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Legal Aspects of Geothermal Energy Development

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ABSTRACT

The legal structure for regulation of geothermal energy development should be logically and explicitly related to the nature of the resource and the institutional arrangements most appropriate to its development. The legal regime in the United States is, however, not as rationally structured as it might be. It is a product of past and present laws, at state and federal levels, on mining, mineral leasing, mineral disposal, water resource, the environment, and public land.

The regulatory structures governing exploitation of other natural resources are not entirely appropriate to geothermal development. Recent state and federal legislation attempts to chart a unique course for geothermal resource development, but has not completely overcome the legacy of the past; important questions concerning ownership and acquisition of rights to geothermal resources have been left unresolved.

The legislation addresses the roles of the public and private sectors in geothermal resource development. Private developers have questioned federal and state policies with respect to: availability of public lands; competitive and non-competitive bidding systems; rent and royalty structures; lease terms; environmental and land-use regulation; tax treatment; and allocation of regulatory responsibilities. In some of the areas, policymakers should now reconsider earlier decisions; in other areas they should closely monitor future performance to determine whether policy changes are needed.

INTRODUCTION

Ideally, the legal structure for regulation of geothermal resource development should be logically and explicitly related to the nature of the resource and to the institutional arrangements most appropriate to its development. Unfortunately, the legal regime has not been as rationally structured as one might desire. The legal aspects of geothermal resource development today are a product of the past history of state and federal laws affecting mining, mineral leasing, mineral disposal, water resources, the environment, and public lands. The attempt to fit geothermal resource development into legal structures created for other purposes has inhibited its full exploitation.

This paper examines, from a historical perspective, the legal context in which geothermal resource development

has taken place and efforts that have been made to develop a more rational legal foundation for future development. It includes a review of the history of mineral and water laws, limitations encountered in applying these laws to geothermal development, the development of new state and federal regulatory regimes, and the remaining legal barriers to geothermal resource exploitation.

HISTORICAL CONTEXT

While interest in the development of geothermal resources is of comparatively recent origin, laws dealing with the development of mineral and water resources have existed for many years. These laws differ somewhat depending on the location of the resources.

If the resources are located upon private lands then the law is relatively clear: the owner of the surface of the land owns all that is under it. With respect to hard rock minerals, the owner is free to exploit these minerals as he sees fit subject only to the broadest restrictions such as those against creating a nuisance which injures his neighbor's lands.

With respect to underground water resources the surface owner is subject to additional restrictions, especially in the arid western states. The use and enjoyment of resources underlying his land are often tempered by the requirement that he not trespass upon or unreasonably interfere with his neighbors' enjoyment of their underground water resources. The "law of capture" of a common underground water source, which holds that one could use what one could take, has been qualified by the doctrine that adjoining users have some "correlative rights" which limit one's ability to interfere with a neighbor's use.

In the arid West, early law relating to underground waters was further modified if the exploitation of underground resources interfered with the flow of surface waters. In such a case the surface owner's use of underground waters was limited by the rights of persons who had previously acquired rights in the flow of the surface waters.

As the West became more populated, the state governments assumed an even larger role in the development and use of water resources. Today, in most western states the surface owner must obtain state permission to exploit the water resources underlying his lands. The extent to which state water regulations govern geothermal resource development is explored below.

MINERAL RESOURCES MODEL

In the earliest period of the development of the West, there was no comprehensive legislation dealing with mineral resource development. A variety of state, territorial, and private "miners'" laws governed. In 1872 Congress passed the General Mining Law (Act of May 10, 1872) governing the extraction of minerals. Intended to apply primarily to hard-rock or metallic minerals, the 1872 Mining Law permitted:

1. Open exploration of the federal domain.
2. Acquisition of rights to minerals on public lands by discovery and filing of a claim.
3. Acquisition of title to the surface by acquisition, for a nominal sum, of a federal deed known as a "patent."
4. Production of minerals without a patent and without payment of any rents or royalties.

The size of the claims was limited to 20 acres. For a variety of reasons this system was not appropriate to all types of minerals.

A second system was established in 1920 when specific minerals were removed from the General Mining Law's "location-patent" system and placed under a leasing plan. Under the Mineral Lands Leasing Act of 1920 (Mineral Lands Leasing Act, 1920) and subsequent related legislation, oil, gas, oil shale, phosphate, sulfur (in two states), potassium, sodium, native asphalt, and solid and semisolid bitumen and bituminous rock (such as tar sands) on public lands were made subject to leasing by competitive or noncompetitive bid. The competitive bidding system applied when minerals were known to exist in workable deposits. With respect to oil and gas, the test was whether or not the land sought to be leased was within a "known geologic structure" of a producing oil or gas field.

Under the competitive bidding system, appropriate notice is given and all interested parties are invited to submit bids. Sales of leases are made on the basis of royalty bidding. The highest cash bonus wins the bid. With respect to offshore oil and gas leases, the lump-sum bonus bidding system has generated billions of dollars in federal revenues.

