

ARIZONA GEOTHERMAL INSTITUTIONAL HANDBOOK

**ARIZONA GEOTHERMAL COMMERCIALIZATION
PLANNING TEAM**

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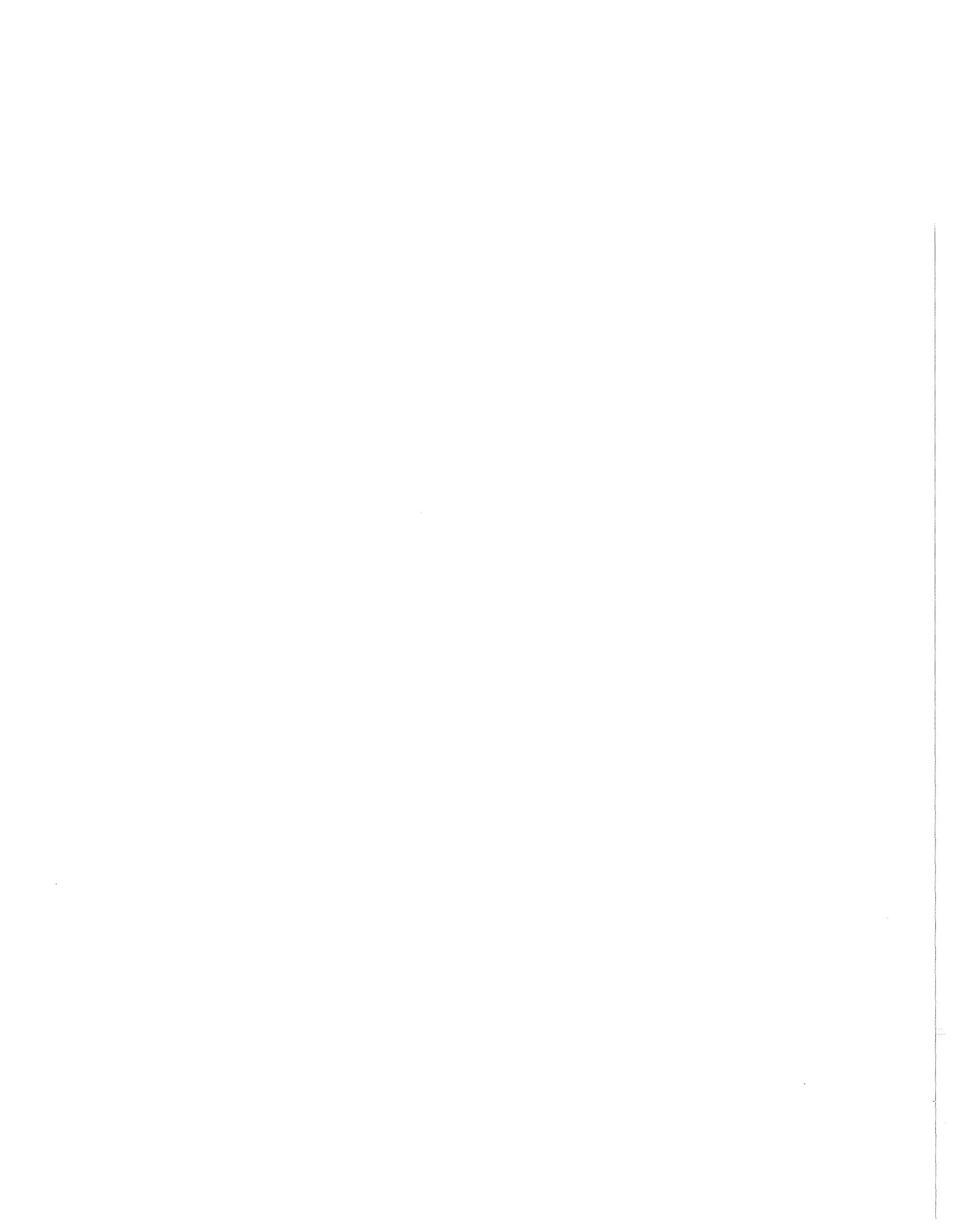


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INTRODUCTION

The purpose of this handbook is to assist interested persons in understanding the various procedures and requirements necessary for the development of geothermal energy in the State of Arizona. It contains the names of key persons and agencies who are directly or indirectly involved in the institutional process. Furthermore, a detailed assessment of all agencies and the role they play in geothermal energy development is provided. This handbook is written with the intention of facilitating the understanding of these applicable rules and regulations. It will also provide potential developers with sources of technical and advisory information as well as detail tax incentives and various governmental inducements which are currently available. The handbook is divided into four sections, the first section consists of the State and Local rules and regulations, the second section consists of the Federal rules and regulations, the third section consists of references, and the fourth section consists of a technical bibliography.

SECTION 1: STATE AND LOCAL RULES AND REGULATIONS

1.1 PRINCIPAL STATE AGENCIES

The principal State agencies are categorized under administrative regulatory, or advisory according to their functions.

1.1.1 Administrative Agencies

- a) Arizona State Land Department, 1624 West Adams, Phoenix, Az 85007.

A.K. Doss - Director of State Land Leasing, (602) 255-4628.

The State Land Department leases State lands for geothermal purposes.

- b) Oil and Gas Conservation Commission, 1645 West Jefferson, Suite 420

Phoenix, Az 85007.

William E. Allen - Director of Geothermal Enforcement Section

(602) 255-5161

The Oil & Gas Conservation Commission issues drilling and injection permits for geothermal drilling.

- c) Arizona Department of Health Services, 1740 West Adams, Phoenix, Az 85007.

Nils Larson - Director of Air Quality Control (602) 255-1140

Dr. Ron Miller - Director of Water Quality Control (602) 255-1252

The Department of Health Services issues environmental permits for geothermal development.

d) Arizona Department of Transportation, 206 South 17th Avenue, Phoenix, Az. 85007.

Philip Thorneycroft - Director of Highway Division, (602) 261-7426

The Department of Transportation issues encroachment and oversized vehicle permits.

e) Power Plant and Transmission Line Siting Committee, Arizona Attorney General's Office, 1700 West Washington - Executive Tower, Phoenix, Az 85007
Tom Prose, Attorney General's designee to Power Plant and Transmission Line Siting Committee, (602) 255-3562.

The Power Plant and Transmission Line Siting Committee determines what effect proposed electrical generating plants and transmission lines will have on the environment. They also issue Certificates of Environmental Compatibility.

f) Arizona State Parks Board, 1688 West Adams, Phoenix, Az 85007.

James Ayres - Historic Preservation Officer, (602) 255-4174. The Arizona State Parks Board issues archeological clearances for improvements in archeological areas.

1.1.2 Regulatory Agencies

a) Arizona Corporation Commission, 2222 W. Encanto Blvd, Phoenix, Az 85009.

Bud Tims - Chairman of Commission (elected), (602) 255-3935

Jim Weeks - Corporation Commissioner (elected), (602) 255-3933

John Ahearn - Corporation Commissioner (elected), (602) 255-4143

Robert G. Kircher - Utilities Director, (602) 255-4251

The Corporation Commission regulates public utilities and sets rates.

In addition, they issue Certificates of Public Convenience and Necessity.

1.1.3 Advisory Agencies

- a) Arizona Solar Energy Commission, 1700 West Washington, Executive Tower,
Room 502, Phoenix, Az 85007

James Warnock - Director, (602) 255-3683

The Solar Energy Commission provides information relating to solar energy
and other renewable energy sources.

- b) Arizona Bureau of Geology and Mineral Technology, 845 North Park Avenue,
Tucson, Az 86719.

Dr. William H. Dresher, (602) 626-1943

The Bureau of Geology and Mineral Technology provides technical assistance
in the area of geothermal resource assessment and development.

1.2 APPLICABLE STATE LEGISLATION AND AGENCY PROCEDURES

1.2.1 State Land Leasing

Sole authority to lease State land for geothermal development purposes
rests within the jurisdiction of the Arizona State Land Department. The
statutes pertaining to such land leasing are incorporated in A.R.S. sections

27-667 through 27-676. The agency regulations are incorporated into Arizona Administrative Rules and Regulations, sections R12-5-850 through R12-5-865.

These laws define "geothermal resource" as:

- a) All products of geothermal processes embracing indigenous steam, hot water and hot brines.
- b) Steam and other gases, hot water and hot brines resulting from water, other fluids or gas artificially introduced into geothermal formations.
- c) Heat or other associated energy found in geothermal formations, including any artificial stimulation or induction thereof.
- d) Any mineral or minerals, exclusive of fossil fuels and helium gas, which may be present in solution or in association with geothermal steam, water or brines, (A.R.S. 27-651).

The State Land Department has statutory authority to designate Known Geothermal Resource Areas (KGRAs) and to lease State lands for geothermal development purposes through competitive bidding. Leases are sold for a primary term of ten years and as long thereafter as geothermal resources are being produced in paying quantities. If drilling operations are being "diligently prosecuted" and the primary lease term expires, then the lease term shall continue for a period of two more years, and so long after that as geothermal resources are produced from the leased lands. If geothermal resources in paying quantities are discovered on the lands while the lease is in full force, but the lessee is unable to produce any geothermal product (lack of transportation, processing or generating facilities) the lease shall be extended beyond the primary ten year term on a year to year basis (but not to exceed three years) by payment of a shut-in geothermal resource royalty of two dollars per acre per year. This royalty would be payable in advance annually on the anniversary date of the lease. The

acreage allowed is limited to 2,560 acres per lease. A minimum royalty rate is set at 12.5 percent of the gross value of the resource at the well head. The annual rent is one dollar per acre for each year the lease is in effect. Any person eighteen years or older or any firm, association or corporation which has complied with the State laws shall be qualified to lease State land.

1.2.2 Procedures for Leasing State Land

Geothermal leases on State land can be initiated by either of two methods:

- a) The Land Department can designate likely resource areas that it wishes to lease, or
- b) an individual or company may apply for a lease on a given tract or State land.

Upon receipt of a lease application (along with a \$25 filing fee), the Land Department shall offer the tracts of land for leasing purposes to the "highest and best bidder" based on the highest first year's bonus bid. The bonus bid is the excess bid above the standard one dollar per acre rental rate for the first year. Thereafter the annual rate is one dollar per acre. The Land Department then publishes a call for bids for a period of 10 weeks in Arizona newspapers of general circulation (Arizona Weekly Gazette and the newspaper distributed nearest to where the lease land is located), the cost of which is to be paid by the successful bidder. This notice will specify the day and hour the bids will be opened, give description of the lands up for bid, specify the royalty to be demanded and give full

information on how and where the bids are to be accepted. A certified check in the amount of the bid must be enclosed with all sealed bids.

Following the opening of the sealed bids, the department will return all unsuccessful bid payments and will notify all interested parties of the outcome. By law, the State Land Department has the right to reject any and all bids. If a lease is offered, two copies of the lease will be sent to the successful bidder. The bidder will then have thirty days to execute and return the lease to the department. At such time, the first year's rent, the cost of publishing the notice and any reasonable expenses of the sale must be paid. According to the sales division of the Land Department, the newspaper notices run anywhere from \$250 - \$400 per lease. If a successful bidder fails to execute and return the lease within the thirty day period, the lease will become invalid and all payments will be forfeited.

Mr. A.K. Doss of the State Land Department estimated that it would take a minimum of five to six months to obtain a lease for State land.

It should be noted that once the decision has been made to put improvements on leased State land, either the State land must be purchased or a commercial lease must be obtained from the Land Department. The procedures for obtaining a commercial lease or purchasing State land are as follows:

- a) Lessee submits application for commercial lease or application to purchase State land.
- b) The land is appraised for current value.
- c) Application is processed through appraisal.
- d) Application goes through a staff review.
- e) Board of Appeals approves application.

- f) Commercial lease is issued, or in the case of purchasing State land, the Land Department publishes notice of public auction for 10 weeks.
- g) Public auction is held and the Land Department issues the land patent to the highest bidder.

Minimum time periods involved in obtaining a commercial lease are four to six months. Minimum time periods involved in purchasing State land are eight months to one year.

1.2.3 County Land Leasing Procedures

Authority to lease county land in Arizona is given directly to the County Boards of Supervisors by the State (A.R.S. 11-256). To lease county land for geothermal purposes, the site must be chosen, then the county department in charge of the land (specific name may vary depending on the county) is contacted and a lease request is filed. Generally, the department's next step is to circulate the lease request among the other county departments. If they have no need for the land and have no objections to it being leased, the land is appraised to determine its rental value and finally approved for leasing purposes by the Board of Supervisors. In addition, the Board may prescribe the terms and conditions of the lease. Notice of the proposed lease is then published in newspapers of general circulation in the county. The length of time the notice is published may vary depending on the county. The notice must state the conditions of the proposed lease and the day on which the auction will be held. Such land is then leased at a public auction with the lease going to the highest responsible bidder. The minimum estimated time period involved in obtaining a county land lease is three months.

It must be noted that not all of the 14 counties in Arizona have land for leasing purposes.

1.2.4 Leasing of City and Town Land

All land leasing on a municipal level in Arizona is conducted through the Mayor and Council of the city or town. The Mayor and Council have the authority to set conditions and terms of each lease as they deem appropriate. Two months is the estimated minimum time involved in obtaining a municipal lease. It must be noted that not all cities and towns in Arizona have land for leasing purposes.

