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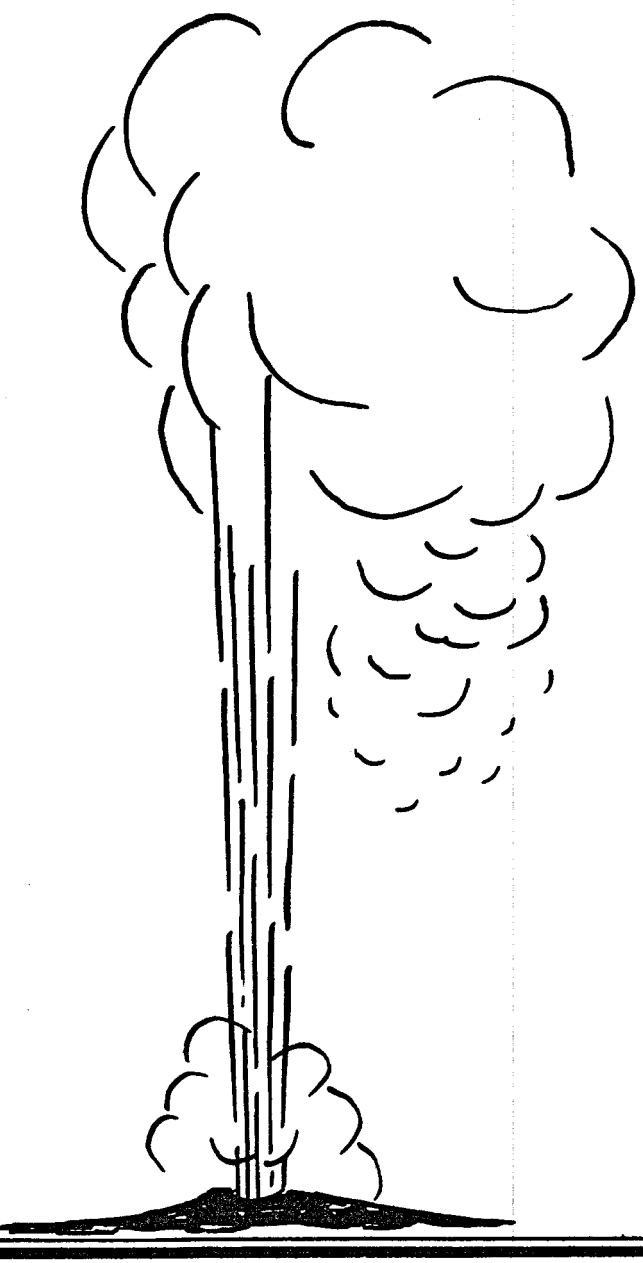

LEGAL ISSUES RELATED TO GEOPRESSURED-GEOTHERMAL RESOURCE DEVELOPMENT

Geopressured-Geothermal Technical Paper No. 1

July 1979

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RPC, Inc.
Austin, Texas

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Geopressured-Geothermal Technical Paper No. 1

LEGAL ISSUES RELATED TO GEOPRESSURED-GEOTHERMAL RESOURCE DEVELOPMENT

The General Land Office of Texas
Bob Armstrong, Commissioner

RPC, Inc.
Austin, Texas

July 1979

ACKNOWLEDGMENTS

This technical paper is one of a series of four papers in which the legal, financial, socioeconomic, and ecological aspects of geopressured-geothermal resource development on Public Free School Lands are discussed.

Many individuals contributed to the production of this paper. The project manager was Ann Orzech. The principal investigator was Gail McDonald. The technical editor was Nancy Grona; production assistance was provided by Kyle Pierce and Lori Snyder. The cover was designed by Kyle Pierce.

Ronald T. Luke
President
RPC, Inc.

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ABSTRACT

This paper discusses the legal aspects of geopressured-geothermal development in Texas. Many of the legal issues associated with geopressured-geothermal development in Texas are unsettled and represent areas of developing policy and law. Lawsuits can be expected either before or shortly after the first commercial development of geopressured-geothermal resources.

CONTENTS

1. INTRODUCTION

This paper begins with a summary of the Texas Geothermal Resources Act. The applicability of federal and state tax laws to geothermal development is then discussed. Geothermal energy was not specifically mentioned in federal tax statutes until the federal Energy Tax Act of 1978 was passed. Texas tax laws still do not make specific provision for geothermal resources.

Chapter 4 discusses pricing regulations. Both the federal government and the state of Texas have rate-making authority over the generation of electricity by public utilities. This authority also applies to electricity produced by geothermal fuels. The federal government also controls the price of natural gas produced from geothermal brine. However, no regulations currently exist to govern the price of geothermal brine sold for its heat content.

The chapter on environmental regulations discusses applicable federal and state constraints on geothermal development. Both federal and state water quality regulations apply to the surface and reinjection disposal of geothermal brine.

The question of rights to and ownership of a geothermal resource is not certain. The courts of Texas have not directly addressed the question of whether a geothermal resource belongs to the surface estate or to the mineral estate. The Texas Legislature only recently stated that the geothermal resources should be treated as part of the mineral estate. Chapter 6 summarizes the issues associated with this ownership question and discusses the effects of ownership alternatives.

The chapter on correlative rights discusses the rule of capture, which will probably govern the geothermal resource in Texas. Whoever lawfully brings the resource to the surface is the owner of that resource. This led to the Railroad Commission of Texas' regulation of oil and gas production to conserve energy resources; i.e., to prevent the bringing of resources to the surface solely to protect rights, without regard to conservation of the resource.

The question of liability associated with subsidence is another legal issue that is undecided. While there are cases dealing with this issue, there are no cases dealing with subsidence as a result of withdrawal of geopressured-geothermal resources. This report ends with a summary of legislation dealing with geothermal resources that has been filed during the 1979 legislative session.

The geopressured-geothermal resource has not been commercially produced in Texas; subsequently, many of the associated legal issues have not been finally resolved but rather represent areas of developing policy and law.

2. SUMMARY OF TEXAS GEOTHERMAL ACT

In Texas, geothermal resources are controlled by the Geothermal Resources Act of 1975, Section 141.001 et seq. Natural Resources Code. That Act was amended by the 66th session of the Texas legislature in H.B. 1490. Those amendments become effective in August of 1979.

The Act defines geothermal energy and associated resources as (Sec. 141.003, NRC):

A. Products of geothermal process, embracing indigenous steam, hot water and hot brines, and geopressured water;

B. Steam and other gases, hot water and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations;

C. Heat or other associated energy found in geothermal formations; and

D. Any by-product derived from them.

The term "by-product" is defined to mean "any other element found in a geothermal formation which is brought to the surface, whether or not it is used in geothermal heat or pressure inducing energy generation." (H.B. 1490)

The Act gives no definition of a "geothermal formation." By the definition of "by-product," however, it is clear that methane that may be found in a geothermal formation is a "by-product." Therefore, it seems the legislature intended that geothermal heat and pressure must be used and not wasted merely to produce the methane in geothermal formations.