Noncompetitive leases are generally awarded to the first qualified applicant on a first-come, first-served basis except in certain circumstances in which a drawing is used to resolve competing claims. With the exception of oil and gas, exploration permits are issued for leasable minerals on a first-come, first-served basis and carry with them the right to lease minerals once a discovery has been made.

More recently Congress has provided for outright sale of certain minerals. The Materials Act of 1947 (Materials Act, 1947) authorizes sale of common materials, such as sand and gravel, usually by competitive bidding.

Much of the early congressional debate about the most appropriate legal arrangements for development of geothermal resources involved discussion of which of these three systems of mineral-rights acquisition should apply to geothermal resources. As the debate progressed it became increasingly apparent that the three systems were deficient even in the contexts in which they were being applied and needed significant modification prior to application to geothermal resources.

The location-patent and leasing systems *per se* were criticized by the Public Land Law Review Commission in

its final report (U.S. Public Land Law Review Commission, 1970). The Commission recommended substantial modification of the system to provide for better filing procedures for claims; systematic review and granting of exploration permits; limitations on exploration rights; environmental regulation; development and production rights; patents to minerals only; payment of fair market value for the land surface; payment of royalties for minerals; uniform federal requirements for location and maintenance of claims; and elimination of dormant claims.

The system established by the Materials Act, which provided for outright sale of certain materials, was at one time considered by the Department of the Interior to be applicable to geothermal resources. This position was soon reversed and the outright sale of geothermal resources was viewed as inappropriate to the complicated geothermal exploration and development process.

Since neither of these systems seemed applicable, the ultimate choice narrowed to selection of some sort of leasing system for geothermal resources. The most clearly related resources were oil and hydrocarbon gas, so most congressional attention focused on how the leasing system applicable to these resources should be modified to apply to geothermal resources.

Two basic sets of issues faced the Congress in selecting a workable leasing plan. The first related to the deficiencies in the Mineral Leasing Law itself, and the second related to the peculiar nature of geothermal resources. The Public Land Law Review Commission found the mineral leasing system to be inadequate in a number of ways.

The provisions for competitive sale of gas and oil exploration permits and leases were a major area of concern. The law provides that competitive bidding (in the case of oil and gas) need take place only when the area in question is within the known geologic structure of a producing oil or gas field. The Commission wanted to eliminate the purely physical test of a "known geologic structure" in favor of more flexible tests related to past successful production and exploration.

A second set of deficiencies in the leasing system involved granting of exploration permits. The Commission in its report recommended limiting the area covered by exploration lease or permits, specifying the time period for which the exploration right is granted, and establishing performance requirements designed to ensure diligent exploration.

These recommendations were designed to encourage competition and prevent lands from being held for speculation. Oil and gas leases, for example, have only limited performance requirements.

Another recommended modification designed to encourage competitive bidding was the modification of the cash bonus system. The requirement of deposit of a percentage of the cash bonus serves to eliminate small developers without significant capital. The Commission recommended that federal authorities have the discretion to employ a combination of bonus, royalties, and rentals to encourage bidding by smaller firms. It also recommended limitations on administrative discretion, security of tenure, environmental protection, and conservation of the resource itself.

WATER RESOURCES MODEL

In addition to the three major systems of mineral exploitation, there is another possible model: water resource devel-

opment. The elusive nature of the geothermal resource has led some to urge that geothermal resources be regulated as a water resource (Allen, 1972; Brooks, 1966; Olpin, 1968; Idaho Law Review, 1964; Abbott, 1963). The argument is that geothermal energy is found, in nature, in an exploitable form only in association with water in its liquid or gaseous forms.

If geothermal resources in the federal domain are to be treated as water for regulatory purposes, then several unique problems arise. With respect to the eleven arid western states, Congress, in the Desert Land Act (Desert Land Acts) decreed that state water laws would determine rights to use of all surplus unappropriated waters "upon the public lands." This grant of authority to the states was tempered by a major exception. The term "public lands" has a specialized meaning. It refers to lands that have not been reserved or withdrawn by the Federal Government for public purposes. Following a reservation no further rights to water can be obtained under state law which are superior to federal rights (*FPC v. Oregon*, 1955).

If geothermal resources were "water" within the meaning of applicable federal statutes, then prior to federal reservation it would be possible for a private citizen to acquire rights to such "water."

In the early 1960s some persons began to assert claims to geothermal resources on the federal public domain under state water laws. The Department of the Interior resolved these claims in two ways. First, it claimed that the lands in question had previously been "reserved" by President Hoover in 1930 under the authority of the Pickett Act, which governed reservations (Pickett Act, 1930) and under the Mineral and Hot Springs Act of 1925 (Mineral and Medicinal Springs Act of 1925) which governed leasing of hot springs. Second, it proceeded to execute extensive withdrawals of potential geothermal lands and resources from public acquisition. The reliance on President Hoover's reservation is somewhat doubtful since he purported to withdraw "springs" and not untapped heated waters or steam obtainable only by drilling.