1.2.5 Leasing of Private Land

There are three types of private land in Arizona; private land with private ownership of mineral rights, private land with State ownership of mineral rights and private land with Federal ownership of mineral rights. There are no State regulations pertaining to the leasing of private land in Arizona. However, in cases of Federal or State ownership of the mineral rights, one would be required to obtain a Federal or State geothermal lease (in addition to the private lease) prior to developing below the surface. This would include drilling for geothermal resources.

Once a private lease is negotiated, a copy of the lease must be filed with the County Recorder for the county or counties in which the land is located. There is a \$3.00 recording fee in Arizona's 14 counties and leases are generally recorded on the day they are received by the recorder's office.

1.2.6 State Exploration and Development

a) Arizona Well Drilling Regulations

The Arizona Oil and Gas Conservation Commission is the Arizona State Agency involved in regulating and enforcing the drilling of wells for geothermal development on State, Federal, Indian or private land. The statutes pertaining to the commission's jurisdiction over geothermal development are incorporated in A.R.S. sections 27-651 through 27-666. The agency regulations are incorporated into Arizona Administrative Rules and Regulations, sections R12-7-201 through R12-7-294. The commission has jurisdiction and authority over such persons and property deemed necessary to administer and enforce the statutes relating to the conservation of geothermal resources. The commission is empowered to do the following:

"Supervise the drilling, operation maintenance and abandonment of geothermal resource wells as to encourage the greatest ultimate economic recovery of geothermal resources, to prevent damage to and waste from underground geothermal reservoirs, to prevent damage to or contamination of any waters of the state or any formation productive or potentially productive of fossil fuels or helium gas, and to prevent the discharge of any fluids or gases or disposition of substances harmful to the environment by reasons of drilling, operation, maintenance or abandonment of geothermal resource wells (A.R.S. 27-652)."

The Oil and Gas Conservation Commission consists of six members, of which five are appointed by the Governor with Senate consent. The State Land Commissioner serves as an ex-officio member.

b) Application Procedures

Before engaging in producing a well on State, Federal, Indian or private land, a person must file with the commission a surety bond in the amount of \$5000 for each well or \$25,000 as a blanket sum for all wells. This surety bond would be conditioned as to the following:

- 1) Compliance with all statutes, rules and regulations.
- 2) Plugging and abandoning the well as approved by the commission.

In addition to the bond the following three items must be filed with the commission in order to obtain a permit to drill:

- 1) an application (form G-3),
- 2) a \$25 filing fee for each well,
- 3) a surveyor certified plat which shows the exact acreage or legal subdivisions allotted to the well.

Once the above procedures are carried out in compliance with the laws, a permit to drill is issued by the commission. Mr. William E. Allen, Director of Enforcement Section of the Oil and Gas Conservation Commission estimates it would take only one to two weeks for the commission to issue this permit. Drilling operations must commence within 90 days of the issuance of the permit or the permit becomes null and void (unless an extension in writing is granted by the commission). If violations occur on the part of the permit holder, the commission may order the holder to cease further work and after a notice and a hearing, the permit holder may be ordered to plug and abandon the well. Only after certain requirements have been complied with, will the commission authorize a change in location of the well.

c) Drilling of the Well

In drilling the well, the parties involved must comply with all technical and environmental conditions and restrictions as set forth by law. Every person drilling or operating a well must post in a conspicuous place (not more than 20 feet from the well) a sign stating the following:

- 1) name of well,
- 2) location of well by quarter-quarter-quarter, section, township and range,
- 3) the state's drilling permit number.

d) Reports

The following types of reports pertaining to geothermal wells must be filed with the Oil and Gas Conservation Commission:

1) Well Completion Report (form G-4)

Report must be filed with the commission within 30 days after completion of the well.

2) Injection Project Report (form G-8)

Report would contain information on amount of geothermal resources produced, volumes of substances injected and other information as called for by the commission. Report must be filed on or before the 20th day of the next succeeding month.

3) Monthly Producer's Report (form G-6)

Such report must be filed on each producing lease within the State for each calendar month. Report must be filed on or before the 25th day of the next succeeding month.

4) Geothermal Purchasers Monthly Report (form G-7)

Each purchaser or taker of a geothermal resource must file the report

detailing acquisition and disposition of all geothermal resources taken by such person during that month. Report must be filed on or before the 20th day of the next succeeding month.

5) Processor's Report (form G-7)

Each plant operator processing a geothermal resource must file a report of the geothermal resource's proceeds during the preceding month.

The report must detail:

- i) Particulars of the geothermal resources received at the plant
- ii) Particulars of the products derived from such geothermal resources and the disposition thereof.

The report must be filed not later than 20th day of each month.

6) An Organization Report (form G-1)

Must be filed immediately. Every person acting as principal or as agent for another or who is independently engaged in the drilling, operation, production, storage, transportation, refining, reclamation, treating, marketing, processing of or scientific exploration for geothermal resources must file an organization report immediately with the commission. The report must contain the following information:

- i) Names and addresses of the business, the directors and principal officers.
- ii) State where incorporated. If a foreign corporation, name of its Arizona agent and date of permit to do business in Arizona.
- iii) The plan of organization.

If any of the above information changes, a supplementary report must be filed immediately.

e) Technical and Environmental Drilling Conditions - Oil and Gas
Conservation Commission

i) Spacing of Wells

The Commission must approve all well-spacing programs or prescribe modifications to programs.

ii) Pit for Clay, Shale and Drill Cuttings

An earthen or portable pit must be provided (prior to drilling operations) in order to assure a supply of mud-laden fluid to confine oil, gas, water, etc., to its natural stream.

iii) Sealing off Strata

Any oil, gas and water above the producing horizon shall be confined to their respective stratum and shall be sealed or separated in order to prevent their contents from passing into another stratum.

iv) Surface Casing Requirements

In areas where pressure and formations are unknown, sufficient surface casing shall be run to reach a depth below all reasonably known estimated fresh water levels, to prevent blow-outs or uncontrolled flows. Surface casing shall be set in through an impervious formation and shall be cemented by the pump and plug or displacement method.

v) Defective Casing or Cementing

The operator shall notify the commission if any well appears to have defective casing, faulty cementing or corroded casing that will permit or create underground waste.

vi) Blow-out Prevention

Any person drilling a well for geothermal resources in an area

where fluids, gases or steam under high pressure are known to exist, shall case (in a watertight manner) the bore hole to a depth sufficient to protect against surface cratering in the event of blow-out.

vii) Pulling Outside Strings or Casings

When pulling outside strings or casing from the well, the space outside the casing left in the hole shall be left full of mud-laden fluid or cement to seal off each fresh and salt water stratum.

viii) Deviation of a Hole

Unless the operator receives permission from the commission, no drilling well may be directionally deviated from its normal course except where necessary to straighten the hole, sidetrack, junk or correct other mechanical difficulties.

ix) Shooting and Chemical Treatment of Wells

The commission shall be notified if injury results to the producing formation, casing or casing seat as a result of shooting or treating a well.

x) Noise Abatement

The operator shall minimize noise when conducting air drilling operations or when the well is allowed to produce while drilling.

xi) Fires, Leaks and Blow-outs

The commission shall be immediately notified of all fires, breaks or leaks in the well.

xii) Casing and Cementing of Injection Wells

Wells used for injection shall be cased with safe and adequate casing or tubing in order to prevent leakage.

xiii) Pollution and Surface Damage

The owner or operator shall take all precautions to avoid polluting streams, polluting underground water, and damaging soil. If any deleterious substances cannot be treated or destroyed by the usual method, then other methods of disposal (approved by the commission) shall be used.

xiv) Disposal of Brines and Salt Water

Commission regulations must be followed in the disposal (either by injection or disposal in earthen pits) of brines and salt water.

xv) Environmental Protection

The commission shall require operations to be conducted so as not to pollute land, water or air, pollute streams, damage the surface or pollute the underground water of the land or of neighboring lands. Federal and State air and water quality standards will be followed unless more stringent requirements are stipulated by the commission. Plans for disposal of well effluents must take into account the effect on groundwaters, streams, plants, fish and wildlife and their populations, atmosphere, or any other effects which may contribute to pollution.

1.2.7 Research and Development

The Bureau of Geology and Mineral Technology (established by the Legislature in 1977) provides technical assistance in the area of geothermal resource assessment and development. The Bureau's primary functions are

scientific investigation and public service activities comparable to those conducted by geological surveys and mineral experimental stations in other states, and are currently achieved through activities such as the following research and service programs:

- a) Development and dissemination of technical and nontechnical information in the following manner:

By individual contact; through the publication of maps, bulletins, circulars, and the quarterly newsletter FIELDNOTES; and through contributions to professional publications and conferences sponsored by other scientific agencies and societies.

- b) Conduct original field and laboratory investigations of various geologic mineral resource and mineral and mining technology matters.
- c) Maintaining a working library that is available for public use.

The Arizona Geothermal Project is under the auspices of the Bureau of Geology and Mineral Technology. The geologists, under the direction of Richard Hahman Sr., are responsible for resource evaluation, delineation and characterization of geothermal reservoirs, as well as with outreach programs. The commercialization planning team, under the direction of Dr. Don H. White, is responsible for all planning aspects including analyses of Arizona's economy, population growth, energy resources and possible applications for geothermal energy.

1.2.8 Information Programs

The Arizona Solar Energy Commission is the State Agency that serves in an information dissemination capacity. The Solar Energy Commission collects, analyzes and provides information and data relating to solar energy technology and other renewable energy sources.

1.2.9 Taxation

The State Department of Revenue grants two types of tax deduction for geothermal development. The two types of tax deductions which the Department recognizes are for development expenses and for exploration expenses. Expenses paid or incurred for the development of a geothermal resource qualify for a deduction of the full amount from gross income or charge to a capital account. Expenses incurred or paid for exploration shall qualify for a deduction not to exceed \$75,000 before computing net income. Exploration refers to amounts of money paid for ascertaining the existence, location, extent or quality of any deposit. This does not apply to improvement of property.

1.2.10 Revenue Bonding

According to statute, a municipal corporation may issue and sell general revenue and tax secured bonds to finance a utility undertaking. The bond interest rate must not exceed nine percent per annum (A.R.S. 9-512).

The Arizona Constitution requires an election for the sale of all bonds if the indebtedness of the issuing governmental entity exceeds four percent of the taxable property within the aforementioned governmental entity. A majority of the voting electors must approve the sale. A municipality may not

become indebted to an amount exceeding ten percent of such taxable property (as shown by the last assessment roll) except if an election is called and a majority of the voting electors allow the municipality to become indebted to a larger amount. Under no circumstances shall this amount exceed an additional 15 percent (Article 9, Section 8). When calling for an election upon the question of the issuance of bonds, the governing body must state the following:

- a) Maximum amount of bonds to be issued.
- b) Purpose for which the bonds are to be issued.
- c) Maximum rate of interest which the bonds are to bear.
- d) A brief statement of fact showing that the bonds will be payable solely from revenues unless the bonds are to be tax secured bonds, in which case the order and call shall state that the bonds shall be payable from revenues and shall additionally be payable from taxes levied upon all taxable property in the municipality.
- e) Date on which election is to be held.
- f) Place where votes may be cast.
- g) Hours the polling place will be open.

The order and call of election shall be published in full at least once, and not less than 15 nor more than 30 days prior to the election, (A.R.S. 9-524).

The bonds which may be in one or more series, may be payable at such medium of payment, and shall be executed in such manner, and in such maturities (not to exceed 30 years) as prescribed by the governing body (A.R.S. 9-529).

The governing body shall call for bids by giving notice in a newspaper of general circulation at least once a week for two successive weeks in cities with a population of 15,000 or more, or once a week for four successive

weeks in all other cities and towns. The bids shall be for the entire bond issue unless the governing body allows for bidding in parcels less than the entire bond issue (A.R.S. 9-529).

1.2.11 Incentives

The Department of Revenue offers a depletion allowance for geothermal resources. In computing net income, a geothermal resource qualifies for a reasonable allowance for depletion and depreciation of improvements. The Department of Revenue has established rules and regulations for implementing the depletion allowance. General rules are as follows: In cases of leases, deductions shall be equitably apportioned between lessor and lessee. In cases of geothermal resources, the depletion allowance shall be 27.5% of gross income less rent or royalties. The allowance shall not exceed 50% of net income computed before the depletion allowance.

1.2.12 District Heating and Cooling

District heating and cooling can be described as follows: Boilers and refrigeration equipment are located at a central plant; water is then circulated through the boilers or chillers depending on whether heating or cooling is necessary (it is possible to mix water from the different devices to obtain optimum temperature control); in the case of a geothermal plant, a heat exchanger between the geothermal water and circulating water would take the place of the boilers; the refrigeration equipment would also be energized by the hot geothermal water; the temperature controlled water would then be sent through an insulated piping network to the individual users; the users would be metered in the same fashion as they are for electricity or regular water.

According to Article XV of the Arizona Constitution, "All Corporations (other than municipal) engaged in furnishing hot or cold air or steam for heating or cooling purposes shall be deemed as public service corporations". They therefore fall under the jurisdiction of Arizona's Corporation Commission and consequently must comply with all rules and regulations as set forth by the commission (for details, refer to the section on the Corporation Commission). This compliance would include obtaining a Certificate of Convenience and Necessity in order to service an area with heating and cooling. The State, by issuing such a certificate, assures the utility of a legal monopoly, providing the utility will make adequate investment and render competent and adequate service.

