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The advent of the energy crisis has heightened the interest in geothermal resources as an alternative form of power. Mr. Schlauch and Mr. Worcester examine the existing federal and state laws governing this resource. They review the fundamental aspects of this legal area while showing the inadequacies that exist in the present laws.

GEOHERMAL RESOURCES: A PRIMER FOR THE PRACTITIONER

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INTRODUCTION

AMID the hoopla which surrounded the dramatically high bonus bids on the initial tract of federal oil shale lands offered for competitive leasing in Colorado, most Americans paid scant attention to the \$3.2 million high bonus bid offered for a 2,340 acre federal geothermal lease in northern California.¹ That competitive bidding, however, represents the initial implementation of the Geothermal Steam Act of 1970.² Because of the complexity of modern rule making and need for plenary environmental analysis, the Department of the

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1. Denver Post, January 27, 1974, § B at 32, Col. 1. This bid was submitted by Shell Oil Company for leasing Unit No. 1 at The Geysers KGRA.
2. Pub. L. No. 91-581, 84 Stat. 1566, 30 U.S.C. §§ 1001-25 (1972). Prior to the passage of this Act, geothermal resources on federal lands were neither leasable nor locatable. See *U.S. Code Cong. & Admin. News* 5115, 5128 (1970).

Interior required more than 36 months, in which it produced an approximately 2500-page Environmental Impact Statement and went through the machinations of three major revisions of the leasing regulations,³ to place in operation a geothermal resource leasing system which was patterned largely upon existing federal oil and gas leasing laws.⁴ But then, Americans historically have been slow to develop the potential of geothermal resources. Although a geothermal steam system has been producing power at Larderello, Italy, since 1904, there was no significant use of geothermal resources to generate electrical power in the United States until the late 1950's when The Geysers field in Sonoma County, California, was developed.⁵ Currently, the Pacific Gas and Electric Company operations at The Geysers produces in excess of 300 megawatts of electricity, and it has been estimated that the ultimate capacity of The Geysers field may be as high as 2,000 megawatts.⁶ Although, as of 1970, world-wide exploitation of geothermal resources for power generation was limited to six fields in four countries,⁷ the United States Geological Survey has already classified over 1.8 million acres of lands in Alaska, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah and Washington as potentially valuable for geothermal resource development.⁸

The cumulative thrust of the energy crunch and the implementation of a federal geothermal resource leasing program is that the practitioner is likely to be called upon to

3. 36 Fed. Reg. 13722 (1971); 37 Fed. Reg. 25282 (1972); 38 Fed. Reg. 19748 (1973); 38 Fed. Reg. 35068 (1973).

4. See H.R. Rep. No. 91-1544, 91st Cong., 2d. Sess., *U. S. Code Cong. & Admin. News* 5113, 5117 (1970).

5. See generally O. Olpin, *The Law of Geothermal Resources*, 14 ROCKY MTN. MIN. LAW INST. 123 (1968); L. Grose, *Geothermal Energy: Geology, Exploration and Developments*, 15 COLO. SCHOOL OF MINES MIN. IND. BULL., No. 1, p. 1 (1972).

6. UNITED STATES DEPARTMENT OF THE INTERIOR, 1 FINAL ENVIRONMENTAL STATEMENT FOR THE GEOTHERMAL LEASING PROGRAM, I-3 (1973), hereinafter cited as ENVIRONMENTAL STATEMENT. Although it has been estimated that geothermal resources may supply as much as twenty percent of the electrical generating capacity of the United States by the year 2000, it is generally conceded that geothermal energy will not replace significant amounts of coal, gas, oil, hydroelectric and nuclear energy as a power source for the generation of electricity. *Id.* at I-1, II-9.

7. *Id.* at I-1 to -3.

8. 36 Fed. Reg. 5626 (1971); 36 Fed. Reg. 6118 (1971); 36 Fed. Reg. 6441, 6442 (1971); 36 Fed. Reg. 7319 (1971); 36 Fed. Reg. 7759 (1971); 36 Fed. Reg. 19409 (1971). Leasing of lands within these known geothermal resource areas (KGRA) is by competitive bidding only. See text accompanying notes 63-73, *infra*.

analyze geothermal resource problems with increasing frequency. This primer on the law of geothermal resources is designed to acquaint the practitioner with the mechanisms of exploration for and development of geothermal resources on federal, state and private lands, and to alert him to potential trouble spots he is likely to encounter in representing a landowner, geothermal resources developer or an investor.

GEOTHERMAL RESOURCES:
EVERYONE WANTS SOME, BUT WHAT ARE THEY?

Geothermal energy is derived from the heat energy of the earth's crust, which in turn is the result of radioactive decay, tidal and crust plate motion and primeval heat.⁹ Scientists estimate that there are 2.5 quadrillion calories of recoverable geothermal energy in the United States alone.¹⁰ Unlike traditional power resources such as coal, gas, oil or uranium which require some further process to produce usable energy, geothermal energy (heat) is ready for consumption as produced from the ground, although an additional process is necessary to convert it into electricity. But while this makes geothermal energy a potentially attractive source of relatively clean and inexpensive power, it also mandates that geothermal energy be consumed where it is produced.¹¹

Geothermal systems may be divided into four major categories: vapor-dominated or dry steam systems, hot water systems, geopressured reservoir systems and hot dry rock systems.¹² Each type of system presents unique technical, economic and legal problems, and the nature of the geothermal systems involved must be carefully analyzed in applying administrative regulations or extrapolating administrative or judicial precedent. For example, operators of The Geysers field in California, which is classified as a dry steam system, have been held entitled to a percentage depletion deduction under Section 613 of the Internal Revenue Code of

9. 1 ENVIRONMENTAL STATEMENT, II-10.

10. *Id.* at II-16.

11. Although geothermal resources are currently used for industrial and residential heating, for refrigeration, in manufacturing and processing and as a source of byproduct chemicals, their chief use is in power generation. See 1 ENVIRONMENTAL STATEMENT, II-15.

12. *Id.* at II-10 to -14.

1954 on the basis that they are producing a "gas" from an exhaustible reservoir.¹³ Obviously, this ruling would be of limited value in analyzing the tax consequences of production from a geothermal field which could not be proved to be exhaustible or from a hot water geothermal system.

The Geothermal Steam Act of 1970 defines "geothermal steam and associated geothermal resources"¹⁴ as:

(1) All products of geothermal processes, embracing indigenous steam, hot water and hot brines;

(2) Steam and other gasses, hot water and hot brines resulting from water, gas or other fluids artificially introduced into geothermal formations;

(3) Heat or other associated energy found in geothermal formations; and

(4) Any byproduct derived from them.¹⁵

Thus, the Act's ambit includes not only natural and artificially produced steam and heat transfer systems, but all the earth's heat itself. It is, after all, the energy contained in the heat of the earth which is the ultimate geothermal resource. Oddly enough, however, this simple fact apparently has been overlooked by lawyers and judges attempting to examine geothermal resource problems within the traditional matrices of property, tax and water law.¹⁶ Since ownership

13. *Reich v. Comm'r*, 454 F.2d 1157 (9th Cir. 1972).

14. 30 U.S.C. § 1001(c) (1973). The regulations define "geothermal resources" in language identical to that used in the Act to define "geothermal steam and associated geothermal resources." 43 C.F.R. § 3200.0-5(c) (1973). The geothermal leasing regulations cited herein are published in 38 Fed. Reg. 35068-100 (1973), and are hereafter cited only by Code of Federal Regulations section. Since Title 43 of C.F.R. is revised annually as of October 1 and Title 30 is revised as of July 1, and the geothermal leasing regulations were not published until December 21, 1973, the text of the regulations does not appear in the 1973 revision of C.F.R. Until the 1974 C.F.R. revision is distributed it will be necessary to consult the Federal Register for the text of the geothermal leasing regulations.

15. Byproduct means 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 to warrant extraction and production in and of themselves; and commercially demineralized water. 30 U.S.C. §§ 1001(d), 1008 (1973); 43 C.F.R. § 3200.0-5(d) (1973).

16. *See, e.g., United States v. Union Oil Co.*, Civil No. 72-1866-GBH (N.D. Cal., Oct. 30, 1973), *Notice of appeal filed*, Jan 11, 1974, (whether geothermal resources are reserved "minerals" under the Stock Raising Homestead Act); *Reich v. Commissioner*, 454 F.2d 1157 (9th Cir. 1972) (whether geothermal steam is a "gas" subject to the percentage depletion deduction of the Internal Revenue Code); WYO. STAT. § 41-121(b) (Supp. 1973) ("underground water" defined so as to include "geothermal steam").

rights and tax treatment may often depend upon the characterization of a particular geothermal resource as a gas, a mineral, or water, the seminal point for analysis should be the recognition that the ultimate geothermal resource is energy, and that all associated resources merely comprise an energy transfer system or are by-products. With this reality in mind we should be able to resist the hobgoblin of "foolish consistency,"¹⁷ and adopt a set of jurisprudential rules which classify geothermal resources as "gas" for some purposes, as a "mineral" for others, as "water" for still others, and so on. Only by embracing this type of inconsistency will we achieve results which are consistent with societal goals and with the "intent" of long since dead legislators and individuals whose acts and deeds affect the ownership, development and taxation of geothermal resources today.

Most of the western states have either passed or are now considering legislation concerning geothermal resource development. Such legislation characteristically is patterned upon either the existing oil and gas regulatory scheme¹⁸ or on the existing state water laws.¹⁹ Idaho has taken the commendable step of declaring geothermal resources to be "sui generis, being neither a mineral nor a water resource, but . . . closely related to and possibly affecting and affected by water and minerals resources in many instances."²⁰ Unfortunately, the incisiveness of this definition is not echoed in the remainder of Idaho's Geothermal Resources Act, perhaps on the theory that specific conflicts and questions are best left to the evolutionary process of the common law.

FEDERAL GEOTHERMAL RESOURCES

Because the vast majority of lands now considered potentially valuable for geothermal resource development are federal lands in the western United States,²¹ the Geothermal

17. "A foolish consistency is the hobgoblin of little minds, adored by little statesmen, and philosophers and divines." R. EMERSON, SELF-RELIANCE.