GEOTHERMAL STEAM ACT OF 1970

Beginning in the early 1960's Congress attempted to construct a rational leasing scheme for geothermal resources. The early efforts culminated in passage of legislation by the Congress in 1966. The bill was vetoed by President Johnson on November 13, 1966. He found the legislation to be deficient in a number of ways: (1) it gave overly generous "grandfather rights" to early geothermal prospectors; (2) it provided for maximum lease acreages of 51 200 acres, which was too extensive; (3) it provided for royalties only on steam sold or utilized, thereby encouraging waste; (4) it failed to give the government clear authority to readjust lease terms and conditions; (5) it provided for perpetual leases to developers of steam produced in commercial quantities; (6) it gave the developer 20 years to begin production and thereby encouraged holding land for speculative purposes.

The Congress returned to the drafting process and successfully resolved these and other pressing issues. In 1970 President Nixon signed into law the federal Geothermal Steam Act (Geothermal Steam Act of 1970). This Act, which remains on the books in its original form, resolved a number of open questions about geothermal energy development

on federal lands but left some issues unresolved. This section reviews the legislation and some of the issues which require further resolution.

DEFINITION OF GEOTHERMAL RESOURCES

The initial task facing the Congress was to produce an acceptable definition of geothermal resources. As the discussion above reveals, the particular legal regime to be applied to geothermal resources could depend on the definition of the physical character of the resource. Congress defined "geothermal steam and associated resources" to include all products of geothermal activity, including steam, water, gases, brines, heat, and associated energy in geothermal formations; energy from artificially injected fluids was also covered. By-products derived from the above were included in the definition.

By adopting such a broad definition the Congress intended the federal leasing statute to supersede other leasing or mineral exploitation arrangements which might be applicable to geothermal resources. Neither the location-patent nor other mineral leasing systems would, henceforth, apply to geothermal resources.

What the definition did not do, however, is resolve all the questions as to how other aspects of mineral and water law applied to geothermal resources. By not stating explicitly that geothermal resources are either minerals, water, or *sui generis*, Congress left open several issues which from the developer's perspective might better have been resolved.

One such issue concerns mineral reservations by the United States in patents (deeds) issued under the various homestead acts. The definition does not clarify the respective rights of landowners and the United States with respect to geothermal resources under lands patented by the United States subject to mineral reservations. Indeed, Congress, in Section 21(b) of the Act, instructed the Attorney General to institute appropriate proceedings in the courts to test out the scope of such mineral reservations. A suit has been instituted and a lower federal court held that the mineral reservations in the patents did not include geothermal resources (*U.S. v. Union Oil Co. of California*, 1973). This case (and possibly others) will have to proceed through the courts until an "authoritative judicial determination" of the issue is received. In the meantime uncertainty will exist as to who has the rights to geothermal resources on land formerly owned by the United States. The Act does make clear that future patents and land restrictions will include reservations of geothermal resources as well as minerals (Section 23).

A second major uncertainty not definitely resolved by the definition is the degree of applicability of state water laws to geothermal resources on federal lands. Section 23 of the Act states that "rights to develop and utilize geothermal steam and associated resources underlying lands owned by the United States may be acquired solely in accordance with provisions of this Act." This section may be sufficient to overcome an equivocal statement with respect to state water laws in a preceding section. In any event, the Secretary of Interior has undertaken to withdraw lands from the public domain which might contain geothermal resources. Under prior case law this withdrawal should effectively prevent use of state water laws to perfect geothermal rights.

A further possible problem area concerns the rights to locatable minerals lying within the land covered by the

geothermal lease which are not by-products associated with geothermal steam and associated geothermal resources, and hence are subject to acquisition under the mining laws. The geothermal lessee is given no preference to such minerals.

A related set of issues arises with respect to minerals subject to leasing under the general mineral leasing laws. During production of geothermal resources, rights to leasable minerals which constitute a "by-product" belong to the geothermal lessee. When geothermal resource production is no longer commercially feasible, the geothermal lessee may convert his geothermal lease to a mineral lease under the appropriate act. Such leases are subject to such terms and conditions as normally apply to the particular leasable mineral [Section 6(3)]. These provisions do not, however, apply to oil, hydrocarbon gas, and helium.

Lands Available for Leasing

The availability of federal lands for geothermal leases was a subject of continuous debate before the Congress in the hearings associated with the Geothermal Steam Act. Producers and potential developers urged broad availability; persons concerned with conservation and environmental matters argued for restrictions on availability of certain federal lands. The final resolution was to remove from leasing: the National Parks; national recreation areas; fish hatcheries; wildlife refuges; wildlife ranges; game ranges; wildlife management areas; waterfowl production areas; and lands acquired or reserved for the protection and conservation of fish and wildlife that are threatened with extinction. Tribally or individually owned Indian trust or restricted lands, within or without the boundaries of Indian reservations, were also removed by Congress from geothermal leasing [Section 15(c)].