The requirement of a certificate poses a problem to a new developer interested in using geothermal for district heating and cooling as most of the populated areas in the State have existing certificated utilities. They therefore have the legal monopoly which is granted only once for each area of the state by the Arizona Corporation Commission.

Two viable alternatives exist in the use of geothermal for district heating and cooling purposes. First, geothermal district heating and cooling could be developed by an existing utility without the need to apply for an additional Certificate of Convenience and Necessity. Thus the potentially time consuming and expensive process involving the Corporation Commission could be avoided. An existing utility would also have the finances to develop such a system. Secondly, geothermal district heating and cooling could be developed by a municipality (any incorporated city or town) or a special district. Under this approach, the Corporation Commission would have no regulatory jurisdiction. Such development would be regulated by the elected members of the municipality or district. By law, municipalities

may issue and sell bonds to help finance the construction, purchase or lease of a utility (A.R.S. 9-514). Municipalities may also acquire land for such purposes through Eminent Domain, acquisition or condemnation.

1.2.13 Water Rights and Usage

Geothermal resources have been given special exemptions from Arizona water laws. Arizona Revised Statutes 27-667 reads:

- a) Geothermal resources and their development shall be exempt from the water laws of this State unless:
 - 1) such resources are commingled with surface waters or groundwaters of this State; or
 - 2) such development causes impairment of or damage to the groundwater supply.
- b) In the development of geothermal resources, any well drilled to obtain and use groundwater, as defined in section 45-301, shall be subject to the water laws of this State.
- c) An operator shall notify the Arizona Water Commission of any well which is drilled or abandoned. The Commission may prescribe rules and regulations relating to the disposition of abandoned wells.

1.2.14 State Environmental Regulations

In addition to Federal environmental regulations and the Oil and Gas Conservation Commission's geothermal environmental regulations relating to disposal of brines, injection, and noise abatement (see section on Oil and Gas Conservation Commission), the State also regulates the following:

a) Hazardous Waste Disposal

The Sanitation Department of the Arizona Department of Health Services currently requires no permit for hazardous waste disposal, but may require the wastes to be treated, neutralized or rendered harmless.

b) Sulfur Dioxide Emission

1. Maximum allowable annual arithmetic mean shall be 80 mg per cubic meter.
2. Maximum allowable 24 hour concentration for sulfur dioxide (SO₂) shall be 365 mg per cubic meter (not to be exceeded more than once a year).
3. Maximum allowable 3 hour concentration for SO₂ shall be 1300 mg per cubic meter (not to be exceeded more than once a year).

c) Air Pollution Control Equipment

A permit is required from the Department of Health Services for construction of a major source or alteration of a major source if said source is equipped with air pollution control equipment.

d) Archeological Disturbance

Prior to making improvements on land in an archeological area, an archeological survey and report must be submitted to the Arizona State Historic Preservation Officer of the State Parks Board. He must then determine that there would be no disturbance of the archeological area before issuing an archeological clearance.

e) County/Municipal Regulations

Arizona's county and municipal governments generally follow the environmental guidelines as set forth by the Federal and State governments.

1.3 STATE GOVERNMENT AND PROPOSED OR PENDING LEGISLATION

1.3.1 Organization of the State Legislature

Legislative Committees have prime responsibility for geothermal development and regulation. A general organizational chart of the Arizona State Legislature is shown in Figure 1. The 16 standing committees in the House and 11 committees in the Senate serve as major forums for the deliberations on the bills. The key committee for geothermal matters in the House is the 15-member Natural Resources and Energy Committee, while the Senate has a 9-member Natural Resources Committee.

No legislative committee in Arizona is specifically charged with responsibility for overseeing of geothermal development and regulation. However, some overseeing is carried out as part of the annual process of the Appropriations Committees of both houses and by the Joint Legislative Budget Committee.

1.3.2 Proposed or Pending Legislation

The regular session of the Arizona State Legislature convenes on the second Monday in January each year. The last day for submission of bills is 29 days after the start of the session. The year 1980 marks the beginning of the second regular session of the 34th Legislature. It appears unlikely that legislation relating to geothermal development will be introduced in this session.

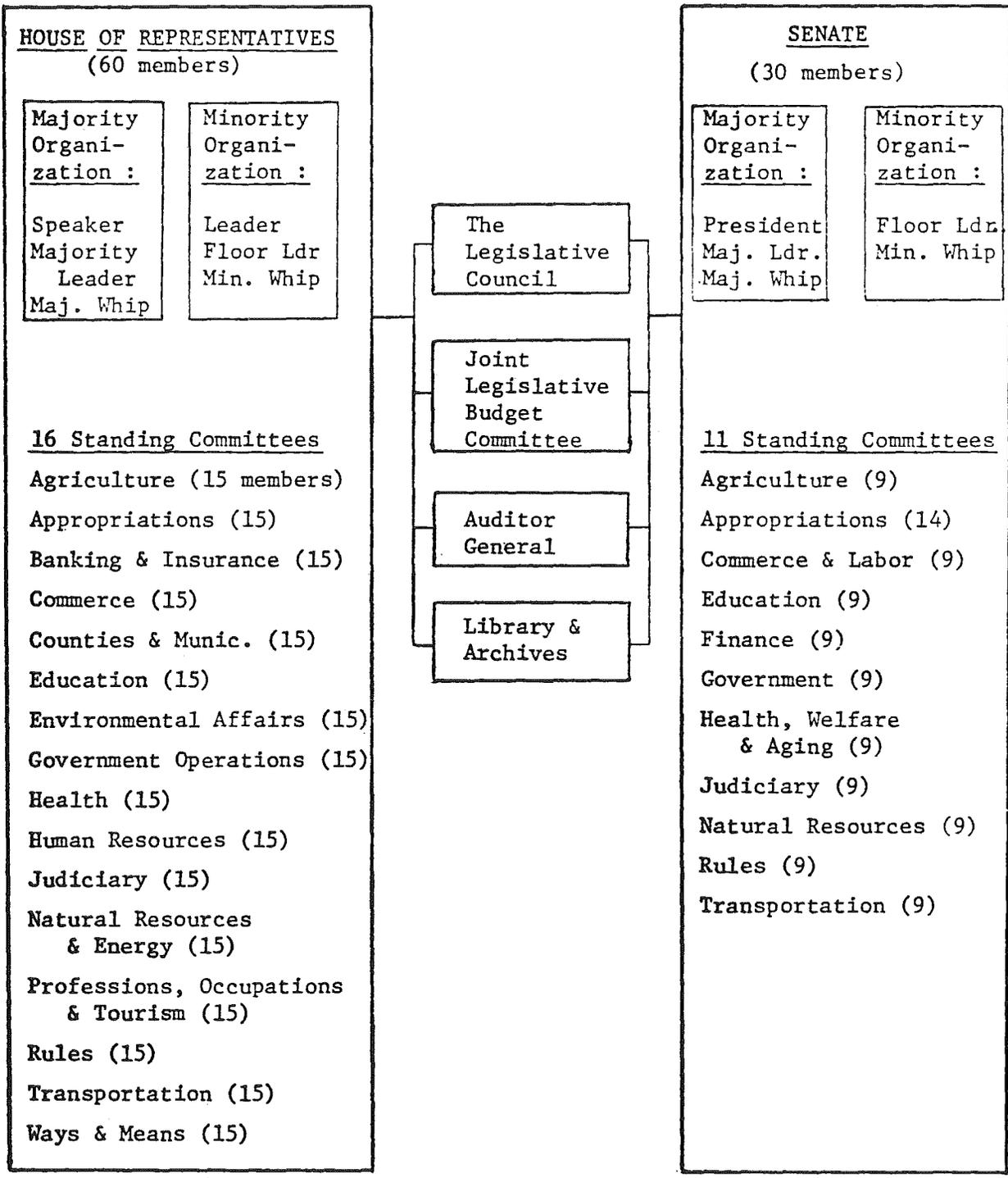


Figure 1 : GENERAL ORGANIZATION CHART OF THE ARIZONA STATE LEGISLATURE (*)

* Staff members are attached to most of the subdivisions of the Legislature, but are not shown here for the sake of simplicity.

1.4 APPLICABLE STATE REGULATIONS

1.4.1 Arizona Corporation Commission

The Arizona Corporation Commission is a Constitutional body provided for in Article XV of Arizona's Constitution. The statutes that pertain are embodied in Title 40 A.R.S. and the rules and regulations pertaining to the commission are embodied in Title 14 of the Arizona Administrative Rules and Regulations. Article XV of Arizona's Constitution states that:

"All corporations (other than municipal) engaged in furnishing gas, oil or electricity for light, fuel or power or in furnishing for profit, hot or cold air or steam for heating or cooling purposes shall be deemed as public service corporations."

The Corporation Commission has regulatory and enforcement authority over such public service corporations. Their function is to regulate public utilities in a manner that is just, reasonable and beneficial to ensure the continuation of a quality service to the people of Arizona while allowing the public utility corporations to earn a fair rate of return on their investment pursuant to the laws and constitution of Arizona.

According to statute, a public utility corporation shall not begin construction of a plant without first having obtained a Certificate of Public Convenience and Necessity from the commission (A.R.S. 40-281). This certificate delineates the specific areas to be served by the utility. The commission sets the conditions of the certificate; for instance, the commission can determine whether a utility can serve solely as a wholesaler (sell their electricity to an existing utility who in turn sells it to the consumer) or if the electric utility can serve as a retailer and sell directly to the consumer. In order to obtain a Certificate of Public Convenience and Necessity,

the corporation must submit an application and all necessary information to the commission which in turn sets a hearing date when the new utility must prove that it will be able to offer quality utility service to their customers. The commission then decides either to issue a certificate or not to issue. The estimated minimum time involved for issuance is four to six months, but controversial cases may involve indefinite time periods.

The Corporation Commission prescribes rates for public service utilities. By law, Arizona is a "fair value" state. That is to say that public utilities are assured of making a fair rate of return on their investments. The rate-setting process involves an accounting audit and engineering studies by the commission. The fair value rate is then debated at commission hearings. The ultimate decision of what rate the utilities may charge their customers rests with the commissioners. In order for an existing utility to receive a rate increase from the commission, hearings are held and the utility must prove that they need the rate increase. The commissioners then decide for or against the rate increase. The estimated minimum time involved in obtaining a rate increase is eight to nine months.

Financial approval also rests with the Corporation Commission.

According to statute:

"The power of public service corporations to issue stock and stock certificates, bonds, notes and other evidences of indebtedness, and to create liens on their property located within Arizona is a special privilege, the right of supervision, restriction and control of which is vested in the state and such powers shall be exercised by the Corporation Commission (A.R.S. 40-301)."

This financial approval also entails an application and hearing process. Estimated minimum time periods involved in obtaining commission approval on financial matters are three to four months.

1.4.2 Power Plant and Transmission Line Siting Committee

The Power Plant and Transmission Line Siting Committee was established by the Arizona State Legislature in 1971 and operates under the auspices of the Corporation Commission. The purpose of the committee is "to provide a single forum for the expeditious resolution of all matters concerning the location of electrical generating plants and transmission lines in a single proceeding to which access will be open to interested and affected individuals, groups, county and municipal governments and other public bodies to enable them to participate in these decisions." (4) The eighteen-member siting committee consists of the following members:

- a) State Attorney General (Chairman of committee)
- b) State Land Commissioner
- c) Chairman of the State Water Quality Control Council
- d) Director of Department of Health Services
- e) Director of the Game and Fish Department
- f) Executive Director of the State Water Commission
- g) Executive Director of the Office of Economic Planning & Development
- h) Chairman of the Arizona Corporation Commission
- i) Chairman of the Archaeological Department of the University of Arizona
- j) Director of the State Parks Board
- k) Executive Director of the Arizona Atomic Energy Commission

1) Seven members appointed by the Arizona Corporation Commission to serve for a term of two years of which two members shall represent incorporated cities and towns, two members shall represent counties and one member who shall be a registered landscape architect (A.R.S. 40-360-01).

The siting committee reviews applications for all proposed electrical generating plants and transmission lines and determines their effect upon the environment. The siting committee approves the project and the Corporation Commission then affirms the Certificate of Environmental Compatibility (7).

Every utility planning to construct a plant, transmission line or both in this state shall first file an application for a Certificate of Environmental Compatibility with the commission. The application must be accompanied by information relating to the proposed type of facilities and description of the site, including the areas of jurisdiction affected and the estimated cost of the proposed facilities and site (A.R.S. 40-360.03). In addition to the application and information, a fee in the amount of \$10,000 for a new proposed plantsite and associated transmission line site must be paid to the committee, (A.R.S. 40-360.90). This fee is used to pay the cost of reporting and transcribing any hearings, expenses incurred by committee members, cost of studies and consultant fees (A.R.S. 40-360.10).

Upon filing of the application, the siting committee sets a time and place of hearing. At such hearing, the committee will either approve or deny the issuance of the Certificate of Environmental Compatibility depending on the suitability of the plant site or transmission line with the environment. In determining whether or not to issue a certificate, the committee considers the following factors:

a) Existing plans of the State, local government and private entities for other developments at or in the vicinity of the proposed site.

- b) Fish, wildlife and plant life and associated forms of life upon which they are dependent.
- c) Noise emission levels and interference with communication signals.
- d) The proposed availability of the site to the public for recreational purposes, consistent with safety considerations and regulations.
- e) Existing scenic areas, historic sites and structures or archaeological sites at or in the vicinity of the proposed site.
- f) The total environment of the area.
- g) The technical practicability of achieving a proposed objective and the previous experience with equipment and methods available for achieving a proposed objective.
- h) The estimated cost of the facilities and site as proposed by the applicant and the estimated cost of the facilities and site as recommended by the committee.
- i) Any additional factors that require consideration under applicable Federal and State laws pertaining to any such site (A.R.S. 40-360.06).