18. *E.g.*, ARIZ. REV. STAT. ANN. § 37-651 to -66 (Supp. 1973).

19. *E.g.*, WYO. STAT. § 41-121(b) (Supp. 1973).

20. IDAHO CODE § 42-4002(c) (Supp. 1973). The Idaho Geothermal Resources Act does not, however, specify the extent to which the State, the mineral rights owner, the water rights owner and/or the surface owner own or is entitled to use the various components of geothermal resources .

21. 1 ENVIRONMENTAL STATEMENT, II-16.

Steam Act of 1970 and its attendant regulations will provide the legal framework in which most geothermal resource exploration and exploitation will occur.

Although the Geothermal Steam Act of 1970 is the conceptual progeny of the federal oil and gas leasing laws, it does not incorporate the general provisions of the Mineral Leasing Act of 1920 as does the Mineral Leasing Act for Acquired Lands of 1947.²² As a result, many of the procedures and safeguards which are provided by statute or regulation in connection with federal mineral leases under either of those two acts are not available to the geothermal resource lessee.²³ In many instances decisions affecting, and regulations under, the Outer Continental Shelf Lands Act²⁴ and other special leasing statutes may provide a more useful analogue than similar decisions or regulations under the general federal mineral leasing acts.

Exploration Activities

Except pursuant to a federal geothermal lease, no one may conduct exploration operations for geothermal resources on public lands²⁵ which involve anything more than "casual use" of the land without first obtaining the approval of the Bureau of Land Management. Such approval, however, is not required for exploration for geothermal resources in national forests, or on other public lands not administered by the BLM.²⁶ "Exploration operations" are defined as any activity which requires physical presence upon public land and which may result in damage to public lands or resources, including geophysical operations, drilling of shallow temperature gradient wells, construction of roads and trails and cross-country transit by vehicle over public lands.²⁷

22. See 30 U.S.C. § 352 (1971).

23. See, e.g., 30 U.S.C. § 184(h) (1971) which protects a *bona fide* purchaser of a federal minerals lease against cancellation of that lease.

24. 43 U.S.C. §§ 1331-43 (1971).

25. Public lands means any lands owned by the United States and administered by the Bureau of Land Management, but does not include retained mineral interests in lands, the title to which has passed from United States ownership. 43 C.F.R. § 3209.0-5(c) (1973).

26. Compare the regulations proposed by the Forest Service for prospecting, discovery, exploration, development, mining and processing operations on National Forest lands under the General Mining Law of 1872. 38 Fed. Reg. 34817-21 (1973).

27. 43 C.F.R. § 3209.0-5(a) (1973). The regulations define "casual use" as activities which do not ordinarily lead to appreciable disturbance or damage to lands, resources or improvements. 43 C.F.R. § 3209.0-5(d) (1973).

In order to obtain BLM approval, a potential explorer must file with the authorized officer for the district in which the lands are located a Notice of Intent, and a \$5,000 bond conditioned upon full compliance with all terms and conditions of the federal geothermal leasing regulations and the Notice of Intent.²⁸ The regulations require the authorized officer to approve or disapprove the Notice of Intent within thirty days after filing, but give that officer unbridled discretion in reaching that decision.²⁹ Thus, the BLM has broad discretion to determine not only the manner in which geothermal resource exploration will be conducted on public land, but whether to allow public land to be explored for geothermal resources in the first place.

This procedure under the geothermal leasing regulations stands in sharp contrast to the self-executing Notice of Intent provisions of the federal oil and gas leasing regulations,³⁰ which do not empower the BLM to approve or disapprove the notice, and thereby delay or deny access to public lands for oil and gas exploration.

Unlike a prospecting permit under the general federal mineral leasing acts, a Notice of Intent carries with it no preference right to a lease.³¹

Leasing Federal Geothermal Resources

Lands Available for Leasing

Pursuant to the Geothermal Steam Act of 1970, the Secretary of the Interior may issue leases for both public domain and acquired lands. Geothermal leases may be issued for withdrawn lands with the consent of the head of the agency for whose benefit the lands were withdrawn.³² Leases for public, acquired and withdrawn lands administered by the Forest Service may be issued only with the prior approval of, and subject to the terms and conditions prescribed by, the Secretary of the Department of Agriculture.³³ Geo-

28. 43 C.F.R. §§ 3209.1-1 and 3209.4-1 (1973).

29. 43 C.F.R. § 3209.1-2 (1973).

30. See 43 C.F.R. § 3045.1-1 (1972).

31. Compare 43 C.F.R. § 3520.1-1 (1973).

32. 43 C.F.R. § 3201.1-2 (1973).

33. 43 C.F.R. § 3201.1-3 (1973).

thermal leases may not be issued for lands administered under the National Park System, presumably including lands within National Monuments,³⁴ for lands within a national recreation area, in a fish hatchery, wildlife refuge or range, game range, wildlife management area or water fowl protection area or for lands on which an application for withdrawal for any of the preceding uses has been made.³⁵ The Act also expressly excludes from its operations all tribally or individually owned Indian trust or restricted lands whether within or without the boundaries of an Indian Reservation.³⁶

Although the geothermal resources of Yellowstone Park are clearly excluded from the ambit of the Geothermal Steam Act of 1970, the application of that Act to wilderness areas seems unclear. The Wilderness Act of 1964³⁷ which established a National Wilderness Preservation System specifies:

Notwithstanding any other provision of this chapter, until midnight, December 31, 1983, all laws pertaining to mineral leasing shall, to the same extent as applicable prior to September 3, 1964, extend to those national forest lands designated by this chapter as "wilderness areas," . . .³⁸

Thus, although the Mineral Leasing Act of 1920 is applicable to wilderness areas created by the 1964 Act, the Geothermal Steam Act of 1970 would seem inapplicable to such areas because of the provision in the 1964 Act that wilderness areas shall be subject to mineral leasing laws "to the same extent as applicable prior to September 3, 1964, . . ." Moreover, The Geothermal Steam Act of 1970 does not authorize leasing of wilderness areas in national parks, wildlife refuges or other areas expressly excluded from the operation of that Act. However, it is at this point axiomatic that a withdrawal of land from "public land" status does affect the applicability of mineral leasing laws.³⁹ As a consequence, it may be argued that the subsequent passage of the Geothermal Steam Act of 1970 without any express prohibition on

34. *But cf.* 30 U.S.C. § 181 (1971) which expressly excludes "national parks and monuments" from the Mineral Leasing Act of 1920.

35. 43 C.F.R. § 3201.1-6 (1973).

36. 30 U.S.C. § 1014(c) (Supp. 1973); 43 C.F.R. § 3202.1-6 (1973).

37. 16 U.S.C. §§ 1131-36 (1970).

38. 16 U.S.C. § 1133(d) (3) (1970).

39. *See Udall v. Tallman*, 380 U.S. 1 (1965).

its applicability to wilderness areas was a manifestation of congressional intent that the Geothermal Steam Act apply to such areas, and to that extent worked a modification of the Wilderness Act of 1964.⁴⁰ In 1967, prior to the passage of any federal geothermal leasing legislation, the Solicitor of the Department of the Interior concluded that such legislation would, unless explicitly restricted, be applicable to wilderness areas.⁴¹ In discussing future legislation creating wilderness areas, the Solicitor advised the Secretary of the Department of the Interior:

I would, however, recommend a specific section which would eliminate the applicability of the geothermal leasing provisions in any bill designating as wilderness any portion of an area of a national park system that is not administered pursuant to the act of August 25, 1916, or is not within a national recreation area, even though it may be argued that the Congressional designation of the area as wilderness and the application of sections 2 and 4 of the Wilderness Act prohibits such leasing activities.⁴²

Notwithstanding this obviously sound advice, statutes subsequent to the Wilderness Act of 1964 which have created wilderness areas have not expressly addressed the applicability of federal mineral leasing laws in general, or the Geothermal Steam Act of 1970 in particular, to those new wilderness areas.⁴³

In any event, to the extent that the initially created wilderness areas and all subsequently created wilderness areas are to be administered pursuant to the Wilderness Act of 1964, those areas will be withdrawn from the operation of the federal mineral leasing laws, presumably including the Geothermal Steam Act of 1970,⁴⁴ as of January 1, 1984:

Subject to valid rights then existing, effective January 1, 1984, the minerals and lands designated by

40. The Sierra Club apparently takes the position that wilderness areas are subject to leasing under the Geothermal Steam Act of 1970, unless within an area expressly excepted from the Act. See 3 Environmental Statement, A-B 43, 113.

41. Solicitor's Memorandum, M-36702, Gower Fed. Svc. (Min.) 50-1967-12.

42. *Id.*, at p. 11.

43. See C. Ragsdale, *Lands Available for Leasing or Similar Disposal of Minerals*, FEDERAL MINERAL LEASING INSTITUTE, 8 & n.28 (Rocky Mtn. Min. Law Found. 1971).

44. See 30 U.S.C. § 530 (Supp. 1973).

this chapter as wilderness areas are withdrawn . . . from disposition under all laws pertaining to mineral leasing and all amendments thereto.⁴⁵

Lessee Qualifications

Federal geothermal leases may be issued to citizens of the United States who have reached the age of majority, to associations of such citizens, to corporations organized under the laws of the United States, the District of Columbia or of any state, and to governmental units.⁴⁶ Whereas citizens of another country may only own an interest in a federal lease issued pursuant to the Mineral Leasing Act of 1920 or the Leasing Act For Acquired Lands of 1947 if their country affords like privileges to citizens of the United States,⁴⁷ there is no similar limitation on indirect foreign ownership in the Geothermal Steam Act of 1970. Thus, aliens and foreign governments may indirectly control federal government geothermal leases through the simple expedient of forming a domestic corporation through which to acquire title.⁴⁸

Acreage Limitations

No person or entity shall take, own, hold or control at any one time, any direct or indirect interest in federal geothermal leases in any one state exceeding 20,480 acres.⁴⁹ The

45. 16 U.S.C. § 1133(d) (3) (1970).