The Act declares the following to be the policy of the state concerning geothermal resources (Sec. 141.002, NRC and H.B. 1490):

(1) the rapid and orderly development of geothermal energy and associated resources located within the State of Texas is in the interest of the people of the State of Texas;

(2) in developing the state's geothermal energy and associated resources, the primary purpose is to provide a dependable supply of energy in an efficient manner that avoids waste of the energy resources;

(3) consideration shall be afforded to protection of the environment, to protection of correlative rights, and to conservation of natural resources by all agencies and officials of the State of Texas involved in directing and prescribing rules or orders governing the exploration, development, and production of geothermal energy and associated resources and by-products in Texas;

(4) since geopressured-geothermal resources in Texas are an energy resource system, and since an integrated development of components of the resources, including recovery of the energy of the geopressured water without waste, is required for best conservation of these natural resources of the state, all of the resource system components, as defined in this chapter, shall be treated and produced as mineral resources; and

(5) in making the declaration of policy in Subdivision (4) of this section, there is no intent to make any change in the substantive law of this state, and the purpose is to restate the law in clearer terms to make it more accessible and understandable.

Except for duties and responsibilities given to other agencies, the Act gives the Railroad Commission of Texas (RRC) authority to regulate the exploration, development, and production of geothermal resources for purposes of conservation and protection of correlative rights. (Sec. 141.011, NRC) RRC rules must provide for environmental protection, waste prevention, the safety of the general public, and correlative rights protection. (Sec. 141.012, NRC) Before the RRC promulgates rules, it must consult with the executive director of the Texas Water Quality Board (now the Texas Department of Water Resources), the executive director of the Texas Air Control Board, and the commissioner of the General Land Office.

The School Land Board (SLB) has authority to lease and to develop rules controlling the exploration, development, and production of geothermal resources on permanent school fund land. (Sec. 141.073, NRC) The SLB's leasing authority is only at the direction of the commissioner of the General Land Office. The SLB may not lease permanent school fund lands that include wildlife refuges or recreational areas. The SLB is also authorized to take in kind the state's interest in geothermal resources. Furthermore, the SLB can approve unit agreements upon application of the lessees. Leasing of geothermal tracts must be done by sealed bid.

The commissioner of the General Land Office, in order to facilitate and encourage the rapid and orderly development of geothermal resources, may provide for the orderly exploration of permanent school fund lands and may issue permits and charge fees in accordance with the rules the SLB promulgates.

3. STATUS OF GEOPRESSURED-GEOTHERMAL RESOURCES UNDER CURRENT FEDERAL AND STATE TAX STATUTES

The geopressured-geothermal resource is a relatively recent discovery which is being examined more closely as a result, at least in part, of the emphasis being placed on alternative energy sources. It was only with the passage of the federal Energy Tax Act of 1978, however, that geothermal was mentioned specifically in the federal tax statutes. Geothermal resources are not specifically mentioned in Texas tax statutes.

This chapter reports on the status of geopressured-geothermal resources and electric power generation facilities under current federal and state tax statutes. The focus of the federal tax analysis is on those provisions pertaining to geothermal energy development. Since the geopressured-geothermal resource may also contain dissolved methane, provisions specific to natural gas from geopressured brine are also presented. Those general tax provisions applicable to any business endeavor or to the development of any resource are not considered.

FEDERAL TAX PROVISIONS

For purposes of certain sections of the federal Internal Revenue Code, a geothermal deposit means a geothermal reservoir within the United States and its possessions consisting of natural heat which is stored in rocks or in an aqueous liquid or vapor (whether or not under pressure). Such a deposit cannot be treated as a gas well. This definition includes the geopressured-geothermal resources believed to be along the Texas coast.

Those provisions of federal tax laws pertaining to depletion allowances, deduction of intangible drilling and development costs, and investment tax credits are examined in this section as they relate to the geopressured-geothermal resource.

Depletion Allowance

In the case of geothermal deposits, an allowance for depletion and for depreciation of improvements may be deducted in computing taxable income. The depletion percentage is applied to gross income to determine the allowance.

Geothermal Deposits

The depletion allowance schedule after October 1, 1978, for geothermal deposits is as follows:

1978, 1979, 1980	22%
1981	20%
1982	18%
1983	16%
1984 and thereafter	15%

Natural Gas From Geopressured Brine

The depletion allowance for wells drilled after September 31, 1978, and before January 1, 1984, is 10 percent. The depletion allowance for wells drilled after January 1, 1984, is 15 percent, but it is limited to independent producers (defined by the Secretary of Treasury), limited to 65 percent of taxable income, and limited to a specific amount of production. The average daily production to which the allowance can apply is limited to 7.2 million cubic feet in 1979 and 6 million cubic feet in 1980 and thereafter.

Deduction of Intangible Drilling and Development Costs

An operator of a geothermal property may at his option consider intangible drilling and development costs as a capital expenditure or as an expense item. The Energy Tax Act puts geothermal property on the same footing as oil and gas as regards intangible drilling and development costs. While the Internal Revenue Service has not yet promulgated regulations for geothermal deposits, the regulations for oil and gas state that the option to charge intangible drilling and development costs to capital or to expense . . .

> applies to all expenditures made by an operator for wages, fuel, repairs, hauling, supplies, etc., incident to and necessary for the drilling of wells and the preparation of wells for the production of oil and gas. Such expenditures have for convenience been termed intangible drilling and development costs. They include the cost to operators of any drilling or development work (excluding amounts payable only out of production or gross or net proceeds from production, if such amounts are depletable income to the recipient, and amounts properly allocatable to cost of depreciable property) done for them by contractors under any form of contract, including turnkey contracts . . . In general, this option applies only to expenditures for those drilling and developing items which in themselves do not have a salvage value. For the purpose of this option, labor, fuel, repairs, hauling, supplies, etc., are not considered as having a salvage value, even though used in connection with the installation of physical property which has a salvage value. CCH Reg. 1.612-4(c)(2) 33,670-3367

Minimum Tax

The deduction for intangible drilling and development costs for geothermal property is subject to the same minimum tax as oil and gas under Section 57 of the Internal Revenue Code of 1954. Section 56 imposes for each taxable year, "with respect to the income of every person, a tax equal to 15 percent of the amount by which the sum of the items of tax preference exceeds the greater of (1) $10,000, or (2) the regular tax deduction for the taxable year."