Lands withdrawn or acquired in aid of a function of the Department of Agriculture (such as National Forest lands) can only be leased with consent of the head of that department. Lands subject to Federal Power Commission jurisdiction can only be leased with consent of that commission and subject to conditions concerning its use for power and related purposes.

Competitive and Noncompetitive Bidding

One of the single biggest issues faced by Congress in establishing the geothermal legislation was definition of a competitive bidding system for geothermal resources. Industry representatives argued that competitive leasing would discourage exploration and deny security of tenure to those persons who made investment in the exploration and discovery of geothermal resources. The Department of the Interior argued consistently for a wholly competitive geothermal leasing system. Its representatives opposed any non-competitive leasing system. Congress, in Section 4 of the Act, adopted a bifurcated system which has elements of both competitive and noncompetitive leasing. The key factor in determining whether or not geothermal lands will be leased on a competitive basis is whether or not the lands to be leased are within a "Known Geothermal Resource Area" (KGRA). If the lands are within such an area, they can only be leased to the highest responsible qualified bidder

by competitive bidding. If lands are not within a Known Geothermal Resource Area, the qualified person first making application for the lease is entitled to a lease of such lands without competitive bidding.

The key decisional variable, then, is whether or not lands are within a "Known Geothermal Resource Area." Section 1(e) of the Act defines a KGRA as "one in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary of the Interior, 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."

As adopted, the definition of Known Geothermal Resource Area, unlike the definition of a "known geologic structure" in the oil and gas leasing system, is not purely a question of geology. The net effect of this definition is to push all geothermal leasing toward cooperative bidding. The regulations adopted by the Department of the Interior make clear that competitive bidding is to be preferred. If two or more persons file for the same parcel of land, a competitive interest can be found to exist and competitive bidding will be required. This procedure should be contrasted with the procedures under the oil and gas leasing regulations which indicate that when there is a competitive filing the lessee will be selected by lot.

Since the thrust of the Act and enabling regulations is toward competitive bidding, the net effect may be to discourage "wildcat" exploration. The wildcatter may not be protected if he makes a discovery, and some other person, within the same filing period, also files with respect to those lands. (In this case, this land would be classified as a KGRA and competitive bidding would follow.) The premium may be on secrecy, so that a developer can have some security that his investment in exploration will lead to a geothermal lease and not to competitive bidding.

These provisions will undoubtedly discourage small independent companies from the geothermal leasing process, in part because they may not be rewarded for their exploration activities, and in part because the bonus bidding system used to award competitive leases discriminates against small firms which do not have the capital to put up before the award of the lease. The Act itself is silent as to the bidding system which shall be used. It merely provides that lands shall be leased to the highest responsible, qualified bidder by competitive bidding under regulations formulated by the Secretary of Interior. The Secretary subsequently chooses a bonus bidding system.

With respect to the recent geothermal bids in a known geothermal resource in California, the highest amount bid for a single lease was only about \$350 000. The revenues to the federal government through the bonus bidding system appear small when compared to the potential value of development of the geothermal resource. The net result, however, is that the major oil companies were the winning bidders for the largest and potentially most valuable tracts of land in the California KGRA's which were opened up for initial bidding. If these recent bids established a trend, then one would believe that the major energy producers, be they oil companies or others, will tend to dominate the geothermal industry. If one wishes to open up this infant industry to more independent talent, then some change in the bidding system will probably be required.

Conversion Rights

Section 4 of the Act carved out a major exception to the bidding system outlined above. A number of so-called "pioneers" had explored federal lands potentially valuable for geothermal leasing, and had attempted to establish claims under federal mining and leasing statutes. The Department of the Interior consistently opposed the validity of any claim for geothermal resources based on mineral leasing or mining-claim statutes. The department argued that these statutes were limited to minerals specified therein or resources which qualified as minerals. The department argued that geothermal resources did not qualify as minerals within the meaning of the General Mining Act, and, therefore, were not subject to location under that Act.

Congress, however, felt that some consideration should be given to the so-called pioneers, and, therefore, provided that persons holding mineral leases, mining permits or applications, or mining claims, could under certain circumstances convert these leases, permits and claims, or applications for leases and permits, into geothermal leases or applications for such leases, respectively.