Figure 2 details the decision-making process of the Power Plant and Transmission Line Siting Committee (8). The estimated minimum time period involved in the issuance of a certificate is four to six months.

1.4.3 Arizona Department of Transportation

The Arizona Department of Transportation (ADOT) has jurisdiction over the use of State highway lands for utility lines. An encroachment permit is necessary prior to the use of or crossing of State highway rights of way with utility lines such as power lines, water mains and sewage pipes. In order to obtain an encroachment permit, the following information must be filed:

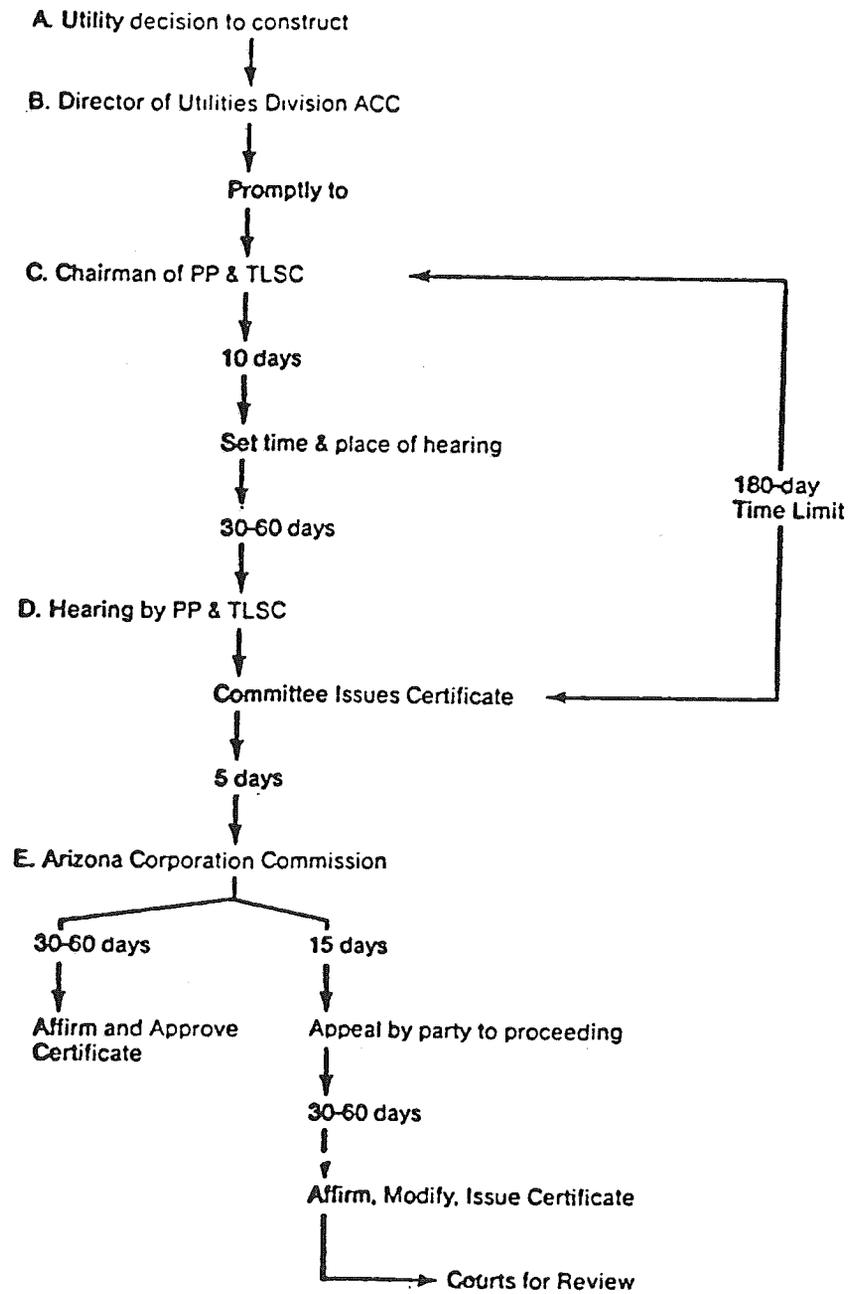


Figure 2: PP & TLSC Decision-Making Process

a) application, b) specific plans, and c) other information deemed necessary by ADOT. There are no filing costs involved and the estimated time of issuance is one to two months.

Arizona Department of Transportation also requires oversized vehicle permits prior to operating oversized or overweight vehicles on State highways. Any operator of a vehicle over 13 feet 6 inches in height, 8 feet wide, 65 feet in length or 80,000 lbs. (non-reducible load) must obtain an oversized vehicle permit. The cost is \$10.00 for the permit and it is good for three days. The estimated time of issuance is several days.

1.5 COUNTY AND LOCAL AGENCIES AND REGULATIONS

1.5.1 County Franchises

Arizona County Boards of Supervisors have jurisdiction over issuing franchises for use of county right-of-way for utility poles, transmission lines, etc. The process generally involves submitting an application for franchise along with a specific plan. The Board then conducts hearings and the application is either approved or denied. The costs and time periods involved vary according to the county. Generally, a two to three month time period can be expected.

1.6 TABULATION OF PERMITTING AND REGULATORY REQUIREMENTS

The following tables include a summary of the State and local regulatory requirements necessary for developing a geothermal resource in Arizona:

Table 1: State Permitting and Regulatory Requirements

Table 2: County Permitting and Regulatory Requirements

Table 3: Municipal Permitting and Regulatory Requirements

TABLE 1: STATE PERMITTING AND REGULATORY REQUIREMENTS

State Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
1. State Land Department	Lease State Lands	Exploring or using State lands	5-6 months	Competitive bidding procedure
	Commercial Lease	Placing improvements on State lands	4-6 months	Commercial lease is necessary for improvements such as power plant, etc.
	Purchase State land	Improving State land	8 months - 1 year	Improvements on State land are permissible only if land is purchased from State or if commercial lease is obtained.
	State Right-of-Way	Using State right-of-way	2 months	Necessary prior to crossing State right-of-way with utility poles, transmission lines or water mains.
2. Oil & Gas Conservation Commission	Well Drilling Permits	Drilling of wells	1-2 weeks	
	Injection Permit	Injecting any substance into a geothermal resource	2 months	
3. Corporation Commission	Certificate of Public Convenience and Necessity	Constructing a power plant	8-9 months	Involves extensive hearings

TABLE 1 cont

State Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
3. Corporation Commission	Financial Approval	Constructing a power plant	3-4 months	Involves extensive hearings
	Rate-Setting	Sale of electricity	Variable	"Fair Value Doctrine" is used in rate-setting
4. Power Plant and Transmission Line Siting Committee	Certificate of Environmental Compatibility	Constructing a power plant	4-6 months	This 18-member committee determines what effect a proposed power plant will have on the environment.
5. Department of Transportation	Encroachment Permit	Using State highway lands	1-2 months	Necessary prior to use of State highway lands for utility poles, transmission lines or water mains.
	Oversized Vehicle Permit	Using State highway for oversized or overweight vehicles	3-5 days	Necessary prior to use of State highway for oversized or overweight vehicles
6. Department of Health Services	Operating Permit	Operating a power plant	30 days	Operating of a plant that pollutes over a specified amount

TABLE 1 Cont

State Agencies	Permit or Function	Required Prior to	Estimate Time for Issuance	Notes
6. Bureau of Water Quality	National Pollutant Discharge Elimination System Permit	Discharging anything into an existing body of water	2-6 months	This is a Federal permit but is processed and enforced on the State level
Bureau of Air Quality	Class A or B Installation Permit	Installing all air pollution control devices	30 days	
7. State Parks Board	Archeological Clearance	Disturbing an archeological area	Variable	

TABLE 2: COUNTY PERMITTING AND REGULATORY REQUIREMENTS

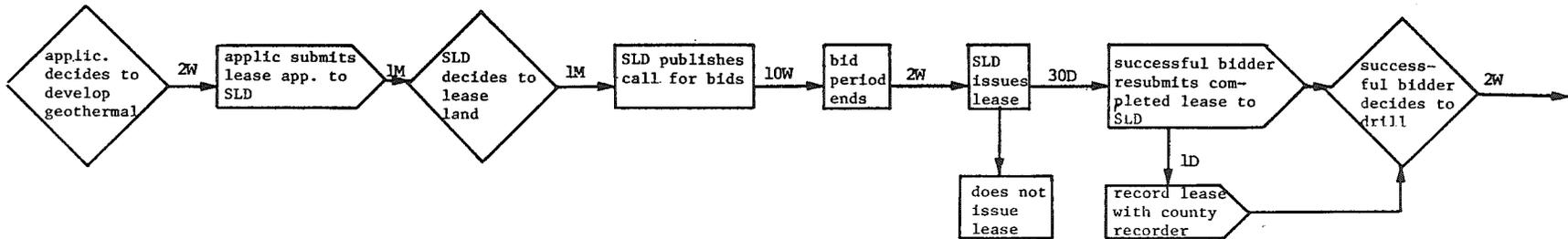
County Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
1. County Board of Supervisors	Lease County Land	Explorating or using county land	2-3 months	Not all counties have land for lease
	County Franchise	Using county right-of-way	2-4 months	Necessary prior to crossing county right-of-way with utility poles, transmission lines, or water mains
2. County Recorder	Record Lease Sales	Exploring	1-2 days	-
3. County Planning and Zoning Department	Zoning	Depends on county zoning ordinances	Variable	-
	Building Permit	Constructing	Several days to several weeks	-
4. County Health Department	Environmental Permits	Constructing	Variable	In conjection with State and Federal standards
	Waste Disposal Permit	Using the building	1 month	
5. County highway Department	Oversized Vehicle Permit	Using county right-of-way by oversized or over-weight vehicles	Several days	Not required in all 14 Arizona counties
6. County Assessors Office	Property Tax Rate	-	-	Tax rate is set annually by each county. Property tax rates in Arizona vary depending on what school district the property is in.

TABLE 3: MUNICIPAL PERMITTING AND REGULATORY REQUIREMENTS

City or Town Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
1. Mayor and Council	Lease Municipal Land	Exploring or using municipal land	2-3 months	Not all cities or towns have land for lease
	Franchise	Using municipal right-of-way	Variable	Necessary prior to use of municipal right-of-way for utility poles, transmission lines, or water mains
2. City or Town Planning and Zoning Department	Zoning	Depends on city or town zoning ordinances	Variable	
	Building Permits	Constructing	Several days to several weeks	