Section 57(a)(11) states that the items of tax preference are "The excess of the intangible drilling and development costs paid or incurred in connection with oil and gas wells (other than costs incurred in drilling a nonproductive well) allowable for the taxable year over the amount which would have been allowable for the taxable year if such costs had been capitalized and straight line recovery in intangibles had been used with respect to such costs." Section 57(d) states, "The term 'straight line recovery of intangibles', when used with respect to intangible drilling and development costs for any well, means ratable amortization of such costs over the 120 month period beginning with the month in which production from such well begins."

Gain from Disposition of Interests in Geothermal Wells

The Energy Act included geothermal properties with oil and gas as regards gain from disposition of interest in such properties. The general rule for oil, gas, and geothermal properties is that if such properties are disposed of, certain gain shall be treated as ordinary income. The certain gain is the lower of the aggregate amount of expenditures which have been deducted as intangible drilling and development costs, reduced by (1) the amount by which the deduction for depletion would have been increased if such costs incurred had been charged to the capital account rather than deducted or (2) the excess of the amount realized over the adjusted basis of such property.

At Risk Rules

The Energy Tax Act of 1978 included geothermal with oil and gas in the "at risk rule." The "at risk rule" provides that the amount of losses deductible in a year cannot exceed the aggregate amount at risk on the oil, gas, or geothermal property.

Investment Tax Credit

Section 38 of the Internal Revenue Code allows a credit against taxes. Other sections of the Internal Revenue Code and the Internal Revenue Service's regulations set out the types of investments that are allowed a regular tax credit of 10 percent. This credit is scheduled to be reduced to 7 percent on January 1, 1981. The Energy Tax Act allows an additional 10 percent energy property tax credit from October 1, 1978, to December 31, 1982.

The energy property tax credit stands on its own, and certain property may take both the regular tax credit and the energy property tax credit. Those energy properties qualifying for the energy property tax credit include equipment for producing natural gas from geopressured brine and equipment used to produce, distribute, or use energy derived from a geothermal deposit, but only in the case of electricity generated by geothermal power up to (but not including) the electrical transmission stage by someone other than a public utility. The credit cannot be greater than the liability for tax for the taxable year in excess of $25,000.

The tax credit section of the Energy Tax Act is subject to regulations to be promulgated by the Internal Revenue Service. According to personal contacts, the regulations generally are not promulgated until about a year after the statute is passed. Those regulations should define energy property that is entitled to both the regular tax credit and the energy property tax credit.

TEXAS TAX PROVISIONS

Occupation Tax

Texas places a tax on the occupation of producing natural gas. The volume of natural gas produced at the mouth of the well is taxed at 7.5 percent of market value at the production point. There is no occupation tax on geothermal resources; however, the tax on natural gas is presumed to be applicable to the production of methane from geopressured brine.

In addition, the state places an occupation tax on the owners, operators, managers, or controllers of a gas, electric light, or electric power plant located within any incorporated city or town which is used for local sale and distribution and for which service charges are received. The tax is levied as a percentage of gross receipts. The rate varies according to the following schedule:

1,000	<	Population	<	2,500	0.581%
2,500	<	Population	<	10,000	1.07 %
10,000	≤	Population			1.997%

Those facilities owned and operated by a municipality, county, water improvement district, or conservation district are exempt from this tax.

Public Utilities Tax

Public utilities within the jurisdiction of the Public Utilities Commission are subject to a tax equal to one-sixth of one percent (0.167%) of gross receipts from rates charged the ultimate consumer in Texas. The purpose of the tax is to defray the costs and expenses incurred in the administration of the Public Utility Regulatory Act (TEX. REV. CIV. STAT. ANN. Art. 1446(c)).

Ad Valorem Tax

Various political subdivisions, including the state, cities, counties, and school districts, have the authority to levy ad valorem taxes. Both the assessment ratio and the tax rate vary among subdivisions. Each political subdivision cannot exceed individual statutorily set tax rates; e.g., the tax rate may be 35¢ for every $100 of property. Some political subdivisions do not exercise this taxing power.

Real property, improvements to real property, and mineral resources are subject to ad valorem taxation and are assessed at a certain percentage of "fair market value."

There is no standard valuation of property. Consequently, the valuation of property varies among political subdivisions. The statute says that property must be valued at fair market value. This is the only statewide standard concerning valuation of property for ad valorem taxes.

4. PRICING REGULATIONS PERTAINING TO GEOTHERMAL RESOURCE DEVELOPMENT AND ELECTRIC POWER GENERATION

This chapter outlines pricing regulations pertinent to geopressured-geothermal resource development. The federal government exercises control over the price of natural gas produced from geopressured brine. No regulations currently exist, however, governing the price of the geothermal brine sold for its heat content.

The widest use of geothermal energy in the United States is currently for the generation of electric power. Subsequently, the rate-making authority of the federal government and the state of Texas over the generation of electricity by public utilities is also presented.

REGULATIONS GOVERNING PRICE OF NATURAL GAS EXTRACTED FROM GEOTHERMAL BRINE

The Federal Energy Regulatory Commission (FERC) has the authority under the Natural Gas Policy Act of 1978 (NGPA) to set the maximum price at the wellhead of natural gas produced from geopressured brine.

For purposes of the Act, natural gas produced from geopressured brine is considered to be "high-cost" natural gas. (P.L. 95-621, Sec. 107) Beginning in December 1978, FERC sets the ceiling price for high-cost natural gas each month until an incremental pricing rule is adopted. By January 1980, controls must be eliminated for all high-cost natural gas, including gas produced from geopressured brine. (P.L. 95-621, Sec. 121(b))

The ceiling price for high-cost natural gas was set at $2.078 per million Btus (MMBtus) for December 1978 and at $2.096 per MMBtus for January 1979.

The ceiling price for any month is "$1.75 per million Btus in the case of April 1977; and in the case of any month thereafter, the maximum lawful price, per million Btus prescribed under this subsection Sec. 102(b)) for the preceding month multiplied by the monthly equivalent of a factor equal to the sum of the annual inflation factor applicable for such month plus .035 . . . ." (P.L. 95-621, Sec. 102(b)) From 1980 to 1984, natural gas from geothermal brine will be part of a small unregulated supply; thus the price could be very high if demand is strong.

According to FERC personnel, the per million Btus measurement is very close to the per thousand cubic feet measurement, with slight adjustments required to compensate for pressure and temperature characteristics.