46. 30 U.S.C. § 1015 (1972); 43 C.F.R. § 3202.1 (1973). The Department of the Interior takes the position that under the language of the Act and the regulations, associations of eligible corporations are also qualified to hold federal geothermal leases.

47. See 30 U.S.C. §§ 181, 352 (1971).

48. Compare 43 U.S.C. § 1331 (1971); 43 C.F.R. § 3300.1 (1973). The following is an excerpt from a letter from then Assistant Secretary of the Interior, John A. Carver, Jr. to Mr. De Vaux-Charbonnel, dated March 16, 1964, concerning ownership by aliens of interest in Outer Continental Shelf leases:

. . . Consequently, the French companies to which you refer in your letter may not be issued leases on the Outer Continental Shelf.

However, there is no barrier, imposed by either statute or regulation, to prevent French companies from forming an American corporation which would be qualified to hold a lease on the Outer Continental Shelf under 43 CFR 201.2 [now 43 C.F.R. § 3300.1]. The fact that the French companies holding the stock in the American corporation were wholly owned by the French Government would not disqualify the corporation.

See generally 2 AMERICAN LAW OF MINING § 10.28 (1973).

49. 30 U.S.C. § 1006 (1973). At any time after December 24, 1985, the Secretary of the Department of Interior by regulation issued after public hearings may increase the maximum permissible holding in any one State to an amount not to exceed 51,200 acres. *Id.*

regulations defined "interest" in a lease to include not only a record title, working, or overriding royalty interest and an operating right, but also:

. . . a claim to any prospective or future advantage or benefit from a lease; a participation in any increment, issue, or profit which may be derived, or accrue in any manner from the lease based upon, or pursuant to, any agreement or understanding in existence at the time when the offer is filed⁵⁰

This language is obviously broad enough to encompass options to acquire interests in geothermal leases,⁵¹ and arguably includes general mortgages and other security interests. Thus, an argument could be made that in the typical partnership or joint venture in which one partner or venturer is advancing the capital, that partner is chargeable with 100% of the geothermal lease acreage held by the partnership or venture on the theory that the lease is an asset which secures the capital advance in the event of a default by the noncontributing partner, and therefore the contributing partner has "a claim to . . . [a] prospective of future benefit from . . . [the] lease."⁵²

This acreage restriction is not as limiting as it appears at first blush since both the Act and the regulations provide several mechanisms by which it may be avoided. For example, any lease operated under an approved or prescribed unit or cooperative plan of development or operation is excluded in the calculation of the acreage chargeable to a lessee.⁵³ Similarly, a lease operated under an approved operating, drilling or development contract, other than a communication or drilling agreement, is excluded in determining the accountable acreage of lessees.⁵⁴

A lessee owning an undivided interest in a federal geothermal lease is charged with his proportionate part of the total lease acreage. Similarly, a party owning an interest in

50. 43 C.F.R. § 3200.0-5(f) (1973).

51. *Id.*

52. The acreage involved would probably be charged as against both the optioner and the optionee. *But see* 30 U.S.C. § 184 (d) (1971); 43 C.F.R. § 3100.0-5 (b) (1973).

53. 30 U.S.C. § 1017 (1973); 43 C.F.R. §§ 3201.2(c), 3243.2 (1973).

54. 30 U.S.C. § 1017 (1973); 43 C.F.R. §§ 3201.2(c), 3243.4 (1973).

a corporation, a partnership or association is charged with his proportionate part of that entity's accountable acreage, and the entity is separately charged with its acreage. However, the regulations provide that "no person shall be charged with his pro rata share of any acreage holdings in any association or corporation unless he is the beneficial owner of more than ten per centum of the stock or other instruments of ownership or control of that association or corporation."⁵⁵ Thus, the acreage limitations of the Act could be easily circumvented by forming a series of corporations each one of which was owned equally by ten individuals. Each of these corporations would be limited to 20,480 acres of federal geothermal leases in any one state; however, since none of the stockholders would own more than ten percent of the corporation, none would be individually chargeable with any of the federal geothermal lease acreage held by the corporation.⁵⁶ This nonrecognition of lease acreage in individuals owning less than ten percent of a corporation or association is not based upon a provision of the Geothermal Steam Act of 1970, but appears to have been borrowed from long-standing federal oil and gas leasing practice.⁵⁷

The penalty for exceeding the maximum acreage limitation is severe. The regulations provide that if any person or

55. 43 C.F.R. § 3201.2(b) (1973). Presumably, the same rule of nonattribution applies to corporations which own interests in other corporations or associations which hold federal geothermal leases.

56. *But cf.* 43 C.F.R. § 3201.2(e) (1973). The Department of the Interior has taken the position that the acreage limitations contained in Section 27 of the Mineral Leasing Act of 1920 (30 U.S.C. § 184 (1971)) may not be circumvented by organizing a series of corporations because "the Department will look beyond the corporate form to the purpose of it and to those who are identified with that purpose." *Construction of Section 27 of the Leasing Act, as Amended, with Respect to Corporate Interests*, 52 I.D. 382 (1928). According to the Shepard's United States Administrative Citations, this opinion has never been cited in any reported decision of any agency or court covered by that Shepard citator. *See also* 2 AMERICAN LAW OF MINING § 10.25 (1973).

57. *See* ROCKY MOUNTAIN MINERAL LAW FOUNDATION, LAW OF FEDERAL OIL AND GAS LEASES § 25.12 (1973). Theoretically, under the Mineral Leasing Act of 1920 a stockholder was chargeable for leases held by the corporation in proportion to his stock ownership. However, because of the administrative difficulties inherent in such accounting, the Department of the Interior did not enforce this chargeability requirement. In 1960 the Mineral Leasing Act was amended to specify that no person shall be charged with the federal mineral lease acreage holdings of a corporation unless he is the beneficial owner of more than ten percent of the stock of that corporation. *See* 30 U.S.C. § 184(e) (1) (1971); 43 C.F.R. §§ 3101.1-5(d), 3501.1-4(a) (1972).

entity is deemed to own or control more than the maximum permissible acreage of federal geothermal leases:

. . . the last lease or leases or interest or interests acquired by him which created the excess acreage holding shall be cancelled or forfeited in their entirety even though only part of the acreage in the lease or interests constitutes excess holdings . . .⁵⁸

Obviously, this LIFO cancellation procedure can be a trap for a partner or investor in a geothermal resources enterprise. For example, consider geothermal partnership *C* composed of equal partners *A* and *B*, which wants to acquire federal geothermal leases in State *X*. Assume that partner *A* is chargeable with 17,945.6 acres of federal geothermal leases in State *X* resulting from its ownership of seven leases of 2,560 acres and a one percent overriding royalty interest in another 2,560 acre lease. Partner *B* at this point has no interest in federal geothermal leases in State *X*. Partnership *C* now files applications for two 2,560 acre geothermal leases in State *X*. Pursuant to the regulations both applications will be rejected because either application would cause partner *A* to exceed his acreage limitation.⁵⁹ If, through failure to properly disclose partner *A*'s interests or through administrative inadvertence, leases were issued on the basis of these applications, it is at least arguable that both leases would be subject to cancellation in their entirety under the provisions of the regulations that the "last lease or leases or interest or interests . . . which created the excess acreage holdings shall be cancelled or forfeited in their entirety."⁶⁰ Since the purpose of the regulation presumably was not to make one partner his partner's keeper, the better result would be to cancel the interest of partner *A* in one or both leases and to assign that interest to partner *B*. If the cancelled interest of partner *A* is not assigned to partner *B*, then partner *B* will face either a partition of his leases or a forced partnership with the federal government or a substitute lessee.

58. 43 C.F.R. § 3201.2(d)(2) (1973). If the Director of the Bureau of Land Management is satisfied that the holding or control of the excess acreage was not the result of "negligence or willful intent," the lease or leases which caused the violation shall be canceled only to the extent of the excess acreage.

59. See 43 C.F.R. § 3201.2(d)(3)(ii) (1973).

60. See *Boesche v. Udall*, 373 U.S. 472 (1963); *W. H. Bird*, 72 I.D. 287 (1965).

The danger posed to the potential geothermal partner or investor by the acreage limitation regulations is compounded by the absence of any protection for a bona fide assignee or purchaser of an interest in a federal geothermal lease similar to the protection afforded to a bona fide purchaser or assignee of an interest under a lease issued pursuant to the Mineral Leasing Act of 1920, or the Mineral Leasing Act for Acquired Lands of 1947.⁶¹ For example, assume that in the preceding hypothetical the leases had issued to partnership *C*, thereby causing partner *A* to exceed his acreage limitation. Further assume that partner *A* had sold his interest in partnership *C*, including his undivided $\frac{1}{2}$ interest in the last two leases issued in State *X*, to *D* for valuable consideration, after *D* had made a thorough examination of the records of the appropriate office of the Bureau of Land Management. Such an examination should disclose that *A* was the record owner of seven 2,560-acre leases and the owner of an undivided $\frac{1}{2}$ interest in two 2,560-acre leases in State *X*, aggregating a permissible total of 20,480 chargeable acres. Also assume that *A* has not yet filed a statement disclosing his one percent retained royalty and that this interest is not mentioned in any instrument on file with the BLM. *D*'s examination would not, therefore, reveal *A*'s retained royalty. Thus, after making a diligent search of available public land records and paying valuable consideration, *D* might be faced with an action by the Department of Interior to cancel the last two leases acquired in State *X* to which he could interpose no valid defense. *D* might offer to relinquish the acreage by which *A* exceeded the acreage limitations, but the regulations do not provide for such a curative relinquishment.⁶²

Competitive and Noncompetitive Leasing

The Geothermal Steam Act of 1970 provides that leasing of federal lands for geothermal resource development shall be by competitive bidding if the lands are within any known geothermal resource area (KGRA), and for leasing to the first qualified applicant of lands outside a KGRA.⁶³ The

