 41 CFR Section 1-1.2302.2

(2) Construction Equal Opportunity - 41 CFR Section 1-12.803-4

(3) Certificate of Non-segregated Facilities - 41 CFR Section 1-12.803-10 (D).

F. Not undertake any work in connection with the Project (by contract or grant) for a Federal agency without the Manager's written finding that performance of the work will not adversely affect its ability to comply with pertinent terms and conditions in the Loan Agreement and Loan Guaranty Agreement;

G. Acquire capital equal to at least 25% of the project costs;

H. Make all reports described in Exhibit B, Reports, attached to this Agreement and by this reference made a part hereof, within the times allowed for the submittal of such reports;

I. Notify the Manager of any deviation in Project planning, management, implementation procedures or techniques from those set forth in the Application for a loan guaranty or the Milestone Schedule which may have a significant impact on any aspect of the Project; and

J. Consult and cooperate with DOE and its agents and representatives to resolve any problems which may arise with respect to any aspect of the Project throughout the term of the guaranteed loan.

3.2 During the term of this Guaranty, Borrower will:

A. Identify and report in writing to the Manager when a patent application on a subject invention is filed in any country, and when a patent issues on a subject invention.

B. Obtain prior written consent of the Manager to transfer rights to third parties in: (a) subject inventions and/or (b) other proprietary rights resulting from this Project.

3.3 Borrower agrees that:

A. Employees and representatives of DOE and other Federal agencies shall, with the Manager's approval, have timely access to the project site at all reasonable times, and will assure availability of all information within its control related to the Project to permit the Manager as is necessary to determine technical progress, soundness of financial condition, management stability, compliance with environmental protection standards and requirements, and other matters pertinent to the Guaranty. In addition, the Borrower agrees that the Manager or his duly authorized representative may have access to all its books, records and other relevant documents related to the Guaranty for a period up to three years after the conclusion of the term of this Agreement.

B. Except as hereinafter provided in this paragraph, all information flowing from the Project will be open to public dissemination. Trade secrets, commercial and financial information, geological, geophysical, and geographical information and data (including maps) concerning wells which the Borrower makes available to DOE during the preliminary discussion or at any time throughout the duration of the Project on a privileged or confidential basis, will be so treated by DOE and, subject to Freedom of Information Act requirements, will not be publicly disclosed without prior written approval of the Borrower. In order to assist DOE in carrying out this provision, information deemed by the Borrower to fall within one of the foregoing categories shall be identified and appropriately marked by the Borrower.

3.4 Borrower agrees to obtain flood insurance as required by 10 CFR Section 790.24, if it is determined necessary at some future date.

SECTION 4: EVENTS OF BREACH

4.1 It is agreed that:

A. Upon a finding by the Manager that the Lender has breached any of the covenants contained in Section 2 of this Guaranty Agreement or any other material term or condition of this Guaranty Agreement or the Loan Agreement, and the breach shall not have been cured within thirty (30) days after written notice to Lender of the finding describing the material breach, the Guaranty shall be terminated and the government shall have no obligation hereunder.

B. Upon such finding and notice by the Manger of such finding, the Borrower will be allowed _____ days to acquire an approved substitute lender.

C. Lender may continue to make approved advances as provided herein Under the Guaranty for a period of no longer than the ____ days during which Borrower may seek a substitute lender. If a substitue lender is procured during such period and a new Guaranty negotiated between DOE, Borrower and the substitute lender within such period, then this Guaranty shall not cover any Advances made after the date of issuance of the new Guaranty by DOE to the substitute lender.

D. If a new Guaranty Agreement is not negotiated with a substitute lender within such _____- day period, then this Guaranty shall not cover any Advances made after the end of such period.

E. Lender may not recover any amount in excess of disbursements approved by DOE together with accrued interest thereon.

4.2 Upon a finding by the Manager that the Borrower is in breach of any of the covenants contained in Section 3 of this Agreement, or of any other term or condition of this Guaranty Agreement or the Loan Agreement, and the breach shall not have been cured within thirty (30) days after written notice to the Borrower of the finding describing the breach, or if an Event of Default as specified in Section ____ of the Loan Agreement has occurred, this Loan Guaranty shall be reduced to the amount approved for disbursement plus any accrued interest due on those approved disbursements as of the date the notice from the Manager is received by the Lender. Any subsequent disbursements will not be covered by the Guaranty.

4.3 Upon default by the Borrower and notification by the Lender, and to the extent that sufficient reserves exist in the Geothermal Resources Development Fund: (1) upon approval of the Secretary, the Manager shall, within sixty (60) days after receipt of such documents pay to the lender, the guaranteed amount of unpaid principal and accrued interest outstanding at the date of default; and (2) during the period beginning from receipt of such documents and until payment is made by the Manager, interest payable by the United States will accrue on the guaranteed debt at a rate to be determined by the Secretary of the Treasury taking into consideration current average market yields on outstanding shortterm Treasury securities.