The NGPA defines "annual inflation factor" as follows. The annual inflation factor "applicable for any month shall be the sum of a factor equal to one hundredth of the quarterly percent change in the GNP implicit price deflator plus a correction factor of 1.002." (P.L. 95-621, Sec. 101(a)) Further, the quarterly percent change in the GNP implicit price deflator is defined for any one month as "the quarterly percent change in the GNP implicit price deflator, computed and published as an annual rate by the Department of Commerce, for the most recent calendar quarter for which such quarterly percent change has been so published at least 8 days before the beginning of such month."

NGPA makes no distinction between gas in interstate commerce and in intrastate commerce. FERC has authority to regulate both.

RATE-MAKING AUTHORITY EXERCISED OVER THE GENERATION OF ELECTRICITY BY PUBLIC UTILITIES

Both the state government (through the Public Utility Commission) and the federal government (through FERC) have the authority to set rates charged by public utilities.

State of Texas

Statutory Authority

The Texas statute controlling the rates charged by public utilities is the Public Utility Regulatory Act. (TEX. REV. CIV. STAT. ANN. Art. 1446(c)) The stated purpose of the Act is "to establish a comprehensive regulatory system which is adequate to the task of regulating public utilities as defined by this Act, to assure rates, operations, and services which are just and reasonable to the consumers and to the utilities." The definition of public utility includes any person, corporation, river authority, cooperative corporation, or any combination thereof, other than a municipal corporation, owning or operating for compensation in Texas equipment or facilities for producing, generating, transmitting, distributing, selling, or furnishing electricity.

The Public Utility Commission (PUC) has the power to regulate rates and service of electrical utilities not regulated by a municipality. A municipality may regulate electric rates set by an electric utility within the municipal boundaries. Municipalities regulating electrical utilities must require all necessary data to make a reasonable determination of rate base, expenses, investment, and rate of return within the municipal boundaries. Appeal from a municipality decision is to the PUC. Appeal from a PUC decision is to a district court.

The Act requires that the PUC ensure that every rate made, demanded, or received by any public utility be just and reasonable and that rates not be unreasonably

preferential, prejudicial, or discriminatory, but shall be sufficient, equitable, and consistent in application to each class of consumers (Sec. 38). Also, the PUC may not prescribe any rate which will yield more than a fair return upon that adjusted value of the invested capital used and useful in rendering service to the public (Sec. 40a).

Regulatory Authority

The PUC rules set out the policy and procedures the PUC uses to set rates.

Definition of Rate Base. PUC defines "rate base" as the "adjusted value of the invested capital used and useful in rendering service to the public." (PUC Rule 052.02.03.021) Components used in determining the overall utility rate base are:

1. Adjusted value of utility plant used by and useful to the public utility in providing service; adjusted value shall be a reasonable balance, as provided by the Act, between original cost less depreciation and current cost less an adjustment for both age and condition.

2. Construction work in progress, where necessary to the financial integrity of the utility, at original cost as recorded on the books of the utility.

3. Working capital allowance to be composed of but not limited to the following:

   A. Reasonable inventories of materials, supplies and fuel held specifically for purposes of permitting efficient operation of the utility in providing normal utility service (e.g., excludes appliance inventories);

   B. Reasonable payment for operating expenses; and

   C. A reasonable allowance up to one-eighth (1/8) of total annual operations and maintenance expenses excluding allowances for A and B above.

4. Deduction of certain items which include but are not limited to the following:

   A. Accumulated reserve for deferred federal income taxes;

   B. Unamortized investment tax credit to the extent allowed by the Internal Revenue Code;

   C. Contingency and/or property insurance reserves; and

   D. Customer contributions in aid of construction. (PUC Rule 052.02.03.031(a))

The PUC rules define "original cost," "reserve for depreciation," and "current cost." The rules also provide that "depreciation expense, including accumulated depreciation on original cost, and the adjustment for age and condition on current cost shall be consistent with each other" (PUC Rule 052.02.03.031(e)), and that "discontinuance of the capitalization of an allowance for funds used during construction will be consistent with inclusion of construction work in progress in the rate base." (PUC Rule 052.02.03.031(f))

Original cost is defined as "the amount of money actually paid (or the value of any consideration other than money exchanged) for property at the time when it was first dedicated to the public use." (PUC Rule 052.02.03.031(b))

Reserve for depreciation is defined as "the accumulation of recognized losses in service value of the original cost of an item or facility not restored by maintenance, caused by age, wear, tear and obsolescence. Depreciation shall be computed on a straight line basis over the expected useful life of the item or facility." (PUC Rule 052.02.03.031(c))

Current cost is defined as "the cost of replacing existing utility plant at current prices no greater than if replaced by current technology. Alternative methods of determination, including but not limited to the following, may be considered by the Commission: (1) Trending original cost with Commission approval indices; or (2) Current cost studies. Unless approved by the Commission, the cost of such studies will not be allowed in the cost of service." (PUC Rule 052.02.03.031(d))

The PUC rules provide that "cost of service" is "equal to that amount of revenue required to (1) cover all reasonable and necessary expenses properly incurred by the utility in rendering service to the public and (2) provide a fair and reasonable return on the adjusted value of invested capital used and useful in rendering such service." (PUC Rules 052.02.03.032(a))

According to PUC rules, cost of service includes:

1. Operations and maintenance expenses incurred in furnishing normal utility service and in maintaining utility plant used by and useful to the utility in providing such service;

2. Depreciation expense based on original cost and computed on a straight line basis as approved by the Commission;

3. Assessments and taxes other than income taxes;

4. Income taxes on a normalized basis;

5. Return on adjusted value of invested capital; and

6. Advertising, contributions and donations

    A. The actual expenditures for ordinary advertising, contributions and donations will be allowed as a cost of service

provided that the total sum of all such items allowed in the cost of service shall not exceed three-tenths of one percent (0.3%) of the gross receipts of the utility for services rendered to the public.

B. No expenditure shall be allowed as a cost of service for the following special items:

i. Funds expended for influencing legislation;
ii. Funds expended in support of political candidates;
iii. Funds expended in support of any political movement;
iv. Funds expended in promotion of political or religious causes;
v. Funds expended in support of or membership in social, recreational, fraternal, or religious clubs or organizations;
vi. Funds promoting increased consumption of energy; and
vii. Additional funds expended to mail any parcel or letter containing any of the above special items.

C. The following expenditures may be allowed by the Commission:

i. Funds expended promoting methods of conserving energy;
ii. Funds expended promoting methods by which the consumer can effect a savings in total bills;
iii. Funds expended promoting load factor improvement at off peak times; and
iv. Funds expended in support of or membership in professional or trade associations provided such associations contribute toward the professional standing of their membership. (PUC Rule 052.02.03.032(a))

A major uncertainity associated with the use of geothermal brine for the generation of electric power concerns reservoir life. The question arises as to whether a utility would be able to recover its capital loss if a facility utilizing geothermal resources were capitalized for a certain time period and the geothermal reservoir failed prior to the expiration of the time period. Conversations with PUC staff indicate that the PUC would probably permit the utility to recover its capital loss through an accelerated depreciation schedule.