61. See 30 U.S.C. §§ 184(h), 352 (1971).

62. Cf. 43 C.F.R. § 3244.1 (1973).

63. 30 U.S.C. § 1003 (1973). Similarly, under the laws controlling federal oil and gas leases on public domain and acquired lands, the determination of

legislative history of the Act reveals that the Department of the Interior strongly opposed any noncompetitive leasing of federal geothermal resources.⁶⁴ Although Congress won the battle by passing legislation which provided for both competitive and noncompetitive leasing of federally owned geothermal resources, it has been widely suggested that the Department of the Interior has won the war by promulgating regulations which define a KGRA so expansively that noncompetitive leasing will never occur.⁶⁵ In this regard, it is interesting to review the evolution of the definition of a KGRA through the various revisions of the proposed leasing regulations. When those regulations were first published for comment in 1971, a KGRA was defined in precisely the same language which appeared in the Act:

“Known geothermal resource area” (KGRA) means an area in which the geology, nearby discoveries, competitive interests, or other indicia 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.⁶⁶

However, when the revised regulations were published for comment in 1972, the prudent man approach to the definition of a KGRA had been largely replaced by the criterion of competitive interest. The revised regulations specified:

Existence of a few, usually two or three, geothermal leases on Federal lands, or geothermal development on other than Federal lands, in a potential geothermal resource area within a geothermal resource province . . . will cause that potential resource area to

the boundaries of known geologic structures of producing oil and gas fields is of crucial importance, because this determination controls not only whether leasing shall be competitive or noncompetitive but also such matters as annual rental, the necessity for bonding, and lease extensions. See generally, ROCKY MOUNTAIN MINERAL LAW FOUNDATION, LAW OF FEDERAL OIL AND GAS LEASES § 15.1 (1973). A “known geologic structure” is defined by the pertinent regulations as “the trap in which an accumulation of oil and gas has been discovered by drilling and determined to be productive, the limits of which include all acreage that is presumptively productive.” 43 C.F.R. § 3100.0-5(a) (1973).

64. *U.S. Code Cong. & Admin. News* 5121-28 (1970).

65. See, e.g., 3 Environmental Statement, A-B 11, A-B 21, A-B 65, A-B 70, A-B 121, A-B 129, A-B 133.

66. Compare 30 U.S.C. § 1001(e) (1973) with 36 Fed. Reg. 13722 (1971).

become a KGRA. Absence of such leases or development shall not, however, exclude an area from determination as a KGRA.⁶⁷

Notwithstanding the hue and cry of protest which this expanded definition of a KGRA raised from industry,⁶⁸ the second revision to the proposed leasing regulations published for comment in July of 1973, contained an even more all-encompassing definition of a KGRA. That definition, which appears in the final regulations,⁶⁹ contains a lengthy explanation of the terms "geology," "nearby discoveries" and "competitive interests," which are the statutory criteria for the determination of whether an area is a KGRA. In reviewing the "geology" of an area, the United States Geological Survey, acting for the Secretary, will consider the existence of siliceous sinter and natural geysers, the temperatures of fumaroles, thermal springs and mud volcanoes, the SiO₂ content and Na/K ratio in spring waters, the existence of volcanoes and calders of late Tertiary or Quaternary age, conductive heat flows and geothermal gradients, the porosity and permeability of a potential reservoir, the results of electrical resistivity, magnetic, gravity and airborne infrared geophysical surveys and information obtained through other geophysical methods such as microseismic, seismic ground noise, electromagnetic and telluric surveys, if these methods prove to have significant value as exploration tools.⁷⁰ For the purposes of determining whether an area is a KGRA, a "discovery" is any well deemed to be capable of producing geothermal resources in commercial quantities.⁷¹ Where the geological structure involved is not known, a discovery will be considered "nearby" if it is within five miles of the area under consideration.⁷² In redefining "competitive interests," the Department abandoned the criteria of the existence of geothermal leases in the area in favor of a test based solely

67. 37 Fed. Reg. 25284 (1972).

68. See e.g., § Environmental Statement, C-D-23, C-D-28, C-D-35, C-D-36, C-D-45, C-D-49, C-D-60, C-D-63, C-D-71, C-D-74, C-D-96, C-D-162, C-D-168.

69. 43 C.F.R. § 3200-5(k) (1973).

70. 38 Fed. Reg. 19749 (1973); now 43 C.F.R. § 3200.0-5(k) (1) (1973).

71. 43 C.F.R. § 3200.0-5(k) (2) (1973). The regulations as adopted added the following definition of "commercial quantities": quantities sufficient to provide a return after all variable costs of production have been met. 43 C.F.R. § 3200.0-5(j) (1973).

72. 38 Fed. Reg. 19749 (1973); now 43 C.F.R. § 3200.0-5(k) (2) (1973).

on the existence of overlapping lease applications. The regulations specify that "competitive interest" shall exist in the entire area covered by an application if at least one-half of the lands sought by that application are also covered by any other application filed during the same application filing period. If there is an overlapping of an application by a single subsequent application which involves less than one-half of the land sought by the first application, some of the land subject to the first application may be determined to be within a KGRA, but the entire area covered by that first application will not be deemed a KGRA.⁷³ The language of both the Act and the regulations make it clear that the Secretary is not limited to criteria of geology, nearby discoveries and competitive interest in determining whether an area is within a Known Geothermal Resource Area.

Miscellaneous Considerations

A detailed discussion of bidding procedures and of operations under geothermal leases is beyond the scope of this article. Both bidding procedures for, and operations under, federal geothermal leases are substantially similar to those for other federal mineral leases, particularly oil and gas leases.⁷⁴ However, there are significant differences.

Before a geothermal lease will be issued, the prospective lessee must file a "proposed plan" consisting of a map and a narrative statement.⁷⁵ The map must indicate the topography of the land covered by the application and show drainage patterns, the location of present road, trail and utility systems, proposed road and trail locations, proposed well locations and potential surface disturbance. The narrative statement must set forth the lessee's plan and methods for diligent exploration. In addition, the narrative statement must describe the measures proposed by the lessee to prevent or control fire, soil erosion, pollution of surface and ground water, damage

73. 38 Fed. Reg. 19749-50 (1973); now 43 C.F.R. § 3200.0-5(k) (3) (1973).

74. See generally, J. Haggard, *Federal Agency Procedures in Leasing Non-Petroleum Minerals*, FEDERAL MINERAL LEASING INSTITUTE (Rocky Mtn. Min. Law Found. 1971).

75. 43 C.F.R. §§ 3210.2-1(d), 3220.4 (1973).

to fish and wildlife or other natural resources, air and noise pollution and hazards to public health and safety.⁷⁶

Once a geothermal resource lease has been awarded, a lessee may still not enter upon the leased lands for any purpose other than "casual use" until a "plan of operation" is approved by the appropriate Supervisor.⁷⁷ The plan of operation must specify:

(1) The proposed location of each well, including the layout showing the positioning of mud tanks, reserve pits, cooling towers and pipe racks,

(2) Existing and planned access and lateral roads,

(3) Location and source of water supply and road building material,

(4) Location of camp sites, air strips and other support facilities,

(5) Other areas of potential surface disturbance,

(6) The topographic features of the land and drainage patterns,

(7) Methods for disposing of waste material,

(8) A narrative statement describing measures taken to protect the environment, including the prevention or control of fires, soil erosion, pollution of surface and ground water, damage to fish and wildlife and other natural resources, air and noise pollution, and hazards to public health and safety,

(9) "All other pertinent information or data" which the Supervisor may require,

(10) Provisions for monitoring deemed necessary by the Supervisor to insure compliance with the regulations, and

76. *Id.*

77. 43 C.F.R. § 3203.6 (1973). "Supervisor" means a representative of the Secretary of the Interior, subject to the direction and supervisory authority of the Director, the Chief, Conservation Division, Geological Survey, and the appropriate Regional Conservation Manager, Conservation Division, Geological Survey, authorized and empowered to regulate operations and to perform other duties prescribed in the geothermal leasing regulations, or any subordinate of such representative acting under his direction. 30 C.F.R. § 270.2(c) (1973).

(11) A requirement for the collection of data concerning the existing air and water quality, noise, seismic and land subsidence activities and ecological system of the leased lands covering the period of at least one year prior to the submission of the plan for production.⁷⁸

On February 14, 1974, the Acting Secretary of the Interior created the Geothermal Environmental Advisory Panel,⁷⁹ to advise and assist the Geological Survey, the Bureau of Land Management and other land managing agencies in discharging their responsibilities for environmental protection in connection with federal geothermal leases. Exploration or development plans within the area of operation under leases, and plans or permits for activities outside the area of operations, but which are directly related to operations under geothermal leases, in "any new geological or geographical areas," must be submitted to the Geothermal Environmental Advisory Panel.⁸⁰ The function of the panel is advisory only, and the responsible agency cannot delay action on the plan pending advice from the panel more than 30 days after submission of the plan to the panel, unless expressly requested to do so by the Secretary of the Interior.⁸¹

All geothermal leases will require "diligent exploration" until geothermal resources are produced in commercial quantities, and failure to perform such exploration may result in termination of the lease.⁸² In order to be "diligent," exploration activities must be approved by the Supervisor, and evidence of all expenditures, and the results of, such exploration must be submitted to the Supervisor each year. In addition, subsequent to the fifth year of the primary term of

78. 30 C.F.R. § 270.34 (1973).

79. 39 Fed. Reg. 6748 (1974). The panel will be headquartered in California, and will consist of a chairman appointed by the Director of the Geological Survey and one member appointed by each of the following: Bureau of Land Management, Geological Survey, Bureau of Sport Fisheries and Wildlife, Bureau of Mines, Bureau of Reclamation, Bureau of Indian Affairs, Bureau of Outdoor Recreation, National Park Service and Office of the Solicitor. Heads of other Executive Departments and the Administrator of the Environmental Protection Agency are each authorized to appoint one member to the panel.