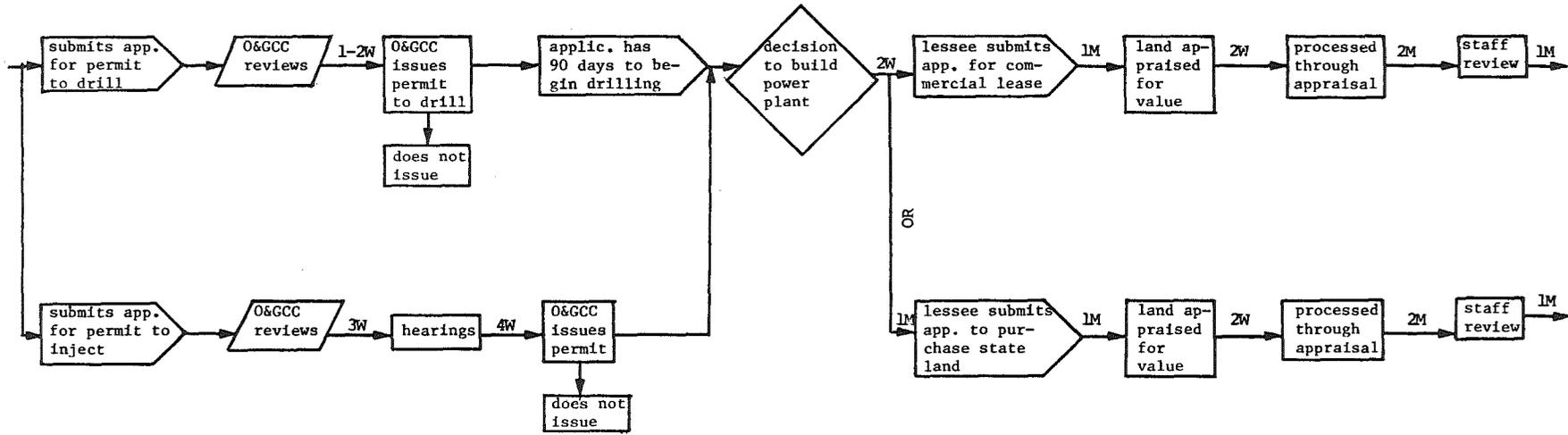
1.7 FLOW CHART OF STATE PROCEDURES

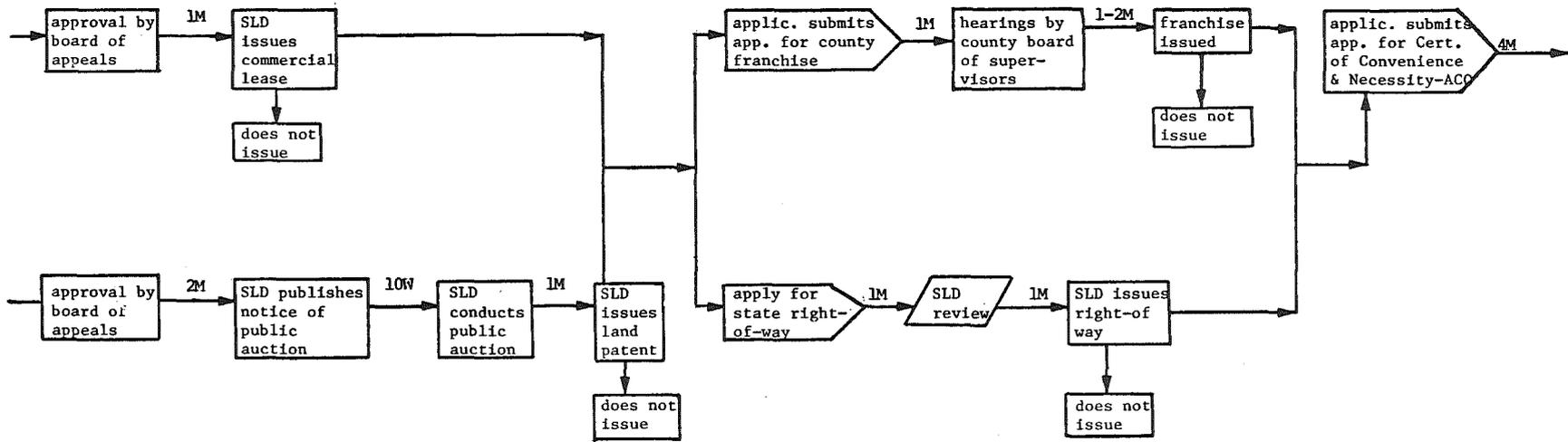
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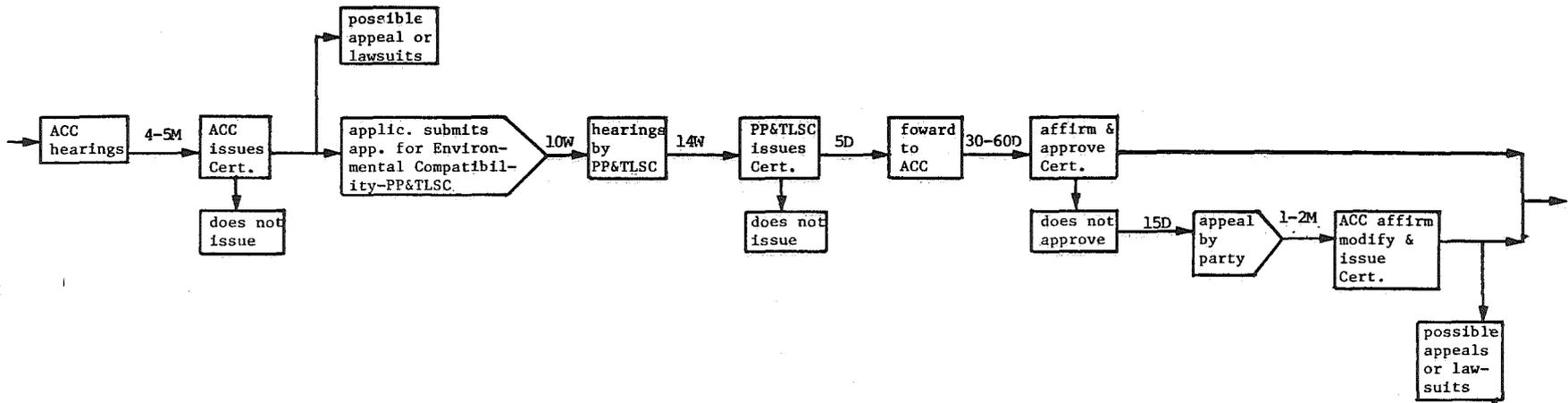


List of Abbreviations

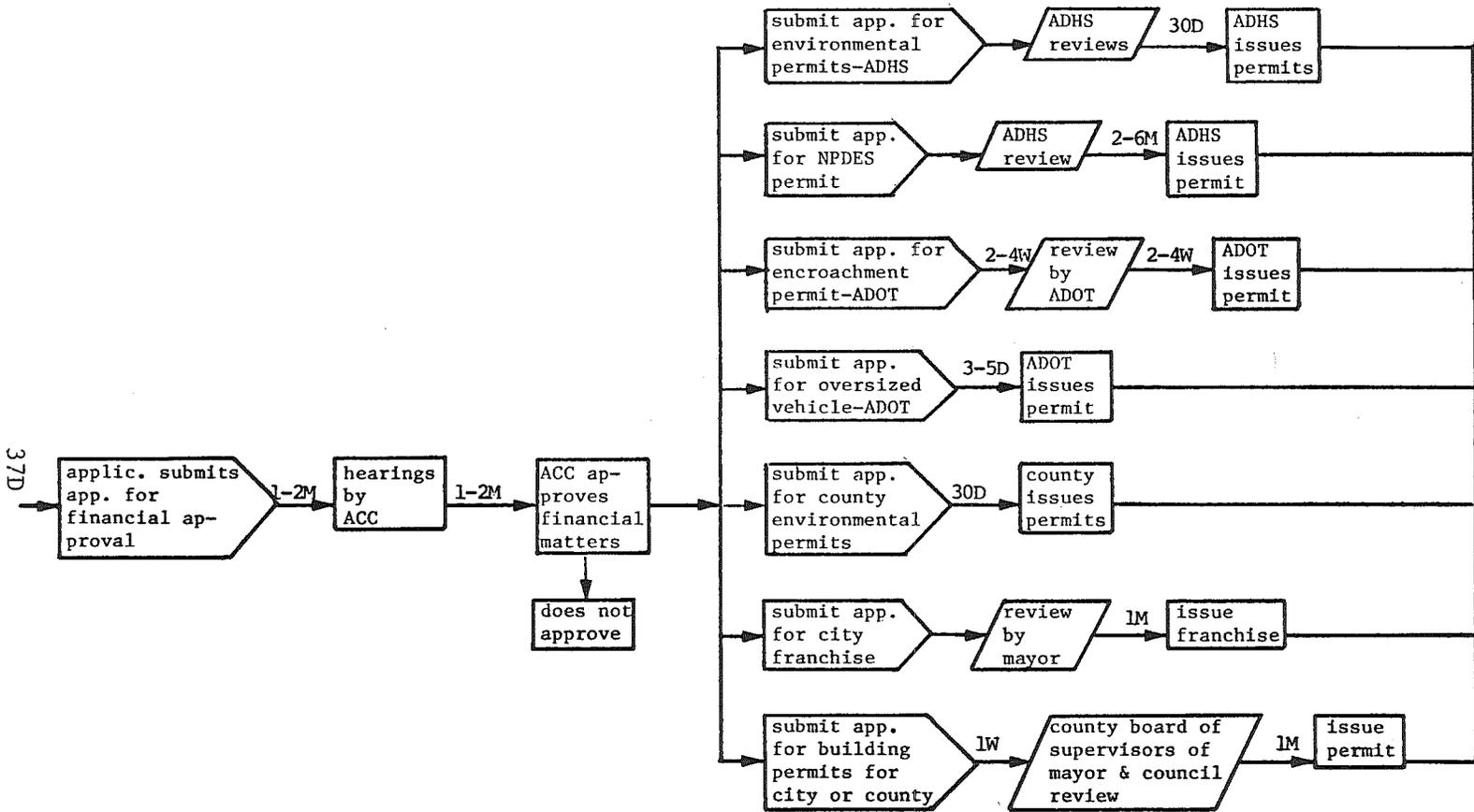
- ACC - Arizona Corporation Commission
- ADHS - Arizona Department of Health Services
- ADOT - Arizona Department of Transportation
- O&GCC - Oil & Gas Conservation Commission
- PP&TLSC - Power Plant & Transmission Line Siting Committee
- SLD - State Land Department







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SECTION 2: FEDERAL RULES AND REGULATIONS

2.1 PRINCIPAL FEDERAL AGENCIES

- a) Bureau of Land Management, Arizona State Office, 2400 Valley Bank Center
Phoenix, Az 85073
Linda Kipp - BLM land leasing, (602) 261-4774
The Bureau of Land Management leases BLM land for geothermal development.
- b) U.S. Forest Service, Regional Office, Federal Building 517, Gold Avenue
S.W., Albuquerque, NM 87102, (505) 766-2401
The U.S. Forest Service leases U.S. Forest Service land.
- c) United States Geological Survey, 345 Middlefield Road, Menlo Park, Ca 94025.
Reid T. Stone - Area Geothermal Supervisor, (415) 328-8111 ext 2841.
The U.S. Geological Survey issues permits for drilling, injecting, and
other surface disturbing activities on Federal land.
- d) Environmental Protection Agency, Regional Office, 215 Fremont Street,
San Francisco, Ca 94105, (415) 556-2320.
The Environmental Protection Agency issues environmental permits.
- e) Geo-Heat Utilization Center, Oregon Institute of Technology,
Klamath Falls, Oregon 97601
Gene Culver - (503) 882-6321
The Geo-Heat Utilization Center of OIT provides geothermal technical
assistance to the general public, industry, DOE contractors, and
Federal and State/local government agencies.

f) Farmer's Home Administration, 230 N. 1st Ave., Room 3433, Phoenix,
Arizona 85025, (602) 261-6701

The Farmer's Home Administration grants Community Facility and
Business and Industrial loan/loan guarantees.

g) U.S. Department of Housing and Urban Developments, One Embarcadero Center,
Suite 1600, San Francisco, Ca 94111

Henry Dishroom - Area Manager, (415) 556-2238

HUD grants Community Development Block Grants, Comprehensive Planning
Assistance Grants, and UDAG Grants.

h) Department of Energy, San Francisco Operations Office, 1333 Broadway,
Oakland, Ca 94612.

Hilary Sullivan - Coordinate of PON and PRDA Program and National Energy
Conservation Policy Act Grants, (415) 273-7943.

Ken Bromberg, Geothermal Loan Guaranty Program, (415) 273-7151.

The Department of Energy offers financial assistance for geothermal
programs.

i) Small Business Administration, 3030 North Central Avenue, Phoenix,
Az 85012, (602) 261-3611.

The Small Business Administration grants loans and loan guarantees
for energy saving projects.

2.2 FEDERAL PROCEDURES AND POLICIES

2.2.1 Federal Leasing Procedures

The foundation of the Federal geothermal leasing program is the Geothermal Steam Act of 1970 (84 stat. 1566; 30 USC 1001-1025). The Act authorizes the Secretary of the Department of Interior to dispose of Federal lands to develop geothermal steam found within public, withdrawn, and acquired land. The Department of Interior has assigned the responsibility for geothermal leasing to two of its agencies, the Bureau of Land Management (BLM) and the U.S. Geological Survey (USGS). For the purpose of lease administration, geothermal resources and by-products are defined as follows:

- a) "Geothermal resources" means geothermal steam and associated geothermal resources which include: (1) all products of geothermal processes embracing indigenous steam, hot water and hot brines; (2) steam and other gases, hot water and hot brines resulting from water, gas, and other fluids artificially introduced into geothermal formations; (3) heat or other associated energy found in geothermal formations; and (4) any by-products derived from them.
- b) "By-product" means (1) any mineral or minerals (exclusive of oil, hydrocarbon gas and helium) which are found in solution or in association with geothermal steam and which have a value of less than 75% of the value of the geothermal steam or are not, because of quantity, quality or technical difficulties in extraction and production of sufficient value or warrant extraction and production by themselves, and (2) commercially demineralized water, (84 stat. 1566; 30 USC 1001-1025).

The maximum acreage allowed per lease is 2,560 acres and the minimum acreage allowed per lease is 640 acres. A single lessee may hold a maximum

of 20,480 acres per state. The terms of the lease are for a primary term of 10 years and as long as steam is produced in paying quantities, up to an additional 40 years. If the lease is producing at the end of this forty year period, another forty year term may be allowed. The annual rental rate is a minimum of one dollar per acre per year for the first five years. Beginning with the sixth year, the rental rate escalates at the rate of one dollar per acre per year until commercial production is achieved. The royalty rate is between 10 and 15% of the value of the steam upon production. By-products from production are subject to a royalty rate of not more than five percent. The specific royalty rate is set by the USGS (11).

There are two basic leasing processes on Federal lands: competitive and non-competitive. The competitive process is used when the land in question is in a "Known Geothermal Resource Area" (KGRA). A KGRA is defined as:

"An area in which the geology, nearby discoveries, competitive interests, or other indices would, in the opinion of the Secretary, engender a belief in men who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose (43 CFR 3200.0-5 K)."

The USGS is responsible for the classification of lands as KGRA's. They delineate KGRA's by information available or by the overlapping of several lease applications thus proving competitive interests.

If an area up for lease is part of a KGRA, it is subject to competitive bidding. Tracts within a KGRA may be put up for competitive leasing either

by nominations from the public or by the BLM's own initiative. The applicant files a lease request with the BLM and they in turn forward it to the USGS who analyze the request to determine if it qualifies as a KGRA. The surface management agencies (BLM, USGS, Forest Service and Fish and Wildlife) then assess the environmental impact, and if deemed necessary, they complete an Environmental Impact Statement (EIS) and circulate it to other agencies and the public. If the EIS is acceptable, the BLM (with the approval of the Secretary of Interior) publishes a notice of a lease sale in a newspaper of general circulation in the area where the land is located. This notice must contain information regarding time and place of sale, description of the lands, procedure for submitting bids, terms and conditions of the sale, and the royalty rates as determined by USGS. A separate sealed bid is required for each lease along with half of the bid amount and a statement of qualifications. Leases are offered to the "highest responsible qualified bidder." The Secretary of the Interior has the right to reject any and all bids. If a lease is granted, before it is issued, the successful bidder must file a \$50,000 statewide bond or \$150,000 nationwide bond to insure lease compliance and to indemnify damages.