Fuel Adjustment. An adjustment of rates to permit prompt recovery of the cost of fuel and to generate electric power may be allowed. The requirements for imposition of the adjustment are specified in PUC Rules 052.02.03.033(b). If the adjustment is made, fuel charges may not be included in the rate base. The fuel cost adjustment clause would presumably be applicable to the cost of geothermal brine used to generate electric power.

Rate of Return. By definition, "rate of return" is the "revenue earned by a utility from its utility operations, over and above allowable operating expenses, expresed as a percentage of invested capital and of adjusted value of invested capital." (PUC Rule 052.02.03.032(b)) Essentially rate of return is the revenue earned, over and above cost of service, expressed as a percentage of invested capital and the rate base.

The rules provide that:

1. The return shall be reasonably sufficient to assure confidence in the financial integrity of the utility and shall be adequate, under efficient and economical management, to maintain its credit and attract the capital necessary for the proper discharge of its public duties.

2. In fixing the rates of a public utility, the Commission shall fix its overall revenues at a level which will permit such utility to recover its operating expenses together with a reasonable return on its invested capital, but the Commission shall not prescribe any rate which will yield more than a fair return upon the adjusted value of the invested capital used and useful in rendering service to the public.

3. In determining the amount of revenues necessary to satisfy these requirements, the Commission may consider inflation, deflation, quality of service being provided, the growth rate of the service area and the need for the utility to attract new capital. In each case, the Commission is the composite of the cost of the various classes of capital used by the utility.

    A. Debt Capital: The cost of debt capital is the actual cost of debt.

    B. Common Stock Capital: The cost of common stock capital shall be based upon a fair return on its adjusted value.

    C. Preferred Stock Capital: The cost of preferred stock capital is its annual dividend requirements plus an adjustment for premiums, discounts and cost of issuance.

    D. Equity Capital: The cost of equity capital shall be based upon a fair return on its adjusted value. (PUC Rule 052.02.03.032(b))

PUC rules provide that "in fixing the rates of a public utilty, the Commission shall fix the overall revenue requirements at a level which will permit such utility to recover its allowable operating expenses together with a fair and reasonable return on its capital investment." (PUC Rule 052.02.03.033(a))

Communications with agency personnel indicate that the revenue requirements for investor-owned public utilities are the sum of allowable operating expenses, depreciation/amortization, taxes, and a fair rate of return. For purposes of determining a fair return, "adjusted value" is taken to mean original cost. In general, the PUC is presently allowing a 14 percent rate of return on both common stock capital and equity capital.

Federal

Statutory Authority

The Federal Power Act (16 USC, Sec. 824 et seq.) spells out the authority and procedures of the federal government to regulate electric utility companies engaged in interstate commerce. FERC assumed regulatory authority over interstate electric utilities under the Department of Energy Organization Act.

The policy of the Federal Power Act is declared as maintaining the public interest in regulating certain matters relating to generation of electricity, transmission of electricity in interstate commerce, and the wholesale of electricity in interstate commerce. Federal regulation, however, extends only to those matters not regulated by individual states. For purposes of the Act, electric energy is transmitted in interstate commerce if transmitted from a state and consumed at a point outside of the transmitting state.

The Act gives FERC the authority to determine just and reasonable rates if it finds that any rate charged by a public utility is unjust or unreasonable. FERC has the power to ". . . investigate and ascertain the actual legitimate cost of the property of every public utility, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation, and the fair value of such property." (16 USC, Sec. 8549)

Regulations and Procedures

FERC has authority over ". . . the establishment, review, and enforcement of rates and charges for the transmission or sale of electric energy, including determinations on construction work in progress, under Part II of the Federal Power Act, and the interconnection, under section 202(b) of such Act, of facilities for the generation, transmission, and sale of electric energy." (FERC rules, Sec. 0.5, Appendix A, 2)

Classification of Utilities. FERC classifies electric utilities as to whether the utilities are under the authority of the Federal Power Act and thus subject to regulation by FERC. This is called "jurisdictional status." FERC rules state: "These classifications, which are tentative and not binding on the persons or the Commission, are made on the basis of data reported to the Commission by such persons, supplemented when necessary by staff investigations of the facilities and their

operations . . . . If any person involved disagrees with the classification and refuses to comply with the requirements of the Act in accordance therewith, a formal proceeding may be initiated to resolve the questions presented." (FERC Rules, Section 3131)

Rate Schedules. Rate schedules must be filed with FERC by utilities which sell to consumers in interstate commerce either directly or indirectly through the wholesale of electricity to out-of-state utilities. FERC rules state that the rate schedule should "clearly and specifically (set) forth all rates and charges for any transmission or sale of electric energy subject to the jurisdiction of the Commission, the classifications, practices, rules and regulations affecting such rates and charges, and all contracts which in any manner affect or relate to such rates, charges, classifications, services, rules, regulations, or practices . . . ." (FERC Rules, Sec. 35.1(a)) The utility must comply with the rate schedule filed with FERC unless otherwise specifically provided by order of FERC. (FERC Rules, Sec. 35.1(e))

FERC rules define "rate schedule" as "a statement of (1) electric service as defined . . . (in FERC rules), (2) rates and charges for or in connection with that service, and (3) all classifications, practices, rules, regulations or contracts which in any manner affect or relate to the aforementioned service, rates, and charges. This statement shall be in writing and may take the physical form of a contractual document, purchase or sale agreement, lease of facilities, tariff or other writing. Any oral agreement or understanding forming a part of such statement shall be reduced to writing and made a part thereof." (FERC Rules, Section 35.2(b))

FERC rules provide for two types of rates schedules. The "initial rate" is applicable "to a transmission or sale of electric energy, other than that which proposes to supersede, supplement, cancel, or otherwise change a rate schedule required to be on file" with FERC. (FERC Rules, Sec. 35.1(b)) A "change of rate" is applicable to any rate schedule "which proposes to supersede, supplement, cancel or otherwise change any of the provisions of a rate schedule required to be on file" with FERC. (FERC Rules, Sec. 35.1(c))

The fact that FERC allows a rate schedule or any part of it to become effective does not necessarily mean approval of the schedule by FERC. (FERC Rules, Sec. 35.4) FERC "may suspend the operation of rate schedules proposing changes in existing schedules . . ." (FERC Rules, Sec. 3.136)