Rents and Royalties

Section 5 of the Act provides that there be a royalty of not less than 10 percent nor more than 15 percent of the value or amount of steam or any form of heat or energy derived from production under a geothermal lease and sold or utilized by the lessee or reasonably susceptible to sale or utilization by the lessee. Some industry spokesmen argued that with respect to a resource whose characteristics were unknown that it would be unwise for Congress to establish any fixed royalty or, at least, peg it at a rate so high that the producer could not make a profit. Other industry spokesmen urged Congress to establish a royalty so that the producers would not be subject to the uncertain discretion of the Secretary of the Interior to fix royalties. As the statute presently reads, the royalty applies to the amount or value of steam or other form of heat or energy sold or utilized by the lessee or reasonably susceptible to sale or utilization by the lessee. It should be noted that even if the lessee does not engage in commercial production or sale of geothermal resources, he is still subject to payment of the royalty for any resources which are utilized by him, presumably at the site, or which he reasonably could have utilized or sold. This language removes one of the grounds for the presidential veto of the 1966 bill. The net effect of this provision is to encourage lessees to engage in commercial production and sale, because they will have to pay the royalty whether or not they, in fact, sell the resource. In addition, lessees will have to be very sure that they have customers for their steam.

Section 5(c) of the Act also provides for payment of annual rental for lands leased under the Geothermal Steam Act. The rental is payable in advance at a rate of not less than \$1 per acre or fraction thereof for each year of the lease. If there is no producing well on the land, then the failure to pay the rental on or before the anniversary day terminates the lease by operation of law. The Secretary of the Interior has been given some discretion to continue the lease if payment is deficient, if there is adequate justification for failure to pay on a timely basis. The lessee

may pay, in lieu of rent, a minimum royalty of \$2 per acre, or fraction thereof, at the expiration of each lease year for each producing lease, commencing after the production of geothermal resource in commercial quantities.

The applicable regulations encourage production by continually escalating the rental rate. For the first five years, the lessee can engage in development activities at a fixed rate. Beginning with the sixth year and until commercial production, he must pay rental at an escalating rate. Therefore, it is in his interest to get to commercial production as soon as possible so that the lands themselves will begin to cover the cost of operation and the developer will not be forced to finance them out of pocket.

Lease Term and Renewal

The term of the lease and periods of renewal and discretion to alter terms upon renewal were another series of issues which once again divided industry spokesmen and the Department of the Interior. The Department of the Interior wanted optimum flexibility in terms of lease term and conditions. Predictably, industry spokesmen wanted long fixed term and limited governmental discretionary powers. Section 6(a) of the Act was a compromise. It provides that geothermal leases extend for a primary term of 10 years. If geothermal steam is produced or utilized in commercial quantities within the 10-year period, the lease continues for so long thereafter as geothermal steam is produced and utilized in commercial quantities, but not to exceed an additional 40 years. Establishment of the 10-year and 40-year time periods should permit the developer adequate time to develop the resource and then ensure him some measure of security of investment in those resources.

Area of Geothermal Leases

Of particular concern to geothermal developers, both large companies and independents, was the area which a geothermal lease may embrace. An important related question was the amount of land which could be under the control of any single developer. The major companies argued that geothermal leases should be of large size and that a developer should be able to control hundreds of thousands of acres as under the oil and gas leases. The independents and, also, the Department of the Interior, which was interested in promoting some competition within the geothermal industry, argued that leases should be small, relatively speaking, and that no person or association should be able to monopolize the industry. President Johnson's veto of the earlier version of the Act was based, in part, on the fact that the Act permitted too large an acquisition by a single developer.

The compromise which resulted is embodied in Section 7 of the Act. It provides that a geothermal lease shall embrace a reasonably compact area of not more than 2560 acres, except where there is an irregular subdivision. No individual or corporation, except as otherwise provided in the Act, can hold or control directly or indirectly more than 20 480 acres, including conversion leases. At any time after 15 years from effective date of the Act, the Secretary of the Interior, after public hearing, may increase the maximum holding in any one state to an area not to exceed 51 200 acres.

At this stage of development it is not yet clear whether

these acreage limitations are too large or too small. In a single state, 20 480 acres is a fairly significant holding considering that the producing geothermal leases in The Geysers area of California encompass no more than a few thousand acres. However, until more is known about the nature and location of the resource, and its general availability, it will not be possible to draw a definitive judgment as to whether or not these acreage limitations are too large or too small. It may well be that Congress, by authorizing use of the bonus bidding system, has limited active participation to well-financed energy producers; therefore, the acreage limitation may not be an effective way of encouraging competition.

Readjustment of Lease Terms and Conditions

Of particular concern to industry personnel is the amount of discretion given to the Secretary of the Interior. One area in which there was particular objection to the Secretary's discretion is the readjustment of lease terms and conditions. Industry spokesmen argued that if the Secretary of the Interior were given broad powers to reduce or otherwise adjust the terms and conditions, he would use that power to the detriment of the producers.

This, in turn, would reduce the security of tenure and, therefore, the willingness to make investments. The Secretary of the Interior argued that he needed authority to modify lease conditions as the character of the industry changed and more information was obtained about the exact nature of the geothermal development process.