80. *Id.*

81. *Id.*

82. 43 C.F.R. § 3203.5 (1973). "Diligent exploration" means exploration operations on, or related to, the leased lands including geochemical surveys, heat flow measurements, core drilling or the drilling of a test well. *Id.*

the lease, in order to qualify as "diligent" exploration, exploration activities must involve expenditures equal to twice the sum of the minimum annual rental and the amount of rental for the year involved in excess of the fifth year's rental, provided that in no event shall the required expenditures exceed twice the rental for the tenth year of the primary term of the lease. Any exploration expenditures in excess of the minimum expenditures required for any given year may be credited, at the lessee's option, against future exploration expenditures needed to qualify under the "diligent exploration" requirements of the lease or against any rental requirement for any year in excess of the fifth year's rental.⁸³ In order to promote prompt development, all geothermal leases will provide that beginning with the sixth year and for each year thereafter until the lease year beginning on or after the production of geothermal resources in commercial quantities, the rental will equal the amount for the preceding year plus an additional rental of \$1.00 per acre.⁸⁴

A federal geothermal resources lease carries with it the right to use for "production, utilization and conservation of geothermal resources" only so much of the surface as is deemed necessary for such purposes.⁸⁵ Moreover, use of any of the leased lands for a power generation plant or a commercial or industrial facility must be authorized by a separate permit or permits.⁸⁶

STATE REGULATION OF GEOTHERMAL RESOURCES

As was pointed out earlier,⁸⁷ state legislation is generally patterned after either the existing oil and gas regulatory scheme or the existing state water laws. However, there are state statutes⁸⁸ and proposed legislation⁸⁹ which treat geo-

83. *Id.*

84. 43 C.F.R. § 3205.3-3 (1973). Upon a showing of "sufficient justification," the authorized officer may waive the payment of all or any portion of the additional rental. *Id.*

85. 43 C.F.R. § 3200.0-8(a) (1973).

86. *Id.*

87. See nn. 18-19, *supra*, and accompanying text.

88. IDAHO CODE §§ 42-4001 *et. seq.* (Supp. 1973).

89. H. B. 1006, 43rd Montana Legislative Assembly (1974).

thermal resources as *sui generis*. Legislation pertaining to geothermal resources was introduced in the 1974 session of at least two state legislatures.⁹⁰

The Arizona legislature placed the regulation of the development of geothermal resources under the jurisdiction of the state's Oil and Gas Conservation Commission in 1972.⁹¹ The Arizona statute defines geothermal resources in terms very similar to those used in the federal act,⁹² adding only the phrase "including any artificial stimulation or induction thereof" to the phrase "heat or other associated energy found in geothermal formations" of the federal definition. The Arizona act replaces the federal definition of byproducts with:

[a]ny 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.⁹³

The Arizona Oil and Gas Conservation Commission is given responsibility for supervision of drilling, operation, maintenance, and abandonment of geothermal resource wells, with the stated purpose of this delegation of authority being the encouragement of the "greatest ultimate economic recovery of geothermal resources," together with prevention of damage and waste to geothermal reservoirs, waters of the state, potential fossil fuel productivity, and the environment generally.⁹⁴ In order to effectuate this scheme, the Commission is given the power to regulate and approve drilling, casing, and transfer of wells, to collect data, to require bonds, and to adopt rules and regulations.⁹⁵ The Commission also has the power to regulate, approve, and, in some cases, order unitization, pooling, or cooperative development of a geothermal area.⁹⁶ There is, however, no provision for leasing of geothermal resources on state lands or for determination of ownership as between surface and mineral owners.

90. *Id.*; H. B. 1165, 49th Colo. General Assembly (1974).

91. ARIZ. REV. STAT. ANN. § 27-651 to 66 (Supp. 1973).

92. See text accompanying n.14, *supra*.

93. ARIZ. REV. STAT. ANN. § 27-651(5) (Supp. 1973).

94. ARIZ. REV. STAT. ANN. § 27-652(A) (Supp. 1973).

95. ARIZ. REV. STAT. ANN. § 27-652 to 62 (Supp. 1973).

96. ARIZ. REV. STAT. ANN. § 27-664 to 66 (Supp. 1973).

Idaho

The Idaho Geothermal Resources Act,⁹⁷ also enacted in 1972, declares:

“Geothermal resource” means the natural heat energy of the earth, the energy, in whatever form, which may be found in any position and at any depth below the surface of the earth present in, resulting from, or created by, or which may be extracted from such natural heat, and all minerals in solution or other products obtained from the material medium of any geothermal resource. Geothermal resources are found and hereby declared to be *sui generis*, being neither a mineral resource nor a water resource, but they are also found and hereby declared to be closely related to and possibly affecting and affected by water and mineral resources in many instances.⁹⁸

Although the Idaho act purports to treat geothermal resources uniquely, the regulation of drilling for these resources is delegated to the Idaho Department of Water Administration,⁹⁹ which is given the power to issue permits for the construction or alteration of geothermal wells or injection wells. In addition, an application to appropriate public waters of the state must be made pursuant to IDAHO CODE § 42-202 (1973) if the construction or operation of the geothermal well will involve the use of water or if it will yield water to be used, for any beneficial purpose, other than as a mineral source, an energy source, or otherwise as a material medium.¹⁰⁰ Apparently, then, water found at depth and used solely as a heat transfer device is not subject to the appropriation permit requirement.

The Idaho act also charges the Department of Water Administration with the responsibility for regulation of the

97. IDAHO CODE §§ 42-001 *et seq.* (Supp. 1973).

98. IDAHO CODE § 42-4002 (c) (Supp. 1973).

99. IDAHO CODE § 42-4003 (b) (Supp. 1973).

100. IDAHO CODE § 43-4003 (b) (Supp. 1973). A “material medium” means any substance, including, but not limited to, naturally heated fluids, brines, associated gases, and steam, in whatever form, found at any depth and in any position below the surface of the earth, which contains or transmits the natural heat energy of the earth, but excluding petroleum, oil, hydrocarbon gas, or other hydrocarbon substances. IDAHO CODE § 42-4002 (e) (1973).

development of geothermal resources in such a manner as to protect the "other resources" of the state from unreasonable degradation or contamination. These "other resources" include subsurface, surface and atmospheric resources and especially ground water aquifers and surface water sources.¹⁰¹ Although this definition does not specifically include formations containing oil and gas or other hydrocarbons, it is broad enough to encompass them. The Department is given the authority to require bonds and to regulate the abandonment and transfer of wells and to require or permit cooperative unit agreements for development of geothermal resources from particular areas within the state. The Department may enact rules and regulations to implement its authority.¹⁰²

1972 also saw the adoption of a geothermal resources leasing act in the state of Idaho.¹⁰³ This Act defines geothermal resources in the same terms as does the Idaho Geothermal Resources Act,¹⁰⁴ and authorizes the State Board of Land Commissioners to adopt rules and regulations to govern the issuance of geothermal resource leases for state lands.¹⁰⁵ The size of individual geothermal resource leases is limited to "one (1) section" of land, but apparently there is no limitation on the number of leases which may be held by one person or entity.¹⁰⁶ Leases may be issued for state lands which are already the subject of grazing, agricultural or other state leases, but the geothermal lessee shall have the paramount right to the use of so much of the surface of the land as shall be necessary for the purposes of his lease.¹⁰⁷ The State Board of Land Commissioners is authorized to fix the manner in which rentals and royalties are to be determined, and a system of competitive bidding may be used.¹⁰⁸ The Board is directed to use whatever system it finds will maximize the public benefits from such leases.¹⁰⁹ A minimum royalty is set at 10% "of the geothermal resources produced from the

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101. IDAHO CODE § 42-4004 (Supp. 1973).
 102. IDAHO CODE §§ 42-4004 to 13 (Supp. 1973).
 103. IDAHO CODE §§ 42-1601 *et. seq.* (Supp. 1973).
 104. IDAHO CODE § 47-1602 (Supp. 1973).
 105. IDAHO CODE § 47-1603 (Supp. 1973).
 106. IDAHO CODE § 47-1604 (Supp. 1973).
 107. IDAHO CODE § 47-1606 (Supp. 1973).
 108. IDAHO CODE § 47-1605 (Supp. 1973).
 109. IDAHO CODE § 47-1605 (Supp. 1973).

lands under lease or the value thereof."¹¹⁰ There is, however, no formula for determining "value" such as is found in the federal leasing regulations.¹¹¹

California

California, in its Geothermal Resources Act of 1967¹¹² has established a leasing system in which permits to explore in areas not classified as "known geothermal resource areas"¹¹³ are granted to the first qualified applicant; the permittee has a preference right for leases in areas which later become so classified if he has done the exploration there. If no one holds a permit to explore in land which is classified as a known geothermal resource area, a competitive bidding system is implemented. The royalty provisions of the California act are more complex than those found in other state acts, calling for a minimum royalty of \$2.00 per acre and a royalty of 10% of the gross revenues, exclusive of charges, for the sale of steam, brines, and other resources from which no minerals have been extracted. In addition, the lessee must pay not less than 2% nor more than 10% of the gross revenues from sales of mineral products or chemical compounds recovered from geothermal fluids. There is also an annual rental requirement of \$1.00 per acre.¹¹⁴ This accounting for the sale of byproducts is somewhat unique in state laws and perhaps reflects the advanced state of the art in California.

Other provisions of California law create a Geothermal Resources Board.¹¹⁵ The Board is an adjunct of the State Oil and Gas Supervisor's office, and has the authority to regulate drilling and to impose requirements for safety, protection of the environment, and the gathering of data, as well as the power to require pooling or unitization where desirable.¹¹⁶ Interestingly, in California the surface owner has the first right to a permit or a lease.¹¹⁷

110. IDAHO CODE § 47-1605 (Supp. 1973).

111. Compare 30 C.F.R. 270.62 (1973).

112. CALIF. PUB. RESOURCES CODE §§ 6902-25 (Cum. 1973).

113. The State Lands Commission shall classify such areas, which shall contain at least one well capable of producing geothermal resources in commercial quantities, independently or upon recommendation of the Geothermal Resources Board. *Id.* CALIF. PUB. RESOURCES CODE § 6912(b) (Cum. 1973).

114. CALIF. PUB. RESOURCES CODE § 6912(b) (Cum. 1973).

115. CALIF. PUB. RESOURCES CODE §§ 3700-76 (Cum. 1973).

116. CALIF. PUB. RESOURCES CODE §§ 3700-76 (Cum. 1973).

117. CALIF. PUB. RESOURCES CODE § 6922 (Cum. 1973).

Oregon

The State of Oregon has placed control of geothermal resources under the Department of Geology and Mineral Industries,¹¹⁸ and has given that Department, acting through the Division of State Lands, the power to fix royalties for any geothermal resources removed from state lands and to impose casing, abandonment, and other safety rules and regulations. The Department also has the authority to approve, but not require cooperative agreements.¹¹⁹ There is no determination of rights as between surface and mineral owners in the Oregon act.