Uniform System of Accounts. FERC publishes a Uniform System of Accounts in its rules. Financial information must be provided in the form specified by the System. The Commission then evaluates the rate schedule based on the completed accounts. FERC rules set what can be included in the rate base through the Uniform System of Accounts. The following are the account titles:

1. Assets and Other Debits
2. Liabilities and Other Credits
3. Plant Accounts
4. Income Accounts
5. Retained Earnings Accounts

6. Revenue Accounts
7. Production Transmission and Distribution Expenses
8. Customer Accounts, Customer Service, and Informational, Sales and General Administrative Expenses

FERC groups utilities into four classes, A through D, on the basis of annual electric operating revenues. One system of accounts applies to Class A and B utilities; another system applies to Class C and D utilities. The classes are defined as follows:

Class A .....Operating Revenues $\geq$ $2.5 million

Class B .....$1.0 million $\leq$ Operating Revenues $<$ $2.5 million

Class C .....$150,000 $\leq$ Operating Revenues $<$ $1.0 million

Class D .....$25,000 $\leq$ Operating Revenues $<$ $150,000

Research, Development, and Demonstration Expenses. FERC rules provide for the inclusion of research, development, and demonstration expenses (R D&D) in the rate-base in certain instances. (FERC Rules, Sec. 35.22) Thus, expenditures for a geothermal-related generating facility may under certain circumstances qualify as a R D&D expense. Such a qualification would mitigate against risks associated with an uncertain geothermal reservoir life, for it would ensure that the utility could recover its capital loss in the nonproductive facility, should the reservoir fail.

FERC rules state that "Advance Commission approval may be requested of rate treatment for R D&D expenditures of $50,000 or more related to a project undertaken by the company or as part of a project undertaken by others, or for a group of projects, which in the aggregate, cost $50,000 or more .... Approval requests shall justify any conduct of or partial support of large-scale demonstration facilities by clearly identifying and justifying the portions of the capital and operating costs which require the high-risk financial support necessary to the pursuit of R D&D." (FERC Rules Sec. 35.22(a))

FERC requires that a utility file a five-year plan outlining the R D&D program. The plan must "clearly relate the objectives to the interests of the rate payers, the public, and the industry and to the objectives of other major research organization, particularly the U.S. Energy Research and Development Administration." (FERC Rules, Sec. 35.22(c))

5. ENVIRONMENTAL REGULATIONS APPLICABLE TO GEOPRESSURED-GEOTHERMAL RESOURCES

The major environmental regulations applicable to geopressured-geothermal resources are those water quality regulations that control brine disposal. Currently, both state and federal regulations apply to the surface discharge and reinjection of brine. If significant air emissions result from production or utilization of the geopressured-geothermal resource, federal and state laws concerning air quality will be applicable.

SURFACE DISPOSAL AND REINJECTION

State and federal regulations currently exist which control the surface discharge and subsurface reinjection of brine.

If the brine is disposed of on the surface and is not reinjected, the discharge must have a National Pollutant Discharge Elimination System (NPDES) permit from the Environmental Protection Agency (EPA). EPA has established the effluent limitations for such discharges and the standards of performance for particular industries.

With the passage of the Safe Drinking Water Act (SDWA) (42 U.S.C.S. Sec. 300F et seq.), the federal governmental mandated EPA to promulgate rules as minimum standards for individual states to follow. The purpose of these rules is to control underground injection of wastes which endanger drinking water sources. EPA may not prescribe rules which interfere with or impede brine associated with oil or natural gas production, except to the extent rules are necessary to protect underground sources of drinking water. The SDWA provides that no underground injection of waste will be allowed in a state that does not have a program approved by EPA. EPA has not yet promulgated final rules for underground injection of waste. Final rules are expected in December of 1979.

Surface disposal and reinjection of geothermal brine are also controlled by Texas law. The Texas Water Code was amended by the 66th session of the Texas legislature in H.B. 1490 to give the Railroad Commission of Texas exclusive responsibility for waste control and water pollution prevention (surface and subsurface) resulting from activities associated with the exploration, development, and production of geothermal resources. The Railroad Commission of Texas would issue waste discharge permits associated with these activities, based on Texas Department of Water Resources Water Quality Standards.

The Texas Geothermal Resources Act provides that the RRC must adopt rules that include:

1. protection of the environment against damage resulting from the exploration, development, and production of geothermal energy and associated resources;

2. prevention of waste of natural resources, including geothermal energy and associated resources, in connection with the exploration, development, and production of geothermal energy and associated resources;

3. protection of the general public against injury or damage resulting from the exploration, development, and production of geothermal energy and associated resources; . . . (Sec. 141.012, NRC)

The RRC has the administrative capability to regulate the discharge of geothermal brine. The RRC already has amended its statewide conservation rules and regulations to include geothermal production. Essentially, the RRC conservation rules that applied to oil and gas production now apply to geothermal production.

The major RRC rule dealing with fresh water protection is Statewide Rule 8: (RRC Rules 051.02.02.008)

> (A) Fresh Water to be Protected
> Fresh water, whether above or below the surface, shall be protected from pollution whether in drilling, plugging, producing, or disposing of salt water already produced.

Section B of Rule 8 specifies that exploratory drilling shall be carried out with safeguards to protect surface and subsurface waters of the state of Texas. In Section C of Rule 8, operators are, with specified exceptions, prohibited from using saltwater disposal pits for geothermal wastes. Finally, Section D provides for the protection of offshore and coastal wetland areas. This section encompasses waste collection and disposal, reporting of violations, requirements for corrective action, and penalty for violation.

RRC Statewide Rule 9 (RRC Rule 051.02.02.009) provides for the disposal of brine by injection into nonproducing oil, gas, or geothermal formations (Sec. A). However, Section B provides that these formations must be separated from fresh water supplies by impervious beds; disposal wells must be properly cased (Sec. C). Sections D and E of Rule 9 specify the application procedure for an RRC permit to dispose of saltwater by injection.

AIR EMISSIONS

During the exploration phase of geopressured-geothermal resource development, the major sources of air emissions are the gases and vapors released during the drilling and testing of wells. During the operational phase, hydrogen sulfide (H_2S) is carried along with the steam when flashing occurs. Emission controls should be quite effective for condensible and some reactive gases and vapors. In nonflashing systems, such as a binary fluid system, the sulfide may not escape from the water and could be reinjected. It is assumed that present air quality and emissions standards must be met for development to occur.