Section 8(a) of the Act, which was a compromise between these positions, provides that readjustment of lease terms may be done at not less than 10-year intervals beginning 10 years after geothermal steam is produced. The lessee is given the option of filing objections to any proposed lease terms and conditions. If the lessee files objections and an agreement cannot be reached between the authorized officer and the lessee within a period of 60 days, the lease may be terminated by either party subject to provisions of the law.

Compatibility of Multiple Uses of Land

A continuing problem with respect to all mining and mineral leasing statutes is the question of what principles should govern the use of land and resources when multiple uses are possible. Section 17 of the Act adopts the general principle that the Geothermal Steam Act shall allow for coexistence of other leases of the same lands for deposits of minerals under the laws applicable then, for location and production of claims under the mining law, and for other uses of the areas covered by them. The net result of this provision is that there is really no set of priorities established other than that the leases or uses of land shall not unreasonably interfere with each other. This, again, raises the question of administrative discretion, since the Secretary of the Interior, who is responsible for administration of this Act, may find that there is some conflict of uses and subordinate the geothermal development to the development of other resources. This could endanger the lessee's use of the lease premises for geothermal development. It does not give priority to development of geothermal resources, and, therefore, does not offer the lessee complete security in its tenure.

Cooperative or Unit Plan; Drilling Agreements

Section 18 of the Act replaces the law "of capture" with a more rational system of development of geothermal resources in a pool, field, or area where there is more than one lessee or landowner. This section provides that for the purpose of properly conserving the natural resources of any geothermal pool, field or area, or part thereof, lessees and their representatives may unite jointly or separately with others in collectively developing, adopting, and operating under a cooperative or unit plan of development.

The Secretary of the Interior may require compulsory unitization of leases, a key role in determining the investment and production decisions of private parties. Compulsory unitization may result in protection of individual lessees and of the resource pool, but possibly at the expense of delaying the development process, for, now, a bureaucratic chain of decisions may be included in the private investment decision.

Exploration Rights

The federal Act is silent with respect to granting of exploration rights. The Secretary of the Interior, in accordance with his rule-making authority, has established a procedure whereby persons who wish to search for geothermal resources upon the public lands must file a notice of intent to engage in exploration operations. The notice of intent gives the holder the right to engage in nonexclusive exploration for geothermal resources. The explorer gains no preferential rights to geothermal resources or any lease. There are requirements with respect to bonding, environmental maintenance, and the like. The way that the exploration process is presently structured, a person coming upon the public domain does so at his own risk. All expenditures for geothermal exploration may be vitiated either by a prior filing of a noncompetitive lease application by another person or by a declaration by the Secretary of the Interior that the lands explored are within a KGRA and therefore subject to competitive bidding.

The net result of this provision will be to discourage independent exploration of the public domain for geothermal resources. The investor would do so at his own risk. Those persons who wish to protect their investment will first have to obtain a geothermal lease. These procedures should be contrasted with those under state law, where in California, for example, a geothermal explorer can obtain an exploration permit from the State of California for exploration on state land and, therefore, have a preferential right to a geothermal lease if geothermal resources are discovered as a result of the exploration operation.

CONGRESSIONAL ACT OF 1974

Congress, on September 3, 1974, adopted the Geothermal Energy Research, Development and Demonstration Act (P.L. 93-410), which provides for guidance of research and development (R&D) by a Geothermal Energy Coordination and Management Project composed of one presidential appointee and representatives of the National Science Foundation (NSF), Department of the Interior, National Aeronautics and Space Administration (NASA), Atomic Energy Commission (AEC) and Federal Electrification Administration (FEA). The project was assigned "overall

responsibility for the provision of effective management and coordination with respect to a national geothermal energy research, development, and demonstration program" (P.L. 93-410, Section 101). The project is also responsible for administering a loan-guarantee and interest-assistance program. The legislation directs that the project be transferred to a permanent energy R&D agency when one is created. This was done in January 1975, when the Energy Research and Development Administration (ERDA) started operations.

The R&D program is to be carried out through the constituent agencies with the project acting as overall coordinator. Its elements include: comprehensive program definition of an integrated effort and commitment for effectively developing geothermal energy resources; resource inventory and assessment; technical and environmental research and development; information collection and dissemination; scientific and technical education; and pilot and demonstration projects.

The new law contains a very important loan guarantee provision for encouraging geothermal energy resource development. A federal loan guarantee may cover up to 75 percent of the aggregate cost of any program for which it is made. Interest payments may be made by the federal guarantor if the borrower cannot do so and the project is worth continuing. Guarantees are limited to \$25 000 000 for a single project and \$50 000 000 for a single borrower. A Geothermal Resources Development Fund was created for carrying out the loan guarantee and interest assistance program.

P.L. 93-410 also mandates an inventory of geothermal resources and publication of maps, etc. It also encourages development of state geothermal resources clearing houses.