Wyoming

Wyoming has taken a different approach to the control of geothermal resources. It has not adopted separate legislation regulating geothermal resources, but has included "geothermal steam" in the definition of "underground water" found in the Wyoming Ground Water Act.¹²⁰ Section 20 of Chapter 2 of proposed Wyoming State Engineer's Office Manual of Rules and Regulations, makes the following statement:

Geothermal Steam and Hot Water. Geothermal steam and hot water are considered ground water for the purpose of administration. A permit to appropriate ground water must be obtained from the Wyoming State Engineer to explore for or before geothermal steam or hot water can be utilized. Anyone contemplating the development of geothermal steam or hot water should contact the State Engineer's Office for additional information.

Correspondence with the State Engineer's Office indicates that "[t]he procedural aspects of filing for geothermal resources [development] will be handled on an individual basis and will depend to a great extent on whether geothermal steam or hot water is to be developed."¹²¹ Although this scheme has the advantage of putting geothermal resources

118. ORE. REV. STAT. § 522.010 *et seq.* (1971).

119. ORE. REV. STAT. § 522.410-50 (1971).

120. WYO. STAT. § 41-121(b) (Supp. 1973).

121. Letter from Richard G. Stockdale, Ground Water Geologist, Wyoming State Engineer's Office, February 15, 1974.

within an existing framework, and will probably work satisfactorily for the protection of the surface and subsurface regimen, such subjects as the disposal of nonmineral byproducts and ownership of the resources themselves are not discussed. Underground water is the property of the state,¹²² but no provision is made for payment to the state for use of this resource in the development of energy. Again, this appears to be the result of tradition-steeped thinking of geothermal resources in terms of substances rather than terms of energy in its pure form. Likewise, exploration for or leasing of the resources that occur on state lands is not addressed by this scheme, nor is the issue of the right to develop the resource as between surface and mineral owners.

Colorado

Legislation introduced in Colorado places control of geothermal resources under the state's Oil and Gas Conservation Commission "because of the similarity in development of oil and gas and geothermal resources."¹²³ The Commission would have the authority to issue or deny permits for geothermal exploration or development, to establish drilling units and to require pooling of interests. This delegation includes the power to impose requirements for protection of the surface as well as for protection of underground aquifers and other formations.

The proposed Colorado legislation grants to the State Board of Land Commissioners the right to lease state lands for purpose of exploring for, producing and developing the geothermal resources thereunder. It provides that "all existing leases on state lands for the development of geothermal resources are hereby validated as though they had been issued pursuant to the authority of this article."¹²⁴ This attempt to ratify a practice which has been going on for some time appears to be unique, and it will be interesting to watch the progress of this section of the proposed legislation.¹²⁵

122. WYO. STAT. § 41-2 (1957).

123. H.B. 1165, 49th Colo. Gen Assembly (1974)

124. *Id.* Section 6.

125. Compare 3 U.S. Code Cong. & Adm. News 5115 (91st Cong. 2d Sess. 1970); the federal position was that leases could not be made without statutory authority.

Another interesting facet of the legislation is that, while it adds geothermal resources to the items which may be reserved in patents and certificates of purchase on state or school lands,¹²⁶ it does not address the question of ownership of geothermal resources as between surface and mineral rights owners.

The proposed legislation, as it was passed by the Colorado House of Representatives, provides that the bill shall not be construed as modifying or amending existing water laws or court decrees with respect to the appropriation of water or the authority of the State Engineer or Ground Water Commission to regulate the use of water wells. Furthermore, permits for exploration or development of geothermal resources are only to be issued after a finding by the State Engineer that the development or exploration will cause no injury to prior vested water rights.¹²⁷ Only last session, the Colorado legislature created a separate system for the administration of waters from deep aquifers which are not tributary to the other waters of the state.¹²⁸ This system is more closely related to the riparian doctrine than to the traditional appropriation doctrine which is a familiar part of the water law of Colorado and other western states. In considering whether to issue a permit for construction of a well in nontributary aquifers, the State Engineer shall consider the minimum useful life of the aquifer to be one hundred years, and shall consider that only the quantity of water underlying the land owned by the applicant, or the owners of the area, by their consent, to be served by the well is unappropriated. The net effect is to limit pumping from these deep aquifers in any given year to 1% of the water stored under the applicable area. Any water derived from geothermal sources would probably fall into this category, and thus production of geothermal resources which can be classified as ground water by the State Engineer will be limited by the Colorado Ground Water Management Act. Of course, if water from other sources were necessary for the development

126. *Id.* Section 5. H.B. 1165, Section 5, 49th Colo. Gen. Assembly, (1974).

127. *Id.*, Section 1. House Journal, Forty-ninth General Assembly, Second Regular Session, 568 (March 8, 1974).

128. S. B. 213, Ch. 441 § 1 [1973] Colo. Sess. Laws 1520, amending COLO. REV. STAT. 1963 by the addition of § 148-18-36(5).

of the geothermal resources, the rights of this water would have to be acquired in accordance with applicable Colorado law.¹²⁹

Montana

Perhaps the most unusual legislation which has been introduced to date on the topic of geothermal resources is House Bill No. 1006, introduced this term in the 43rd Montana Legislative Assembly. Last year, "geothermal water" was included within the definition of "water" as contained in the Montana Water Use Act of 1973.¹³⁰ This year's proposal declares that it is the state's policy to control the production, sale and distribution of energy derived from geothermal resources,¹³¹ and that the control of these activities is an exercise of the police power of the state. Furthermore, no exploration, development, production or distribution of geothermal energy in the state of Montana would be permitted unless accomplished by the Department of Natural Resources and Conservation or carried out under contract made pursuant to the act. District courts are given the power to restrain any person from violation of the act.¹³² The bill would create a Geothermal Energy Council with the power to pass upon the development of geothermal resource facilities if the Department of Natural Resources and Conservation determines, after an inventory of potential sources within the state, that a particular source is capable of producing energy at a competitive cost.

The Council could approve construction of a facility only upon certain specified conditions, which appear to be designed to prevent any development of geothermal resources.¹³³

129. See pp. 360-1, *infra*, for a discussion of the water rights implications of geothermal resources.

130. REV. CODE MONT. § 89-867(1) (Supp. 1973).

131. A term not defined in the Bill.

132. H.B. 1006, 43rd Montana Legislative Assembly (1974).

133. The council may approve the construction of a facility only if:

(a) The facility will reduce the necessity for the construction in Montana of a facility, which produces the same energy form but which has a greater environmental impact;

(b) The facility will produce energy at a cost to the consumer which is the same or less than energy supplies from other sources; and

(c) The facility can be constructed with a minimal impact on the ecological and social community adjacent to the proposed building site. *Id.*, Section 5(3).

Although the bill empowers the Department to acquire lands necessary for the purposes stated therein, by condemnation or otherwise, it makes no provision for compensation of the geothermal resource owner, nor does it make any determination of the title to geothermal resources. That is, it does not specify whether the resources are the property of the state, or whether they belong to the surface, mineral or water rights owners and therefore must be condemned. Likewise, the bill does not specify the action to be taken with regard to holders of federal geothermal leases, but a literal reading indicates that such a lessee could not explore or develop pursuant to his lease from the federal government. Query whether a federal leasehold interest is condemnable by the state or whether denial of the right to explore or develop under such a lease is inverse condemnation. The bill would establish priorities and preferences for distribution of power produced as a result of geothermal resource development and establish preferences in the rate structure for domestic and small business consumers within the State of Montana.¹³⁴ Although this bill died in Committee,¹³⁵ it presented a myriad of problems including: the extent of police power and eminent domain, federal-state comity, and federal supremacy and pre-emption and is significant in that it represents a very parochial attitude and one which could cause a great deal of difficulty for a potential developer of geothermal resources in the state of Montana.

New Mexico

New Mexico adopted a "Geothermal Resource Act" in 1967,¹³⁶ which gives the Commissioner of Public Lands the power to lease state lands for geothermal resource development.¹³⁷ The Commissioner shall classify as "known geothermal resources fields" those areas which he has, with the consultation of the Director of the Bureau of Mines and mineral resources, "determined may be capable of producing

134. *Id.* Sections 9 and 10.

135. Telephonic conversation with clerk in the Montana Legislative Information Office, March 7, 1974.

136. N. M. STAT. ANN. §§ 7-15-1 to 28 (Supp. 1973).

137. N. M. STAT. ANN. § 7-15-5 (Supp. 1973).

geothermal resources in commercial quantities,¹³⁸ and lands in those areas will be leased on a competitive bidding system.¹³⁹ Provision is made for use of the surface as necessary,¹⁴⁰ with a bond required for protection of the surface.¹⁴¹ There is also a grandfather clause giving a preference right to holders of general mining leases from the state if those lessees can show that the lease was applied for or issued for geothermal resource development purposes.¹⁴² The act contains no determination of rights between surface, water rights and mineral owners.

Utah

The Utah Division of Water Rights has been given jurisdiction and authority to insure the safe operation of, and maximum economic recovery from, geothermal wells in the state.¹⁴³ In addition to this, the State Land Board has adopted a rule providing for the leasing of geothermal resources contained in or under the lands of the state.¹⁴⁴ These leases will be issued only when the state owns both the surface and mineral rights for the lands involved. The state lessee has a prior right to a separate mineral lease for minerals of possible recoverable value found in formations intercepted by mining or drilling operations in connection with geothermal production.¹⁴⁵

Alaska

In 1971, the state of Alaska adopted a geothermal resources leasing act¹⁴⁶ which provides for the leasing of geothermal resources on lands owned by the state. The Commissioner of the Department of Natural Resources is given authority to issue prospecting permits and leases and to adopt rules and regulations providing for operations conducted under these leases. The Alaska statute embodies a "known geo-

138. N. M. STAT. ANN. § 7-15-6 (Supp. 1973).

139. N. M. STAT. ANN. §§ 7-15-6 (Supp. 1973).

140. N. M. STAT. ANN. §§ 7-15-17 (Supp. 1973).

141. N. M. STAT. ANN. §§ 7-15-18 (Supp. 1973).

142. N. M. STAT. ANN. § 7-15-320 (Supp. 1973).

143. UTAH CODE ANN. § 73-1-20 (Supp. 1973).

144. Rule 30, Rules and Regulations of the Utah State Land Board Governing the Issuance of Mineral Leases (as amended to June 19, 1973).