Federal authority over air quality is based upon the federal Clean Air Act. (42 U.S.C. 7401 et seq.) The federal Clean Air Act requires the operator of a project that will either directly or indirectly result in the emission of air pollutants to take appropriate steps to ensure that the operation of the source will not result in violation of air quality standards developed under the Clean Air Act. The federal Clean Air Act has defined a major source as having an allowable emission rate of 100 or more tons per year. The EPA enforces provisions of the federal Clean Air Act.

State policy as declared in the Texas Clean Air Act is "to safeguard the air resources of the state from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of health, general welfare, and physical property of the people, including the aesthetic enjoyment of the air resources by the people and the maintenance of adequate visibility." TEX. REV. CIV. STAT. ANN. art. 4477-5, Sec. 1.02 (1974) Implementation and enforcement authority under the Act is granted to the Texas Air Control Board (TACB).

Before construction or modification of any facility which may emit air contaminants may be undertaken, a construction permit must be obtained from the TACB. Similarly, an operating permit must be obtained from the TACB before such facilities can begin operations. The TACB has and exercises the authority to order such action as is indicated by the circumstances to control air pollution.

6. ANALYSIS OF OWNERSHIP ISSUES

The courts of Texas have not addressed directly the question of whether ownership of geopressured-geothermal resources belongs to the surface estate or to the mineral estate. Only recently has the Texas legislature stated that geothermal resources should be treated as part of the mineral estate. The potential for court action remains, however, as case law is unclear on this point.

The ownership question exists in part because of a lack of clear legal definition concerning the nature of the resources. If the geopressured-geothermal resource is considered to be "water," ownership rights and control lie with the surface owner; if the resource is a "mineral," ownership rights and control belong to the owner of the subsurface or mineral estate.

To the extent that uncertainty concerning ownership exists, a potential developer of geopressured-geothermal resources does not know if he should seek a lease from and pay royalties to the owner of the surface estate or to the owner of the mineral estate. This chapter summarizes the issues associated with the ownership question and discusses the effects of resource ownership alternatives.

OWNERSHIP ISSUES

Introduction

The University of Texas at Austin's Center for Energy Studies (CES) has published a report entitled The Geopressured Geothermal Resources of Texas: A Report on Legal Ownership and Royalty Issues. That report contains the most thorough examination of how a Texas court might approach a lawsuit concerning the ownership of geopressured-geothermal resources.

The most important issues discussed in the report concern:

1. Ownership and rights of surface estate owner in underground water, and the definition of underground water
2. Mineral characteristics of salt water and the accommodation doctrine
3. Technical elements of geopressured-geothermal resources
4. Alternative theories under which a mineral lessee could claim both that the Texas geopressured resources belong to the mineral estate and that the holder of the mineral estate has a right to develop the entire estate

The major issues presented and the authorities cited in that report are extracted below. For a comprehensive discussion of the issues, the reader is urged to read the CES report in its entirety.

Discussion of Issues

Surface Estate Ownership Rights

Texas Water Code Section 52.002 reaffirms that the owner of the surface estate alos has ownership and rights in "underground water." Underground water is defined under the Water Code (Section 52.001(3)) as "water percolating below the surface of the earth and that is suitable for agricultural, gardening, domestic, or stock raising purposes, but does not include defined subterranean streams or the underflow of rivers, . . ."

Mineral Characteristics of Water

The mineral characteristics of water and the accommodation doctrine are discussed in the section of the report "Rights in Salt Water." The accommodation doctrine states that the owner of the dominant mineral estate must give due regard to the rights of the owner of the servient surface estate.

Salt was found to be a mineral within the meaning of the phrase "oil, gas, and other minerals" by a civil appeals court in Ambassador Oil Corp. v. Robertson (384 S.W.2d 752 (Tex. Civ. App. 1964, writ refused n.r.e. on other grounds, sub nom 390 S.W.2d 472).).

Subsequently,

> (t)he Texas Supreme Court was faced with the issue of underground salt water ownership in 1973 in Robinson v. Robbins Petroleum Corp. (501 S.W.2d 865 (Tex. 1973)). Robinson owned only the surface estate in a tract of land, and the mineral estate under the tract had been leased to Robbins Petroleum for producing "oil, gas, and all other minerals." Salt water had been drawn from a former oil well on the Robinson tract to waterflood for secondary recovery of oil under Robinson's property, but also under other property outside of that tract. The court said that a question was presented as to whether "salt water" is part of Robinson's surface estate, but they did not answer that question directly. Many people have assumed that the question was answered, perhaps only indirectly, as a necessary part of the holding. For example, one law review article (27 Baylor L. Rev. 353, 356 (1975)) says:
>
> > The Court, in Robinson v. Robbins Petroleum Corp., has now extended the reasoning of Sun Oil and classified subterranean salt water as an incident of ownership belonging to the surface water. (emphasis added)

The Supreme Court did say that "water" is part of the surface estate, (using the broad term), and water is never pure in nature. In the case, the salt water was being used as "water," not for the value of its mineral content, and the court said, under those circumstances, "saline content has no consequence upon ownership." They pointed out, in dictum, that if the water were being produced for the value of its mineral content:

> (t)he substance extracted might well be the property of the mineral owner, and he might be entitled to use the water for purposes of production of the mineral.

The case held Robinson was entitled to recover the value of that portion of the salt water used for the benefit of land outside of the Robinson tract. No reference was made in the case to the Water Code limitation of underground water to that which is suitable for general agrarian and domestic purposes.

The case illustrates that the Texas Supreme Court considers ownership aspects in such disputes between surface and mineral estate owners but ownership is not necessarily decisive. The court is also very concerned with accomodation (sic) between the rights of the dominant mineral and servient surface estates. In Robinson, the accomodation (sic) doctrine was determinative, and the decision was based upon a desire to avoid increasing the burden on the surface estate for the benefit of lands outside the leased premises. The dictum quoted above, related to use of water for its mineral content, will be important for cases involving geopressured waters. (pp. 24-25)

Technical Elements of Geopressured-Geothermal Resources

The section "Classification of Geopressured Waters" discusses some of the technical elements of the geopressured-geothermal resources and the importance of the accommodation doctrine. While subterranean streams are owned by the state and percolating waters are underground waters owned by the surface estate, the report states: "geopressured waters appear to be, for all practical purposes, entirely removed from that cycle in their 'natural pressure vessel'."

> Moreover, development of the geopressured-geothermal resources, through deep wells, would not have any practical effect on the availability of ground water to a surface owner for the natural development of his estate. Furthermore, geothermal well drilling procedures are controlled, primarily through Rule 8 of the statewide rules of the Railroad Commission, which are applicable to oil and gas operations, for the protection of fresh water supplies.