STATE GEOTHERMAL LEASING LAWS

Nine states (Wyoming, California, Arizona, Alaska, Oregon, New Mexico, Utah, Montana, and Idaho) have adopted geothermal laws. Only three of these states (California, Alaska, and New Mexico) have specific geothermal leasing statutes with respect to state lands.

While these statutes are modeled on the federal statutes, they do differ in some respects. California's statute was adopted prior to enactment of the federal law and therefore served as a model for several other states. The statutes are administered by a variety of state agencies—illustrating the uncertainty about the nature of geothermal resources. In California, for example, the supervisor is the State Oil and Gas supervisor. In Arizona, it is the Oil and Gas Conservation Commissioner. In Alaska, it is the Director of the Division of Lands and Department of Natural Resources; in Oregon, the state geologist; in New Mexico, the Commissioner of Public Lands; and in Idaho, the Director of the Idaho Department of Water Administration.

Generally, these statutes are written so as to govern all leasing of state lands for geothermal purposes. All the statutes draw a distinction between competitive and non-competitive bidding lands, and basically parallel the federal statute in this regard.

Definition of Geothermal Resources

The state statutes use differing definitions of geothermal resources. Of particular interest are the Arizona and Oregon statutes which explicitly recognize that geothermal resources

include energy resulting from artificial stimulation or induction of fluids into geothermal formations. Oregon also, perhaps in order to resolve some conflict with its water laws, indicates that geothermal resources include hot waters which have a bottom-hole temperature of more than 250°F. Idaho indicates in its statute that geothermal resources are declared to be *sui generis*, neither a water resource nor a mineral resource, but the legislation goes on to indicate that they are also found and declared to be closely related to and possibly affected by water and mineral resources in many instances. This tag clause appears to leave some uncertainty with respect to the nature of geothermal resources in Idaho.

Definition of Geothermal Resource Area

The nine states which have adopted geothermal statutes have in five cases defined "geothermal resource area" or "Known Geothermal Resource Area." It is interesting that the states which have so defined these areas have used what appears to be, in essence, a physical definition. That is, they refer to surface areas which are underlain or reasonably appear to be underlain by geothermal resources. This definition should be distinguished from the federal statutory definition which indicates that a KGRA is an area which is, in effect, suitable for investment purposes. The use of a purely physical definition removes some discretion from the state administrative officers with respect to classification of lands, and thereby encourages noncompetitive leasing of state lands, whereas the federal statute has the distinct tendency to encourage competitive leasing of lands.

Prospecting Permits

California and Alaska have dealt explicitly with the problem of exploration and prospecting for geothermal resources on lands which are not classified as geothermal resource areas. If the permit is awarded, the prospector has an exclusive three-year period of prospecting which may be extended administratively for an additional two years. This prospecting permit includes a preferential right to lease lands. If while the prospecting permit is still valid and, in effect, the state authorities reclassify lands in a KGRA, the permittee is given a preferential right to lease the lands. Permits are subject to cancellation for nonperformance or failure to use diligence and care in prospecting and development.

State Leasing Provisions

State leasing provisions are very similar to those in the federal law. They do, however, differ in some particulars. For example, in California the primary leasing term is 20 years and renewals of up to 99 years are permitted as long as there is a commercial production of geothermal resources. This should be contrasted with the federal law which has a 10-year primary term and 40-year renewal periods. Alaska has a 10-year primary term and 40-year renewals up to a total of 99 years. New Mexico provides for a 5-year primary term and 5-year renewals thereafter as long as the resources are produced in commercial quantities. The developer would appear to have more security in California than under the federal statute, but more under the federal statute than he would in New Mexico. The rental provisions are similar to the federal law with

roughly \$1 per acre required at a minimum. The royalty provisions differ somewhat. California provides for 10 percent of gross revenue on steam and brine, and between 2 and 10 percent on gross revenue of other resources found in geothermal fluids. This should be contrasted with the federal law which provides for a royalty of from 10 to 15 percent for steam, 5 percent or less on by-products, and 5 percent or less on commercially demineralized water. Alaska provides for royalties of 10 to 15 percent of gross revenue from sales of steam and brine, and 2 to 10 percent of gross revenues of minerals and chemicals sold. Oregon puts the authority for setting royalties in the Division of State Lands and has no statutory maximum or minimum. New Mexico is similar to California and Arizona, but does, however, provide for a royalty of 8 percent of net revenue from energy-producing plants, and 2 to 10 percent of gross revenue for use of lands for recreational purposes. The state statutes also have provisions with respect to termination of leases; suspension; transferability; and waiver, suspension and reduction of rents and royalties which are similar to the federal statute. The state laws have provisions for adjustment of rents and royalties and terms and conditions of the lease which are basically the same as the federal statute, although California does provide for readjustment of terms and conditions after 20 years, whereas the federal statute provides for readjustment of terms and conditions at 10-year intervals beginning 10 years after commercial production.