145. *Id.*

146. ALASKA STAT. § 38.05.181 (1971).

thermal resources area" concept, as to which leasing will be competitive,¹⁴⁷ and provides for a minimum lease acreage of 640 acres and a maximum of 2,560 acres, with total holdings by any one person not to exceed 25,600 acres.¹⁴⁸ Royalties are to be set at not less than 10% nor more than 15% of the gross revenues exclusive of charges received from the sale of geothermal steam, with separate royalties to be paid on revenues from sale of byproducts.¹⁴⁹

OWNERSHIP OF GEOTHERMAL RESOURCES

If it is proper, as suggested earlier, to regard the resource primarily as "energy" rather than as a "substance," then perhaps it is wrong to make reference to "ownership" of the resource. It might be better, instead, to ask who has the right to use the resource without payment to others. To date, however, traditional ownership doctrines and analysis have been used to determine who has the right to produce geothermal resources. In *United States v. Union Oil Co.*,¹⁵⁰ the question raised was whether geothermal resources are reserved "minerals" under the Stock Raising Homestead Act.¹⁵¹ The suit was brought by the United States to quiet title to geothermal resources in Sonoma County, California, pursuant to § 21(b) of the Geothermal Steam Act of 1970.¹⁵² This section requires that, on the report of the Secretary of the Interior that development of geothermal resources in a particular area is imminent, the Attorney General must institute such an action, "Provided, that upon an authoritative judicial determination that Federal mineral reservation does not include geothermal steam and associated resources" the obligation ceases.¹⁵³ In granting the defendants' motion to dismiss for failure to state a claim upon which relief could be granted, the court considered the reservation in the Stock Raising Homestead Act, together with that Act's legislative history, and determined that Congress did not intend to re-

147. ALASKA STAT. § 38.05.181(h) (1971).

148. ALASKA STAT. § 38.05.181(j) (1971).

149. ALASKA STAT. § 38.05.181(k) (1971).

150. 369 F. Supp. 1289 (N.D. Cal. 1973), notice of appeal filed Jan. 11, 1974.

151. 43 U.S.C. § 299 (1971).

152. 30 U.S.C. § 1020(b) (1970).

153. 30 U.S.C. § 1020(b) (1970).

serve geothermal steam and associated resources from lands patented thereunder, "because such fluids would not have come within the definition of 'minerals' in force and usage at that time."¹⁵⁴ The court noted that the legislative history of the Stock Raising Homestead Act includes no references to geothermal phenomena and that the government's argument that the main constituent of geothermal energy, namely superheated water, was a "mineral" within the contemplation of Congress and the meaning of the mineral reservation in the Act "will not hold water." Citing authorities contemporaneous with the passage of the Stock Raising Homestead Act,¹⁵⁵ and the United States Geological Survey's annual *Mineral Resources of the United States*, listings of both metals and non-metals for the years 1913, 1914 and 1916, the court pointed out that neither of those definitions nor listings of minerals had included water. This is followed by an analysis of current authority which supports the same view.¹⁵⁶ Finally, the court pointed out that since 1961 the Department of the Interior had held and disseminated the opinion that geothermal steam and the associated resources are not minerals,¹⁵⁷ and that in 1965 the Office of the Solicitor had

expressed the view in two opinion letters that geothermal steam is merely super-heated water, that water has not been treated as a mineral in public land laws, and that as a result mineral reservations under the Act do not include geothermal steam.¹⁵⁸

One of the opinion letters, the court pointed out, referred to land owned by defendants in the *Union Oil* case.

In the *Union Oil* case, the court followed the lead of the Department of the Interior and categorized the resources as water, or steam. While this approach is appropriate for a dry steam field such as The Geysers, it fails to come to grips with the real issue, which is a definition of the resource in terms

154. 369 F.Supp. at 1293.

155. A. RICKETTS, RICKETTS ON MINES § 99 (1911); 1 C. LINDLEY, LINDLEY ON MINES § 93 (3d Ed. 1914); 3 C. LINDLEY, LINDLEY ON MINES §§ 2740-41 (3d Ed. 1914).

156. See, e.g., Mack Oil Co. v. Laurence, 389 P.2d 955, 461 (Okla. 1964); Fleming Foundation v. Texaco, 337 S.W.2d 846, 850 (Tex. 1960); 1 H. WILLIAMS & C. MEYERS, OIL & GAS LAW § 219.6 (1973).

157. 369 F. Supp. at 1298.

158. 3 U.S. Code Cong. & Adm News 5126-28 (91st Cong., 2d Sess., 1970).

of energy per se. The result is a rational one though, for if the reservation does not apply to water, or steam, it certainly does not apply to the energy itself.

Obviously, the resolution of disputes concerning the ownership of, or right to develop, geothermal resources between private parties under circumstances in which there has been a severance of the mineral estate, or some part thereof, from the surface will involve many of the same considerations present in the *Union Oil* case. Since many mineral estate severances employ the words, "oil, gas and other minerals," the owner of the mineral estate will be able to claim that geothermal resources are a "mineral," as well as a "gas." A detailed discussion of ownership and development rights in geothermal resources is beyond the scope of this article. However, the careful draftsman will specifically include or exclude geothermal resources as appropriate in deeds, leases and other documents affecting real property.

If the surface owner, rather than the mineral estate owner, is deemed entitled to the geothermal resources underlying the land, complex questions concerning whether one or both of these owners has the right to produce byproduct minerals, under what circumstances and with what accountability will be presented. Clearly, the geothermal resource developer should attempt to acquire all possible water and mineral rights in the land in which he is interested. Moreover, until the questions of ownership and right to develop geothermal resources are definitively resolved, the prudent geothermal resource developer will acquire both surface and mineral estate rights wherever possible.

Another context in which characterization of the resource becomes important involves the right to use the surface in exploration for and development of geothermal resources. Traditionally, when the surface and mineral estates have been severed, the mineral estate has been considered to be dominant and the owner thereof has had the right of reasonable access to his mineral interest, subject to an obligation to compensate the surface owner for damages.¹⁵⁹ Although this right has recently undergone some scrutiny, particularly with

159. See, e.g., 30 U.S.C. §§ 81, 85 (1971); 43 U.S.C. § 300 (1971).

reference to strip mining,¹⁶⁰ it would seem to survive insofar as the operations involve drilling which would not be destructive of the entire surface. Will this right apply to exploration and development of geothermal resources? It has been said that "the concept of mineral-estate dominance had its basis in the ownership of the minerals by the English sovereign, and it was reinforced by economic pressures arising from the nation's need for minerals."¹⁶¹ If this policy is also based upon the underlying philosophy that minerals are where you find them, and if geothermal resources are not considered to be minerals, then this dominance may not obtain. This position is bolstered by the argument that geothermal energy is derived from the heat of the earth's crust, which is present everywhere. On the other hand, geothermal energy is more accessible in certain locations due to faults, fractures, and the like so that the energy might be much more economically recoverable in one location than in another. Current technology does not permit the recovery of geothermal resources from most points on the earth's surface. In the long run, rights to use or consume the surface will probably depend upon the exact relationship between the parties involved and possibly the language used to memorialize that relationship. Resolving surface use questions rising from severances which do not make specific reference to geothermal resources will require the determination of phantom intent.

WATER RIGHTS IMPLICATIONS

Depending upon the characterization which has been given to geothermal resources, their extraction may be viewed as an appropriation of water rights. Whether this characterization should be given to the resource should depend upon the nature of the particular system involved.¹⁶² That is, if the system is actually withdrawing water, either in the liquid form or in the form of wet steam, from a geologic formation,

160. See *Smith v. Moore*, 172 Colo. 440, 474 P.2d 794 (1970).

161. Hughey, *Severance of the Minerals and the Severity of the Attendant Problems*, WESTERN COAL DEVELOPMENT INSTITUTE 4-1 (Rocky Mtn. Min. Law Found. 1973).

162. See n.13, *supra* and accompanying text for a discussion of the various types of systems. A hot dry rock system is suspected to exist near Marysville, Montana. Environmental Statement, II-13.

it should be treated as an appropriation. If, on the other hand, it is a hot dry rock system which requires injection of water in order to utilize the energy, the system itself should not be viewed as an appropriation, but that water which is injected would be derived from another source, necessitating an appropriation for that purpose.¹⁶³ Even if the particular system under consideration involves the appropriation of water as part of the extraction of the energy, as opposed to injection of water appropriated from another source, that water will probably be considered non-tributary or developed water. Developed water has been defined as "that water which has been added to the supply of a natural stream and which never would have come into the stream had it not been for the efforts of the party producing it."¹⁶⁴ This water is accorded special treatment under the appropriation doctrine and the appropriator is given a free rein as to the use of such water. That is, he may use, reuse, cease to use, or make any disposition he pleases of the water, on the theory that no other appropriator will be harmed thereby since, but for the efforts of the appropriator, this water would not have been available. On this theory, the water derived from a geothermal resource would not be subject to the same controls as would tributary water, but the producer of such water must be prepared to overcome the characteristic presumption that the water is tributary, and to prove the non-tributary nature of the water.

FEDERAL INCOME TAX CONSIDERATIONS

Notwithstanding a now-significant history of production of geothermal resources at The Geysers, and increased exploration activity for geothermal resources generally, neither the Internal Revenue Code nor the pertinent regulations contain any express provisions relating to the tax consequences of geothermal resource exploration or production. This article will consider only two areas of income tax concern: (a) depletion allowance, and (b) intangible drilling costs.

163. *Stevens v. Oakdale Irr. Dist.*, 13 Cal. 2d 343, 90 P.2d 58 (1939); *Denver v. Fulton Irr. Ditch Co.*, 506 P.2d 144 (1972); *Comrie v. Sweet*, 75 Colo. 199, 225 P. 214 (1924).