If the land to be leased is not part of a KGRA, it is subject to non-competitive leasing. In this process, an application (along with a \$50 filing fee and the first year's rent) must be submitted to BLM in a sealed envelope. The date of filing is stamped on each application. BLM in turn forwards the application to USGS at which point they analyze it to determine that the lands are not a part of a KGRA. Once again, the surface management agencies assess the environmental impact. Leases are then awarded (at the discretion of the Secretary of Interior) on the basis of priority according

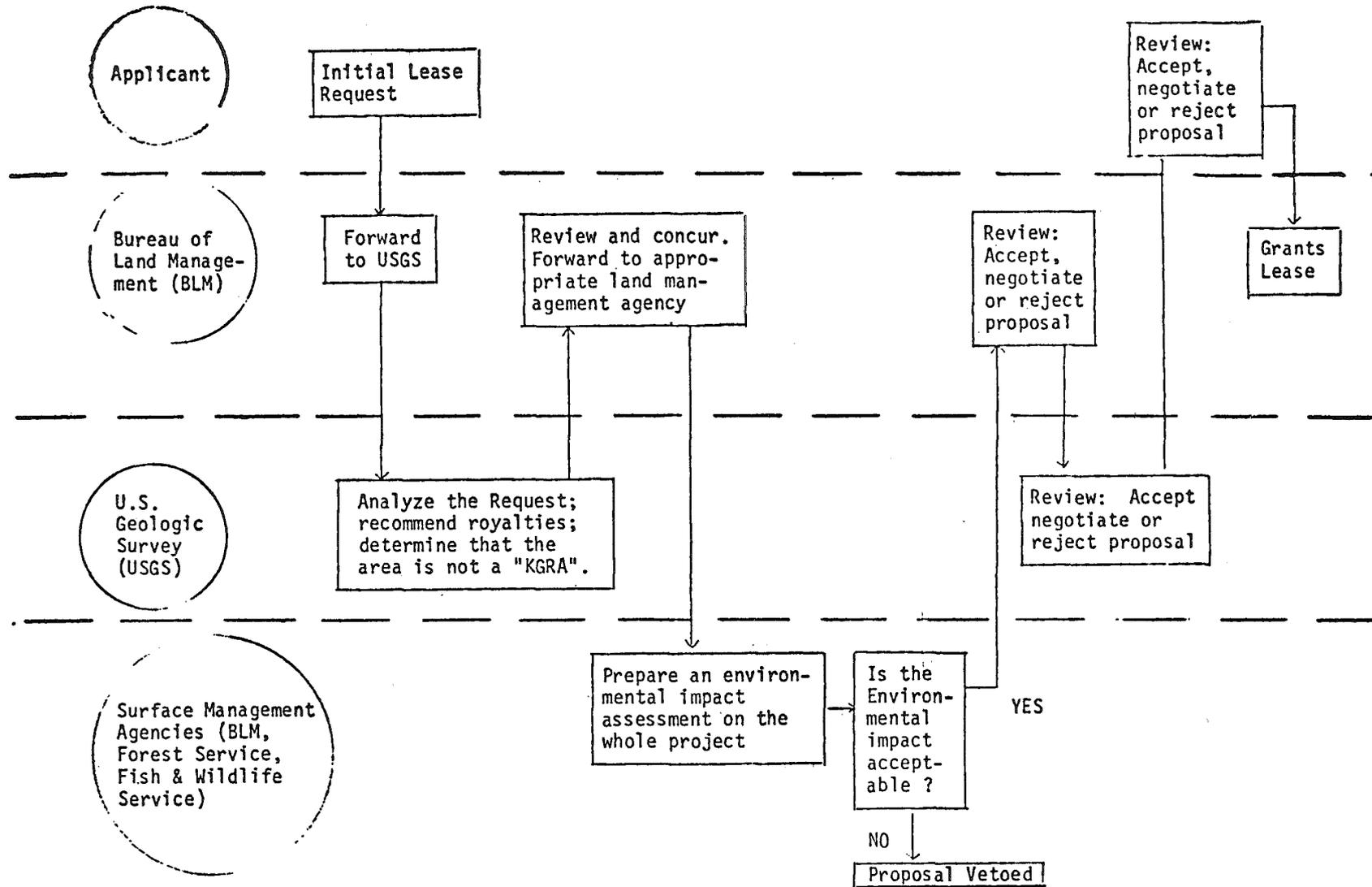


FIGURE 3: NON-COMPETITIVE LEASING PROCESS FOR FEDERAL (NON-INDIAN) LANDS FOR GEOTHERMAL DEVELOPMENT

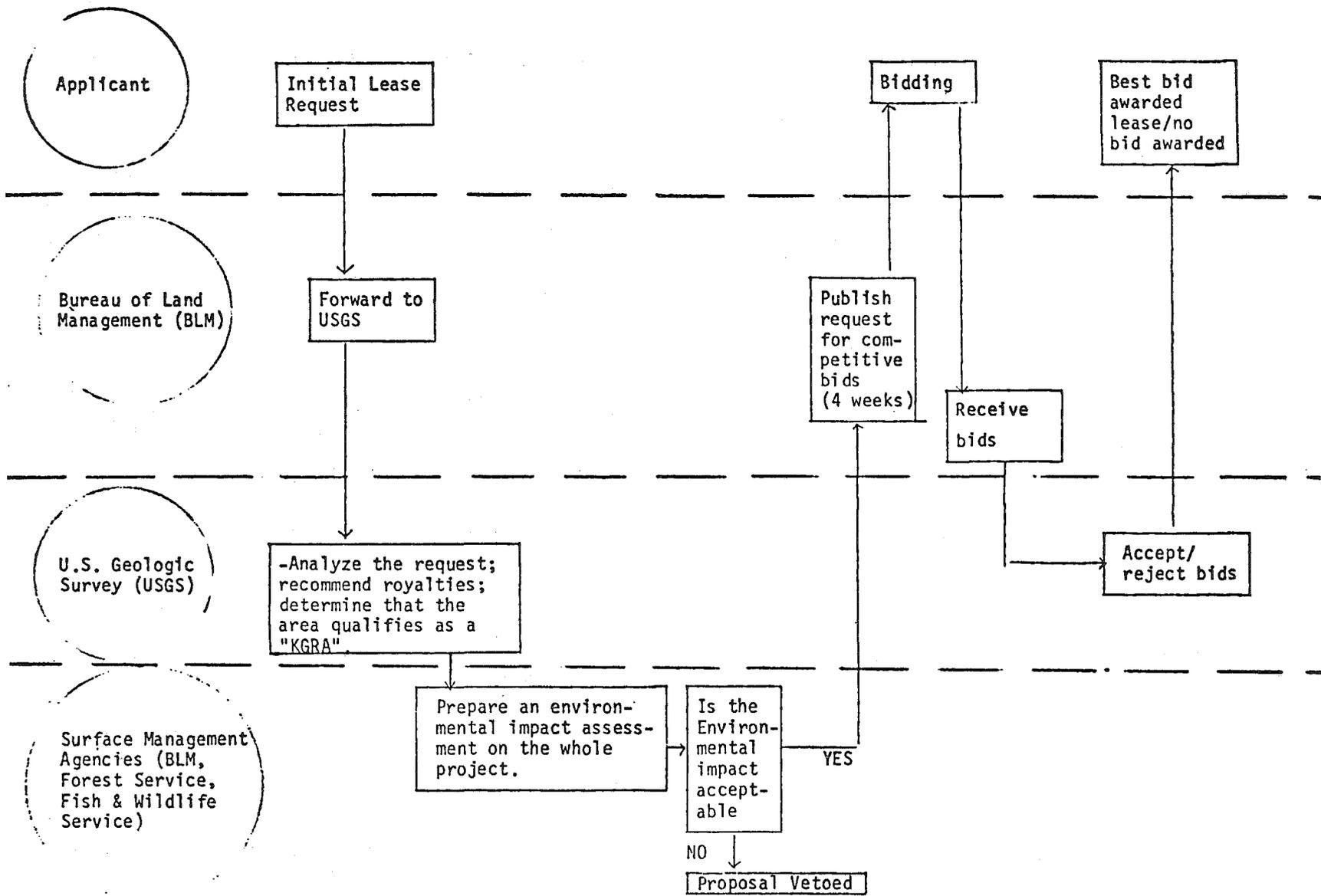


FIGURE 4: COMPETITIVE BIDDING PROCESS FOR THE LEASING OF FEDERAL (NON-INDIAN) LANDS FOR GEOTHERMAL DEVELOPMENT

to the filing date stamped on each application. As in competitive lease procedures, the surety bond must be filed before the lease is issued.

Periods in excess of two years are realistic in obtaining a Federal land lease. This is due to the lengthy processes involved in assessing the environmental impacts and drafting and circulating the EIS.

Figure 3 details the non-competitive leasing process for Federal lands and Figure 4 details the competitive bidding process for Federal lands.

2.2.2 Indian Land Leasing

Actions that relate to trust resources on Federal lands ultimately rest with the Secretary of the Department of the Interior. Accordingly, the leasing of Indian lands for geothermal development has been assigned to the Bureau of Indian Affairs (BIA) and the USGS. The BIA provides technical and administrative assistance to the Indian Tribe in bid publication, lease contract review, and operations monitoring. USGS evaluates any environmental assessments or impact statements and also provides similar technical assistance. In addition, USGS has enforcement authority in operation compliance of resource development. The individual Indian tribes maintain a fair degree of flexibility in that they determine the terms of the lease, for instance, rents, royalties, period of lease and whether a lease will be sold by competitive or non-competitive bidding process. The time periods involved in obtaining an Indian land lease for geothermal development purposes depend on whether the BIA or other Federal agencies determine that an EIS is necessary. In such cases, periods of two years or more would be realistic in obtaining a lease.

It is possible to do pre-lease exploratory work on Indian lands. This would require obtaining an exploration permit from the individual tribes involved. The terms of the permit (cost, length of permit, extent of exploration work, etc) would be determined by the tribe.

2.2.3 Exploration and Development on Federal Land

The regulations relating to geothermal resources operations on Federal leases are embodied in 30 CFR Part 270. The regulations are administered by the USGS. Before permitting operations on leased Federal land, USGS shall determine if the lease is in good standing; whether the lessee is authorized to conduct operations; whether the operator has filed an acceptable bond; and whether the operator has an approved plan of operation, notice of intent to do exploratory work, sundry notices or other appropriate permit applications, (30 CFR, Part 270.11).

Prior to commencing operations on the leased lands, the lessee must first obtain the joint approval of a plan of operation from USGS and the appropriate land management agency. The USGS also issues permits and oversees operations on Federal land relating to:

- a) The drilling and development of production wells.
- b) The drilling and development of injection systems.
- c) Plugging and abandoning of resource wells.
- d) Construction of power plants.
- e) Use of the resource for power production.

2.3 FEDERAL INCENTIVES

2.3.1 Federal Geothermal Loan Guaranty Program

A major incentive toward the development of geothermal energy offered by the Federal Government is the Federal Geothermal Loan Guaranty Program. This program is under the auspices of the Department of Energy (DOE) and has two main objectives:

- a) To encourage and assist the private and public sectors to accelerate development of geothermal resources by enabling DOE to minimize a lender's financial risk that is associated with the introduction of new geothermal resources and technology.
- 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 (9).

Under this program, DOE can guaranty a maximum of 75 percent of the total project cost with the individual putting up the remaining 25 percent. The maximum loan guaranty for a single project is one hundred million dollars. The maximum guaranty for any single borrower is two hundred million dollars. The loans can be guaranteed up to 30 years. At present, DOE has authority to guaranty a total of three hundred fifty million dollars.

Application Procedure - The application and supporting documentation may be jointly submitted by the lender and borrower at which time a pre-application conference with both will be conducted by DOE; or the borrower can apply alone and have DOE help locate a lender. Priority consideration will be given to projects located at undeveloped geothermal resource areas, projects that show promise of quickly resulting in geothermal applications, and projects that use new technological advances. The estimated time involved in the processing

of an application is six months after a totally complete application is received by DOE.

2.3.2 Program Research and Development Announcement

The purpose of the Program Research and Development Announcement (PRDA) sponsored by DOE, is to provide an opportunity for interested parties to propose site specific engineering and feasibility studies of direct applications of geothermal energy. DOE's primary interest under the PRDA Program is for studies covering a detailed analysis of engineering, economic, and institutional factors associated with single-purpose or multiple usage of geothermal heat in application areas such as industrial and agricultural processing, mineral extraction and space/water heating and cooling for commercial building complexes and residential development. Results of these studies are expected to aid in selecting the location and design of possible follow-on applications experiments, help to identify impediments to commercialization, and directly stimulate private development of direct applications of geothermal energy. These PRDA studies are generally funded 100% by DOE.