4.4 Upon a determination by the Manager that a default has occurred (except where interest assistance is provided as set forth in Section 4.5 below) the following shall apply with respect to patents and proprietary data:

A. Foreground. Borrower agrees to convey to the Government, upon request, the entire right, title, and interest throughout the world in any patent applications and patents resulting from subject inventions, and other proprietary rights accruing to the Borrower and resulting from the Project. These conveyances shall be duly executed instruments and such other papers as are deemed necessary to vest in the Government the entire right, title, and interest to enable the Government to exercise full and complete ownership and control over these assets.

B. Background. For a period of five years after the date of default, and upon the Secretary's determination in writing that it is in the public interest, Borrower agrees to license background patents and background proprietary rights upon reasonable terms and conditions, and under conditions to protect the confidentiality of information, to domestic third parties to continue or practice the results of the Project.

C. Borrower's License. Upon conveyance to the Government of title to the above patent applications, patents and other proprietary rights referred to in Subparagraph A above, Borrower may reserve upon request a revocable, non-exclusive license in each of said patent applications, patents, or other proprietary rights, upon such reasonable terms and conditions as may be specified by DOE at the time of said request.

4.5 Nowithstanding any other part of this Agreement:

A. In the case of failure by the Borrower to make interest payments as required in the Loan Agreement, the Manager reserves the right and shall, within a period of thirty (30) days after receipt of notice of failure to pay interest, pursuant to the provisions of 10 CFR Section 790.7, determine whether an interest assistance contract shall be executed. In the event that interest assistance is not warranted, the Manager shall so notify the Secretary and the Lender. The lender shall make available without delay such documents and certifications as the Manager may reasonably require evidencing the Lender's compliance with notification provisions of the Loan Guaranty Agreement.

B. In the event interst assistance is warranted, DOE will enter into an agreement with the Borrower to pay Lender for and on behalf of the Borrower, upon the same terms and conditions provided in the Loan Agreement and the Note, interest payments then in arrears and interest payments which thereafter become due and payable on the unpaid balance of the Loan. Lender agrees to accept interest paid from DOE in lieu of the Borrower.

4.6 The Manager is under no obligation to exercise the rights given him in this Agreement and may, when he determines that it is in the best interest of the Government, waive or delay the exercise of any of those rights including, but not limited to, the voiding or reducing of the Guaranty.

SECTION 5: ADDITIONAL REQUIREMENTS

5.1 Communications.

All notices, demands, or other communications shall be in writing addressed as follows:

A. If to DOE:

Manager
San Francisco Operations Office
Department of Energy
1333 Broadway
Oakland, CA 94612

B. If to the Lender: _____

C. If to the Borrower: _____

5.2 Survival of Agreement.

This Guaranty Agreement shall be binding upon the Lender, Borrower, and DOE and upon their successors and/or assignees and shall survive payment by the United States. No delay or failure of the Secretary or the Manager in the exercise of any right or remedy and not single or partial exercise of any such right or remedy shall preclude any further exercise thereof, and no action taken or omitted by the Secretary or the Manager shall be deemed a waiver of any right or remedy.

5.3 Disputes.

Any dispute arising under this Agreement should be sent to the Manager. All decisions by the Manager relating to disputes arising under the Loan Guaranty Agreement or Loan Agreement shall be in writing. The Borrower or Lender, as applicable, may request the Manager to reconsider any such decision. If not satisfied with the final decision made by the manager, the Borrower or Lender, upon receipt of such written decision, may appeal the decision within thirty (30) days, in writing, to the Chairman, Board of Contract Appeals (EBCA), Department of Energy, Washington, DC 20545. That Board when functioning to resolve such loan guaranty disputes, shall proceed in the same general manner as when it presides over appeals involving contract disputes. The decision of the Board with respect to such appeals shall be the final decision of the Agency.

5.4 Other Loans.

It is agreed that: (1) the terms and conditions set forth in any non-guaranteed loan relating to the project shall be acceptable to the Manager, and (2) the non-guaranteed loan shall be subordinate to the guaranteed loan.

5.5 Officials Not to Benefit.

No member of, or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom; but this Section 5.5 shall not be construed to extend to this Agreement if made with a corporation for its general benefit.

5.6 Applicable Law.

Interpretation of this Loan Guaranty and the rights and obligations of the parties thereto shall be governed by the laws of the United States of America. Nothing in this Agreement shall be construed to modify requirements imposed on the Borrower or Lender by Federal, State, or local government agencies in connection with permits, licenses or other authorization to conduct or finance geotheraml activities.

IN WITNESS WHEREOF, the United States of America, the Borrower, and the Lender(s) have extended this Agreement, intending to be legally bound thereby.

THE UNITED STATES OF AMERICA

BY _____

TITLE _____

(Borrower)

BY _____

TITLE _____

BY _____

TITLE _____

(Lender)

BY _____

TITLE _____