164. *Id.* *But cf.* nn. 128-29, *supra*, and accompanying text.

Section 611 of the Internal Revenue Code specifies: In the case of mines, oil and gas wells, other natural deposits, and timber there shall be allowed as a deduction in computing taxable income a reasonable allowance for depletion . . . according to the peculiar conditions in each case¹⁶⁵

The Code further specifies that in the case of certain specified "mines, wells and other natural deposits," the allowance for depletion under Section 611 shall be a specified percentage of gross income from the property.¹⁶⁶ The applicable percentage depletion allowance for "oil and gas wells" is now 22%.¹⁶⁷

Commencing in 1954 the Internal Revenue Code expressly afforded an operator the option of expensing or capitalizing intangible drilling and development costs for "oil and gas wells."¹⁶⁸ The phrase "intangible drilling and development costs" generally includes all expenditures for the drilling of wells and for the preparation of wells for production, which in themselves do not have a salvage value. For example, expenses for labor, fuel, repairs, hauling and supplies used in the drilling, shooting or cleaning of wells, in ground clearing, site draining, road making, surveying, and in the construction of derricks, tanks, and pipelines are all within the ambit of intangible drilling and development costs.¹⁶⁹

Thus, in order to be eligible for the percentage depletion deduction and the option of expensing intangible drilling and development costs, a taxpayer must establish that the natural resource involved is a "gas."

In *Reich v. Commissioner*,¹⁷⁰ a case involving production from the The Geysers field, both the Ninth Circuit and the

165. INT. REV. CODE OF 1954, § 611(a).

166. INT. REV. CODE OF 1954, § 613(a).

167. INT. REV. CODE OF 1954, § 613(b)(1).

168. INT. REV. CODE OF 1954, § 263(c). The regulations define "an operator" as one who holds a working or operating interest in any tract or parcel of land either as a fee owner or under a lease or any other form of contract granting working or operating rights. Treas. Reg. § 1.612-4(a) (1965).

169. Treas. Reg. § 1.612-4(a) (1965). Intangible drilling costs which are capitalized are returnable through either depletion or depreciation. Treas. Reg. § 1.612-4(b) (1965).

170. 454 F.2d 1157 (9th Cir. 1972), *aff'g*, 52 T.C. 700 (1969) and George D. Rowan, T.C. Memo 1969-160, 28 T.C.M. 797 (1969).

Tax Court were persuaded that the natural resource involved was steam, which in turn was a "gas" within the meaning of Sections 263(c) and 613(b) of the Internal Revenue Code. Those courts were also persuaded that The Geysers consists of exhaustible steam reservoirs which have been in the past and are now depleting. Even a cursory examination of the opinions of those courts, however, reveals that the *Reich* case is virtually without value as precedent outside of The Geysers field. Moreover, the *Reich* decisions make it clear that a taxpayer must discharge a heavy evidentiary burden in order to claim the fruits of intangible drilling cost expensing and percentage depletion deduction.

The primary factual disputes in the *Reich* case were the nature and exhaustibility of the natural resource involved. Not surprisingly, the Commissioner took the position that the real product of the wells at The Geysers was "the internal heat of the earth," and not the steam produced by the wells.¹⁷¹ In the alternative, the Commissioner contended that steam is not a "gas" within the meaning of the relevant sections of the Code, and that even if it were so viewed, The Geysers is an inexhaustible resource, and hence not subject to depletion. After a lengthy analysis of the geology of The Geysers, Judge Fay writing for the Tax Court rejected each of the Commissioner's contentions. Significantly, in the five pages of his opinion devoted to the geology and production history of The Geysers, Judge Fay concluded:

While the earth thus contains an enormous supply of heat at depth, this supply is inaccessible and cannot be utilized from the surface.

* * *

The heat source at The Geysers consists of . . . a body of magma which penetrated close to the surface of the earth and then commenced to freeze The water contained in the zone of fractured rock is meteoric in origin. The steam zones at The Geysers are physically separated from the magma below, from the surrounding areas containing ground water under normal hydrostatic pressure, and from the surface of the earth by impermeable zones

171. 52 T.C. at 709.

The isolation of the central area by a zone of impermeable rock has resulted in the formation of a sealed off, isolated, irregularly shaped reservoir of steam with relatively uniform internal pressures differing significantly from the hydrostatic pressures of the normal ground water environment outside the reservoir.¹⁷²

Judge Fay also concluded that from 1957 to 1967 there was a decline in static pressure at the Big Geysers area of approximately 50 pounds per square inch.¹⁷³ Moreover, there was evidence that in the 32-year period from 1926 until 1957 there had been a drop in pressure in the Big Geysers of at least 20 pounds per square inch. Based on this data, Judge Fay concluded:

The application of a general heat, material, and volumetric balance formula indicates there can be neither significant water present in the steam reservoir, nor liquid recharge, and that *the reservoir is essentially a closed volume of steam.*¹⁷⁴

Electricity is produced at The Geysers through the use of turbine generators "which are activated by the impulse of steam against the series of curved blades on a central rotating spindle."¹⁷⁵ The steam which drives these turbines comes through a pipeline directly from the wells. However, payment to the steam producer is based upon the amount of electricity generated rather than the amount of steam produced.

Given the foregoing geology and method of power generation, Judge Fay had no difficulty in concluding that the commercial product of the wells at The Geysers is steam and not heat.

For purposes of the commercial enterprise at The Geysers, steam is much more than heat and water. It is heat and water combined in a way that results in tremendous pressure. And it is the pressure of the steam which drives the turbines. Heat alone would not drive them. It follows that the commercial

172. *Id.* at 704-05.

173. *Id.* at 706. The Geysers field consists of four areas commonly known as Big Geysers, Little Geysers, Sulphur Bank and Happy Jack.

174. *Id.* at 707 (Emphasis added).

175. *Id.* at 703.

product of the wells at The Geysers is steam, not heat.¹⁷⁶

But does that conclusion really follow or does it merely beg the question? It is clear that at The Geysers, steam is the vehicle or medium through which the heat energy of the earth is converted into electrical energy. Thus, it seems reasonable to conclude that the current commercial product of The Geysers is indigenous steam. This also would be the appropriate conclusion even if some heat transfer system were interposed between the indigenous steam and the turbine, for example in a system which contains corrosive material or obnoxious gases in combination with the steam. However, the conclusion that steam is the commercial product of any geothermal field, including The Geysers, seems questionable if that field is subject to recharge by artificial injection of fluids or if the potential exists for the extraction of the heat of the reservoir by some other means.

The remaining issues in the *Reich* case, albeit conceptually more pedestrian, will afford the Commissioner ample opportunity to oppose any taxpayer who claims a percentage depletion deduction or the right to expense intangible drilling costs for geothermal resources. Although the Commissioner argued in *Reich* that because steam condensed to water at ordinary room temperature and pressures it was not a "gas," the Tax Court concluded that steam was a gas in the "ordinary commercial usage"¹⁷⁷ of that term. For the purposes of this case, the Commissioner conceded that the term "gas" as used in § 263(c) and 613(b) of the Internal Revenue Code is not limited to hydrocarbonaceous products. Of course, there is no guarantee that the Commissioner would so stipulate in the future.

The final issue resolved in the *Reich* case was whether The Geysers is an exhaustible natural resource. Based on extensive, although conflicting, expert testimony, the tax court ruled that the field was exhaustible, and was in fact depleting. As complex as was this issue in this case, the courts nonetheless had the benefit of pressure measurements

176. *Id.* at 709.

177. *Id.* at 710.

made over a period of 42 years. It seems unlikely that such a wealth of historical data will be available to the courts faced with similar questions in the future.¹⁷⁸

Taxpayers involved in production of geothermal resources from fields which are not vapor-dominated, or which do not use the resource directly, *i.e.*, which use some heat transfer mechanism, can take some comfort in *United States v. Shurbet*.¹⁷⁹ In the *Shurbet* case the taxpayers had claimed the right to deduct cost depletion for the exhaustion of the underground water supply which they used for irrigation. The court concluded that the pumping of water from the aquifer involved had upset the previous state of dynamic equilibrium and caused a measurable depletion in the water reserves. Commenting on the function of the depletion deduction, the Fifth Circuit said:

As we read the legislative history [of the cost depletion provisions of the Code], it means no more than that Congress intended depletion as a means of allowing an annual deduction to represent the capital exhausted in the taxpayer's business operations. In cost depletion, we do not agree with the government that "natural deposits" have been equated to "mineral deposits" from which income is derived through severance and sale of the mineral. The language of the cost depletion provisions, sections 611 and 612 of the Internal Revenue Code of 1954, do not convey any such meaning, and it seems to us inconsistent with the purpose and rationale of cost depletion.¹⁸⁰

Although *Shurbet* should be of some value to geothermal resource producers, it, like the *Reich* case, is premised on empirical proof that the resource was in fact depleting.¹⁸¹

It seems clear that unless the Internal Revenue Code of 1954 is revised, or the Commissioner broadly acquiesces in the *Reich* decision, the issues of the nature and exhaustibility

178. Apparently, the IRS is attempting to challenge the *Reich* and *Rowan* rulings in another circuit. *Wall Street Journal*, (Pac. Ed.) Nov. 15, 1973, p. 1, col. 5.

179. 347 F.2d 103 (5th Cir. 1965) *aff'g*, 242 F.Supp. 736 (N.D. Tex. 1961).

180. *Id.* at 108.

181. For an excellent discussion of the *Shurbet* case see O. Olpin, *supra* note 5, at pp. 156-65.

of the resource will be potential subjects for litigation for each geothermal field brought into production.

CONCLUSION

Lawyers, judges and legislators who have considered geothermal resources have characteristically described them as water, gas or mineral. But like the blind men's description of the elephant, these characterizations indicate a perception of only part of the reality. Geothermal resources are more than water, gas and mineral in various proportions. Energy, not substance, is the essence of geothermal resources. While recognition of this distinguishing factor is not a panacea to all problems posed by geothermal resource development, it suggests the need for both new legislation concerning and imagination in dealing with geothermal resources.