2.3.3 Program Opportunity Notice

The purpose of the Program Opportunity Notice (PON) sponsored by DOE, is to provide an opportunity for interested parties to propose direct use demonstration projects (field experiments) using geothermal energy. These field experiments are needed to provide visible evidence of the profitability of various direct heat applications in a number of geographical regions and to demonstrate a variety of types of applications. These PON demonstration projects are funded on a cost-sharing basis between the developer and DOE.

2.3.4 Geothermal Energy Technical Assistance Program

The Geothermal Energy Technical Assistance Program, administered by DOE, acts as an incentive by providing technical assistance to the general public, industry, DOE contractors and Federal and State/local agencies on a request basis. Specifically, the Technical Assistance Program offers a maximum of 100 man hours of technical assistance in the following areas:

- a) Resource definition.
- b) Resource evaluation.
- c) Engineering evaluations.
- d) Engineering preconceptual design.
- e) Material technology.

2.3.5 National Energy Conservation Policy Act Grants

The Department of Energy has established grant programs (pursuant to the National Energy Conservation Policy Act), subject to cost sharing requirements, to reduce consumption and associated costs of conventional energy resources to schools, hospitals, buildings owned by units of local government and public care institutions. This objective is to be achieved through several means including financial assistance for:

- 1) Identifying improved operating and maintenance procedures.
- 2) Identifying energy conservation measures, including solar energy or other renewable source measures. (This does apply to geothermal energy).
- 3) Implementation, in the case of schools and hospitals, of selected energy conservation measures.

2.3.6 Farmers Home Administration (FmHA) Community Facility Loan

Farmers Home Administration (within the U.S. Department of Agriculture) is authorized to make loans available to public entities (such as municipalities, counties, special district, non-profit corporations, etc) for the purpose of developing community facilities for public use in rural areas and towns with populations of less than 10,000 people. The funds may be used to acquire interest in land, leases, and rights of way and to construct, enlarge, extend, or improve community facilities that provide essential service to rural residents. The FmHA has not set maximum dollar amounts to be granted per project, however, any loan over two million dollars must go to the national FmHA office for approval. The maximum term on all loans is 40 years. The interest rate is currently 5% on the unpaid principal. The FmHA will assist the applicant in making the first determinations regarding engineering feasibility, economic soundness, cost estimates, organization, financing and management matters in connection with the proposed improvements. Applications may be obtained at the local county FmHA office. The estimated minimum time period involved in receiving a loan is three months.

2.3.7 FmHA Business and Industrial Loan

The Farmers Home Administration is authorized to offer assistance to further business and industrial development in rural areas. This assistance is provided in the form of a business and industrial loan guarantee. The Business and Industrial loans may be made in any area outside the boundary of a city of 50,000 or more and its immediately adjacent urbanized areas with population density of more than 100 persons per square mile. Priority will be given to applications for projects in open country, rural communities and towns of 25,000 and smaller.

The basic purposes of this loan guarantee program include developing of financing business or industry, increasing employment, and controlling or abating pollution. The loans can be used for the following purposes:

- 1) Financing business and industrial construction, conversion, acquisition, and modernization.
- 2) Financing purchase and development of land, easements, equipment, facilities, machinery, supplies or materials.
- 3) Supplying working capital.

Any legal entity, including individuals and public and private organizations may apply for the loan guarantee. FmHA will guarantee a maximum of 90% of the loan. There are no maximum dollar amounts to be guaranteed per project, however, any amount over one million dollars must be approved by the national FmHA office. Repayment schedules vary according to what the loan money is used for. Applications may be obtained at the local county FmHA office. The estimated minimum time period involved in receiving a loan guarantee is three months.

2.3.8 Urban Development Action Grants - (UDAG)

The nature of the UDAG Program, sponsored by HUD, is to assist severely distressed cities and urban counties to revitalize local economics and reclaim deteriorated neighborhoods through a combination of public and private investments (approximately 3 private dollars to 1 UDAG dollar) in projects of maximum benefit to low- and moderate- income persons and members of minority groups. Those cities that are now eligible to apply for UDAG funds are listed in the Federal Register, Vol. 44, No. 211, October 30, 1979. It must be noted that other cities may become eligible for funds at a later date.

Priority will be given to projects with prospects of recapturing the community's financial investment for recycling in other economic development activities. Funding will be based on a "reasonable balance" of residential, commercial, or industrial projects.

UDAG has a competitive application process, with application dates of February and May for cities over 50,000 population and January and April for cities under 50,000. The funding distribution is such that at least 25% of each year's appropriation will be set aside for these small communities with populations of 50,000 or less. Award announcements will be made 90 days after the first of the application month.

2.3.9 Community Development Block Grants

The nature of this program is to offer Federal aid to promote sound community development. HUD awards "block" grants to local governments to fund a wide range of community development activities. In this single, flexible program, the block grants finance activities previously eligible under separate categorical grant programs such as: Urban Renewal; Neighborhood Development Grants; Model Cities; Water and Sewer Grants; Neighborhood Facilities Grants; and Public Facilities Loans.

Metropolitan cities (population of at least 50,000) and qualified urban counties (population of at least 200,000) are guaranteed an amount called an "entitlement". Smaller communities compete for the remaining "discretionary" funds (3% of each year's appropriation goes into this discretionary fund).

2.3.10 Comprehensive Planning Assistance Grants

The nature of this program is to offer grants to help State and local governments finance comprehensive planning activities. A broad range of planning and management activities is supported by these HUD grants of up to two-thirds of the cost of a project. The comprehensive planning defined by this program is an ongoing process by which needs are determined and long-term goals set for land use, housing and community facilities, and proper weight given to human and natural resources, and the improvement of the living environment. Those eligible to apply for these grants are states, metropolitan clearinghouse, council of governments, Indian Tribal groups or other governmental units having special needs.

2.3.11 Small Business Administration

The Small Business Administration (SBA), administered by the Federal Government, offers new energy direct loan and loan guaranty programs as incentives to aid in the development of energy saving programs. Geothermal projects would therefore be included.

Under the loan guaranty program, the developer of a geothermal project must apply to a bank for a loan. The developer then applies for a loan guaranty through the SBA. The SBA will guaranty 90 percent of a bank loan up to \$500,000. The minimum time involved in obtaining a loan guaranty is two to three weeks.

Direct loans are offered through the SBA in cases where banks will not lend money. The maximum amount is \$150,000. Time periods of approximately two to three months can be expected in obtaining a direct loan through SBA.

2.4 PENDING FEDERAL GEOTHERMAL ENERGY LEGISLATION

Various pieces of geothermal energy legislation are currently being considered by Congress. They can be outlined as follows:

Geothermal Energy Omnibus Bills

S. 1330/H.R. 4471, S. 1388/H.R. 5187

Acreage Limit Increase

H.R. 740

Tax Credits

H.R. 3919, Title II

Omnibus Geothermal Energy Act

S. 932, Title VI

Geothermal Steam Act Amendments

H.R. 6080

Copies of these bills can be obtained by contacting the office of one's U.S. Senator or Representative.

2.4.1 Summary of Pending Legislation

The following are the major geothermal provisions embodied in the amendments to the Geothermal Steam Act (H.R. 740, H.R. 6080):

H.R. 740 - Increased Acreage Limit to 51,200

H.R. 6080

- Narrow KGRA Criteria (Substantial Geological Indications of Electric Potential)
- Increases Acreage Limit to 51,200 Acres
- Processing Time Goals for Leases and Permits
- Federal Use Authorized
- Exempts Developed Acreage From Limits
- Free Use for Noncommercial Nonelectric Applications
- Relief from 10-Year Readjustment Authority
- Grandfathering for Noncompetitive Lease Applications

The following are the major geothermal provisions embodied in the Alternative Energy Tax Credits Legislation (H.R. 3919, Title II):

Residential Credit

- Increased to 50%
- Available to Builders
- Heat Pumps Included (15% up to \$2000)
- Extended to 1990
- Wells Specifically Eligible

Business Credit

- Increased to 20%
- Utilities Eligible
- Extended to 1990
- Refundable
- Heat Pumps Eligible for 10% Credit

The following are the major geothermal provisions embodied in the Synfuels Legislation (S. 932, Title VI):

- Reservoir Confirmation Loans (\$750 Million), 90% Nonelectric, 50% Electric
- Reservoir Insurance (\$100 Million)
- Direct Low-Interest Loans for Nonelectric Feasibility Studies, License Applications, and System Construction (\$50 Million)
- 90% Loan Guarantees for Municipals and Cooperatives
- Loan Guaranty Program Extended to 1989
- Use of GLGP by REA, HUD, SBA, FmHA Authorized (\$50 Million)
- Expedited Loan Guaranty Processing
- Federal Buildings Program
- Expedited Geopressured, Hot Dry Rock, and Environmental Control Technology Programs
- Public Utility Regulatory Exemption Expanded to 140 MWe

It must be noted that these provisions are subject to amendment or possible deletion by Congress. For the current status on these bills contact: Arizona Geothermal Commercialization Team, Bureau of Geology and Mineral Technology, 2045 N. Forbes Ave., Suite 106, Tucson, Arizona 85705, (602) 626-4391.

2.5 ENVIRONMENTAL REGULATIONS

Federal Regulations - If a geothermal project is on Federal land or involves Federal money, an Environmental Assessment and Environmental Impact Statement will be required. The State of Arizona does not require Environmental Assessments or Environmental Impact Statements.

Air Pollution - EPA regulations require that if a facility discharges more than 250 tons of hydrogen sulfide (H₂S) annually, a permit is required and the addition of pollution controls will also be required.

Water Pollution - If water from a geothermal resource is discharged into an existing body of water, the EPA requires a National Pollutant Discharge Elimination System Permit. The cost is \$100 for one discharge point and an additional \$50 per outlet. This is a Federal permit but is administered by the Clean Water Section of Arizona Department of Health Services. An application must be submitted to the Department of Health Services 180 days prior to the discharge date. Permits are issued for a maximum of five years.

Noise Pollution (Federal/State Standards) - The following decibel levels are the maximum noise levels permitted per various duration of exposure:

<u>Duration of Exposure</u>	<u>Equivalent Maximum Noise Level</u>
8 hours	90 decibels
6 hours	92 decibels
4 hours	95 decibels
3 hours	97 decibels
2 hour	100 decibels
1-1/2 hours	102 decibels
1 hour	105 decibels
1/2 hour	110 decibels
1/4 hour	115 decibels

Endangered Species List - A consultation process with the U.S. Fish and Wildlife Service (USFWS) is required in cases where a geothermal project is planned for an area that serves as the habitat for an animal on the

endangered species list. A description of the proposed action that may effect an endangered species must be filed with the USFWS. They, in turn, will prepare a biological assessment which requires a minimum of 180 days. The agency will then issue a biological opinion which requires a minimum of 60 days. This opinion may require modifications of the project.

2.6 TABULATION OF FEDERAL PERMITTING AND REGULATORY REQUIREMENTS

Table 4 details the federal permitting and regulatory requirements for developing a geothermal resource in Arizona.

TABLE 4: FEDERAL PERMITTING AND REGULATORY REQUIREMENTS

Federal Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
1. Bureau of Land Management	Permit for Pre-lease Operation	Non-surface disturbing exploratory activities on lands not leased by applicant	30 days	Includes geophysical/geological exploration temperature gradient surveys, etc. 30 day time limit for approval
	Issue Lease -- BLM Lands	Major exploratory activities	8 months or longer	
	Conducts EAR Conducts KGRA Lease Sales Issues Lease			
	Plant Siting Permit	Plant construction	Not known	-
	Post-Lease Joint Approval with USGS of Plans of Operation	-	-	Site specific
2. U.S. Forest Service	Special Use Permit for Pre-Lease Operations	Exploratory activities on lands not leased by applicant	30 days	Includes geophysical/geological exploration, temperature gradient surveys, etc., 30 day time limit for approval
	Issue Lease -- Forest Service Lands	Major exploratory activities	About 17 months or longer	-
	Conducts EAR, KGRA Land Sales Approves Lease Joint Approval with USGS of Plans of Operation			

TABLE 4 Cont

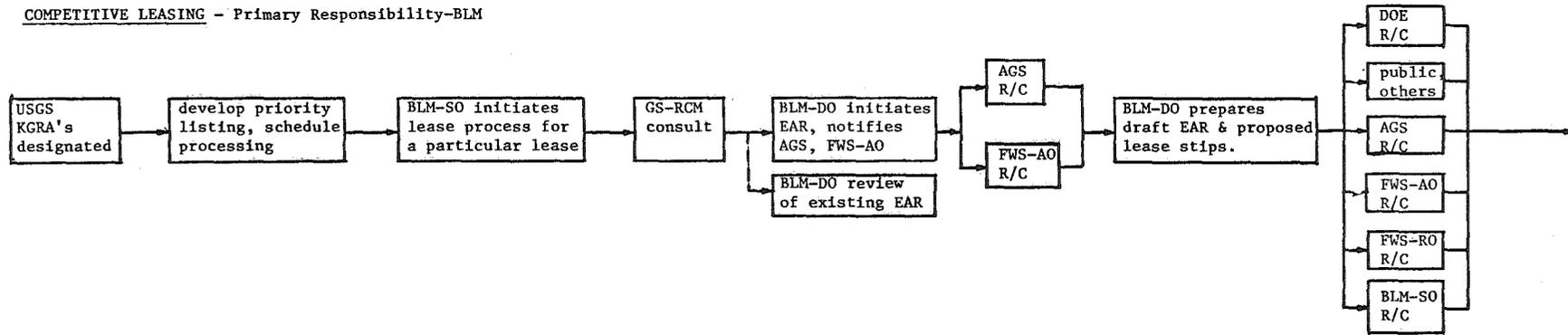
Federal Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
3. U.S. Geological Survey	Administers Terms of Lease	-	-	-
	Approves Permit for Exploratory Activities	Non-surface disturbing activities	30 days	Includes geophysical/geological activities, temperature gradient surveys, etc., 30 day time limit for approval
	Conducts Site-Specific Environment Analysis and approval of Plans of Operation	-	-	Plans of operation are site specific
	Exploration	Surface disturbing activities	About 1 year	-
	Environmental Baseline Data	Gathering of required 1-year's environmental baseline data	About 3-5 months	Must be completed at least one year before plan of production is submitted
	Development	Drilling and development of production wells	About 3-5 months	Define extent of field
	Injection	Drilling and development of injection system	About 3-5 months	-
	Utilization	Constructing a power plant	About 3-5 months	Sundry notices submitted for each phase. Includes contract and royalty breakdown
	Production	Using the resource for power production	About 3-5 months	Includes production data from wells and target date for completion