Protection of Resources and Environment

The state statutes, as well as the federal statute, provide for prevention of waste and safeguarding of life, health, property, and the environment. The terms of conservation and waste prevention provisions are essentially similar to those in the federal statute. California, Alaska, and New Mexico also provide that where land is used for some other state purpose, the state lease requires the consent of the agency which has reserved the land for its own purposes. The state statutes provide that in future leases the state authorities have the right to reserve minerals or geothermal resources in the leasing and selling of state lands. State statutes have provisions for cooperative development and drilling agreements to conserve the resource pool; the emphasis here is on conservation of the resource and protection of the public interest in those resources.

OVERLAPPING REGULATORY JURISDICTIONS

Federal, state, county, and local governments are involved with respect to regulation of private lands, state lands, and federal lands. A problem which is going to plague the geothermal resource industry in years to come is the sorting out of overlapping regulatory jurisdictions with respect to acquisition of rights to geothermal resources, exploration, drilling, development, production, and utilization of those resources.

TAX TREATMENT

The taxation of geothermal resources is a problem which has not yet been resolved. Geothermal developers would like to obtain the favorable tax treatment under both federal and state law which is given to hydrocarbon, oil, and gas

developers. Oil and gas companies may deduct a percentage (currently 22 percent) of their gross income as a depletion allowance. This allowance is not related to the rate at which the resources are being used up; rather, it is in the nature of a subsidy for the producer. The oil and gas people are also entitled to deduct in a single year intangible costs of drilling and developing wells. These intangible drilling and development costs include the cost to operators of any drilling or development work (excluding amounts payable only out of production and amounts properly allowable to cost of depreciable property) done for them by contractors under any form of contract, including "turnkey" contracts. It is to the advantage of the developer to be able to deduct these so-called intangible costs in a single year rather than have to depreciate them over the life of the resource. In 1969 precedent was established in a significant tax case (*U.S. v. Reich*, 1972). The taxpayers in that case had participated in ventures to develop geothermal resources at The Geysers. They had taken the depletion allowance and intangible drilling expense deductions applicable to hydrocarbon oil and gas.

The court was faced with several different questions. First, it had to determine whether the resource was classified as one of the substances for which the depletion allowance was applicable. In practical terms this meant that the resource had to be classified as a "gas." Secondly, the resource could not be one for which a depletion allowance was specifically denied by the Internal Revenue Code, and, third, the resource had to be one which is exhaustible as provided in the Internal Revenue Code regulations.

The opinion of the court dealt largely with the physical nature of the resource. It determined that with respect to The Geysers area the resource existed in the ground as superheated steam and at no time was in a liquid water form. This was an important determination since the Internal Revenue Code explicitly prohibited a depletion allowance for water. The court held that water was intended to have its common meaning of liquid H₂O rather than its chemical meaning of H₂O in all states. The court therefore held that the steam in The Geysers was not water and, secondly, that it was a gas and, therefore, if the third condition were met, entitled to a depletion allowance.

The third condition is that the resource be exhaustible. The argument was made by the U.S. Government that the The Geysers steam reservoir was constantly being replenished by ground water and that the heat of the earth was turning the water into steam, and as long as the heat of the earth remained, the resource was, in essence, inexhaustible. The taxpayers argued that at The Geysers there existed, underground, a steam reservoir which through a slow geologic process had become sealed off and incapable of replenishment. They also argued there was no water in this reservoir so that the steam was being taken from a closed volume and was gradually being depleted. There was evidence as to reduction of pressure of steam at The Geysers offered on behalf of the taxpayers.

The Court agreed with the taxpayers' contention and concluded that with respect to the facts of the situation at The Geysers, that the resource was exhaustible and was a gas, and therefore the developer was entitled to a deduction of 22 percent depletion allowance and was entitled to deduct his intangible drilling costs in a single year rather than amortizing them over the life of the project.

The *Reich* case was limited to its own facts by the Court

of Appeals. That is to say it does not apply generally to all geothermal resource developers. The Court relied heavily on the specific geologic structure of The Geysers area and the fact that it contained a closed volume of steam. The finding would not, for example, apply to an area where there is a wet basin characterized by an active ground-water system. The result of the case has been that developers of geothermal resources in an area other than The Geysers are not certain at this time whether they may, in fact, claim the depletion allowance and deduct their intangible drilling expenses in a single year. Because of the limitation of the case to its own facts, it is anticipated that there will be considerably more litigation with respect to depletion allowance and expense deduction with respect to geothermal resource development, and, second, there will be considerable pressure on Congress to define an appropriate scheme of tax or other subsidy to the infant geothermal resource development industry.

The problem is not limited to the federal tax laws. There are state, business, income, and franchise taxes which also depend upon the characterization of the resource as a gas. These taxes should also be reexamined in light of the economic and institutional necessities for development of the geothermal resource industry and appropriate rules adopted.

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