TABLE 4 Cont

Federal Agencies	Permit or Function	Required Prior to	Estimated Time for Issuance	Notes
	Change of Plans of Operation	Implementing any change of plans in operation	A few months	Sundry notices
4. U.S. Environmental Protection Agency	Certify Air Discharge Permit	-	About 90 days	Air, water, and solid waste permits are in conjunction with State Department of Health Services
	Issue Water Permit	-	About 90 days	
	Issue Solid Waste Disposal Permit	-	About 90 days	
	Review of EIS	-	-	-
5. U.S. Fish and Wildlife Service	Advisory	-	-	Consults on lease sales (competitive and non-competitive), pre-lease and post-lease environmental analysis
6. U.S. Department of Energy	Financial Assistance			
	State Cooperative Program			
	Industry Coupled Case Study Program			
	Loan Guaranty Program		About 9 months	
	Demonstration Programs		About 9 months	
	Development of Lease Stipulations			
	Issuance of Lease			

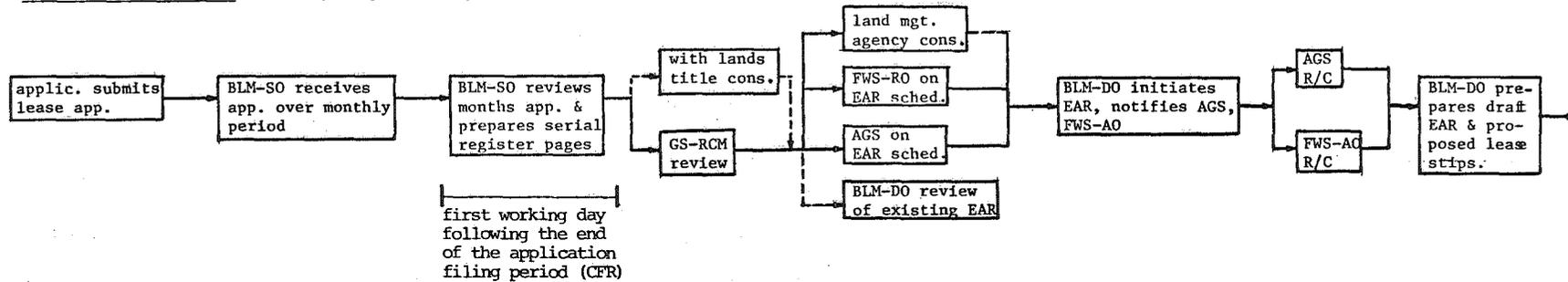
2.7 FLOW CHART OF FEDERAL PROCEDURES

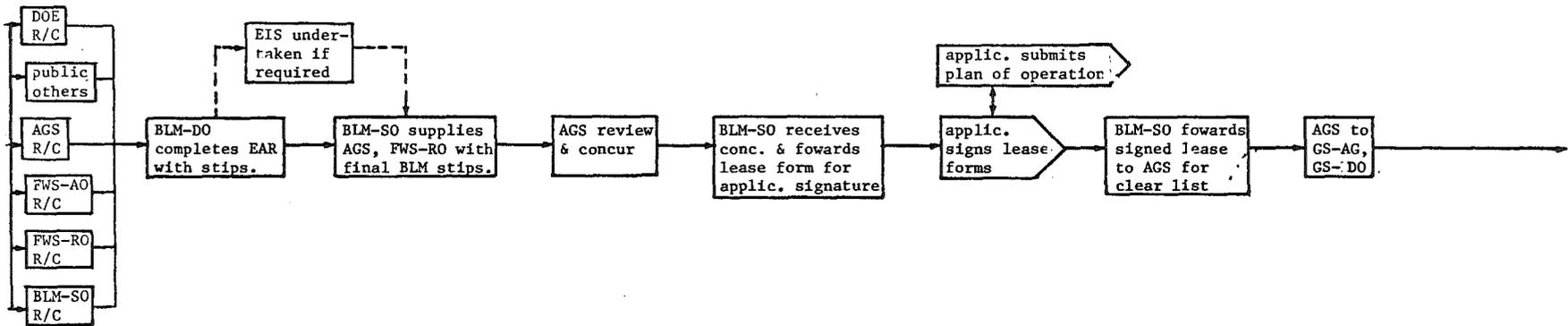
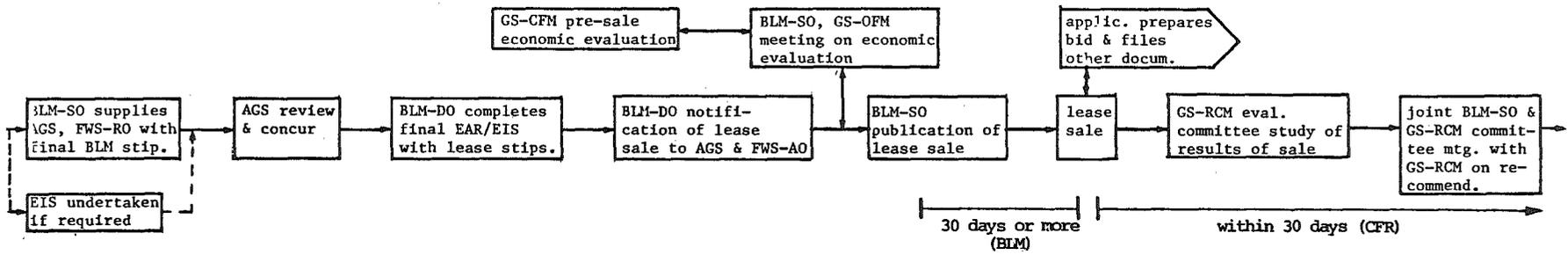
COMPETITIVE LEASING - Primary Responsibility- BLM

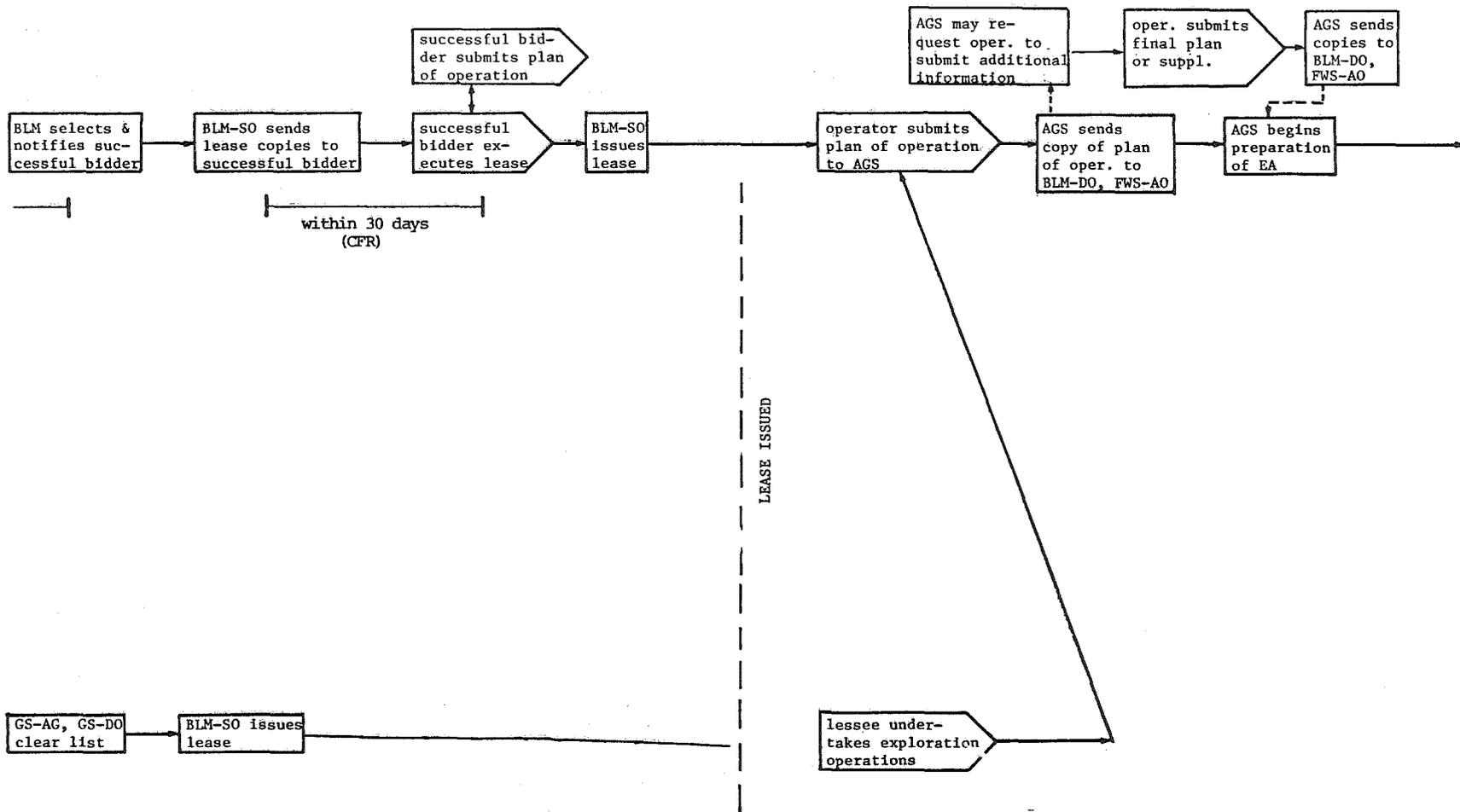


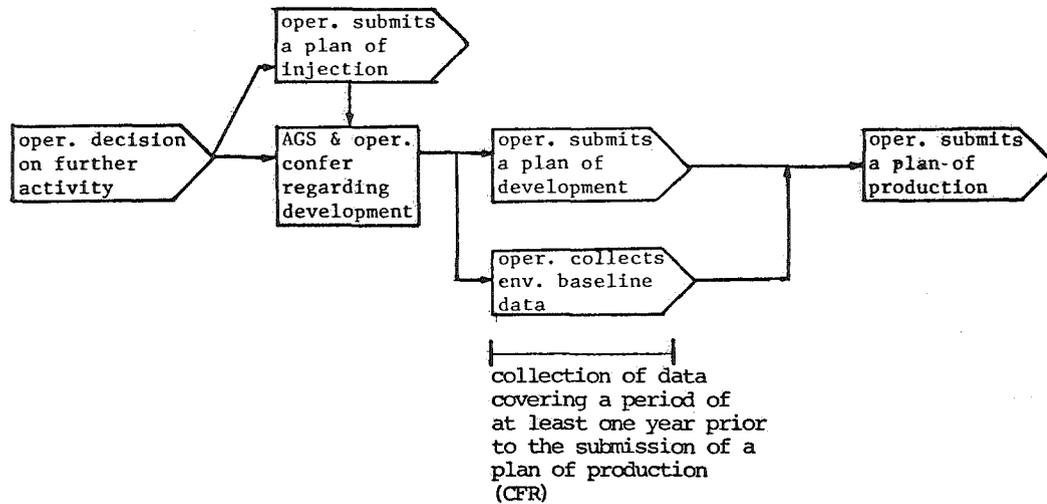
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NONCOMPETITIVE LEASING - Primary Responsibility- BLM









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Geothermal Regulatory Activities

(Compiled from Geothermal Steam Act of 1970, Federal Rules and Regulations 43 CFR Part 3000 and 30 CFR Parts 270 & 271, and Memorandum of Understanding for the Geothermal Program - USGS, BLM, FWS)

List of Abbreviations

BLM	-	Bureau of Land Management
BLM-DO	-	Bureau of Land Management District Office
BLM-SO	-	Bureau of Land Management State Office
GS	-	U.S. Geological Survey
GS-RCM	-	U.S. Geological Survey, Regional Conservation Manager
AGS	-	Area Geothermal Supervisor
GS-AG	-	U.S. Geological Survey Area Geologist
GS-DG	-	U.S. Geological Survey District Geologist
FWS	-	Fish and Wildlife Service
FWS-RO	-	Fish and Wildlife Service Regional Office
FWS-AO	-	Fish and Wildlife Service Area Office
EAR	-	Environmental Analysis Record (prepared by BLM)
EA	-	Environmental Analysis (prepared by GS)
GEAP	-	Geothermal Environmental Advisory Panel
R/C	-	Agency Review and Comment
DOE	-	Department of Energy

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