Even though a surface owner should attempt an argument, under some authority such as Fleming Foundation, (Fleming Foundation v. Texaco, Inc. 337 S.W.2d 846 (Tex. Civ. App. 1960, writ ref'd)) that all subsurface water belongs to him, it would be extremely difficult, if not impossible, to show that superheated water, of moderate salinity, and under pressures of several thousand pounds per square inch when brought to the surface, at great expense, are "suitable for agricultural, gardening, domestic, or stock raising purposes," as the Water Code qualifies his underground water rights.

In considering a possible application of the accomodation (sic) doctrine to give due regard to the rights of the owner of the surface, the virtually complete, physical separation of geopressured waters from the ground water system on which the surface owner depends for natural enjoyment of his estate seems highly significant. Further, this ground water system is protected from contamination during geothermal resource field development by Railroad Commission rules. (pp. 17-18)

Alternative Theories

In "Mineral Character of Geopressured Resource" the report states: "There are several complementary or alternative theories under which a mineral lessee could argue the mineral character of the Texas geopressured resources, and his right to develop the entire estate." Those theories are entitled the "Geothermal Kinetics Approach," the "Doctrine of Guffey v. Stroud," and "Reasonable Use by the Mineral Lessee."

1. In the "Geothermal Kinetics Approach" the report states:

The first theory is that used by the Geothermal Kinetics court. As stated before, this approach is consistent with that outlined by the Texas Supreme Court in Acker v. Guinn for determining which resources fall within the mineral estate when land has been severed horizontally into surface and mineral estates .... The valuable substances in the Texas geopressured resources are all contained in geothermal deposits which lie at great depth below the surface of the earth, and which are distinct from the surrounding soil. These valuable substances must be obtained by mineral drilling techniques similar to those used in regular oil and gas recovery, and there is no requirement for open quarrying or strip mining which would essentially destroy the surface, or prevent its use by the surface estate owner for natural purposes. The substances obtained have substantial value for their own sake, not as fill material, or as common rock or gravel. The water in the geopressured deposits is not part of, and does not affect, in any practical sense, the supply of the percolating underground water which belongs to the surface owner, and is needed by him for enjoyment of his estate ....

Finally, the value of the geopressured fluids is in their energy and mineral content, and, as withdrawn from the wells, they are not useful to natural development of the surface estate. All of these are characteristics which have caused courts in Texas and other states to declare other deposits to be part of the mineral estate, and included within a grant of "oil, gas, and other minerals." Presumably, the geopressured waters and their energy would be included within the "other minerals" term under this theory of mineral characterization. (pp. 31-33)

2. In the "Doctrine of Guffey v. Stroud" the report states:

There is a second theory for considering the resource as mineral, or at least subject to mineral development, which would not have been applicable to the geothermal resources in The Geysers, but is applicable to the Texas geopressured resources . . . .

Thus, while these geothermal deposits have been characterized by the legislature as an energy resource, which must be exploited in an efficient manner that avoids waste of the energy, they are also substantially a methane resource. Nevertheless, efficient use of the internal energy of the geopressured waters is required for lawful recovery of the methane. Of course, the methane is natural gas, and would be included in a normal mineral grant, reservation, or lease of oil and gas, without need of reference to other minerals. Since the mineral owner is required by law to make efficient use of the energy of the geopressured waters in order to enjoy his ownership right in the gas, and since the Geothermal Resources Act speaks of "geothermal energy and associated resources" as a resource system, it seems probable that the doctrine of Guffey v. Stroud (16 S.W.2d 527 (Tex. Comm. App. 1929, opinion adopted)) could be argued successfully. In that case, which involved production of "gas" under an "oil" lease, the court said:

> The grant of the oil carried with it a grant of the way, surface, soil, water, gas, and the like essential to the enjoyment of the actual grant of the oil . . . . The rule in Shylock's case is not controlling . . . . The bond for a pound of flesh, if valid, did carry with it by necessary implication of law as much Christian blood as was necessary to be shed in the operation.

This is a colorful statement of a broad legal principle that any grant carries with it by implication all things reasonably necessary to the enjoyment of the rights granted.

Clearly, under any lease which provides for the recovery of gas, the solute methane is a specifically granted substance. Considering the expert opinion as to the mineral source of the geopressured waters and their energy, and the systemic legislative definition of the resource, these

waters could also be considered as specifically granted substances under the "other minerals" category if the lease includes that term. If the lease does not, or if the courts should consider the geopressured waters as "water" (using the broad term as in Robinson) and determine that it is part of the surface estate, the Guffey doctrine might be applied.

To bring his methane to the surface, the mineral lessee must also produce the geopressured waters in which the methane is dissolved. Having done this, he is required by law to avoid waste of their energy. Under these circumstances, it would be logical for the court to consider the geopressured waters as "Christian blood" which is "necessary to be shed in the operation" in order to recover the granted "pound of flesh"--the methane.

This doctrine implies more than reasonable use of the geopressured waters and their energy. In effect, it is a grant of other substances, such as water, which are essential to the enjoyment of the actual grant. Thus, their taking is not wrongful, although it may or may not be a cost free grant. (pp. 34-36)

3. In the "Reasonable Use by the Mineral Lessee" the report states:

Alternatively, under the dictum of Robinson, the lessee could argue that he was using the water, not as water, but for the value of its mineral content. The methane is a solute mineral, and the lessee would be using the water to recover it.

Summary

In summary, the Texas Water Code definition of "underground water," the general kinetics approach, the doctrine of Guffey v. Stroud, and the reasonable use by the mineral lessee theory would all seem to indicate that the Texas geopressured resources belong to the mineral estate. There is the possibility, however, that the courts could rule that ownership belongs to the surface estate:

... the recovery of the energy of the waters might not be considered a mineral recovery, depending on how energy itself is categorized.

Nevertheless, to reach this questionable point, involving recovery of the energy of the geopressured waters, the courts must have made all of the following preliminary determinations:

a. Percolating underground water, as defined in the Water Code, is not the only type of sub-surface water privately owned by the surface estate owner after severance of the mineral estate.

b. All sub-surface water, which is not state water, is privately owned by the surface estate owner after severance of the mineral estate.

c. Expert opinion as to the hydrologic separation of the geopressured deposits from the ground water system is not determinative.

d. Expert opinion as to the mineral origin of the geopressured deposits is not determinative.

e. Energy of the geopressured waters, although they are products of geothermal processes, is not mineral in character, but only a characteristic of the water with which it is associated.

f. Arguments that the legislature intended a systemic definition of an energy resource, mineral in character, are not persuasive.

g. The doctrine of Guffey v. Stroud is not applicable in favor of a mineral owner who is recovering his methane gas, the principal value component of the geopressured resources. (pp. 37-38)

EFFECTS OF RESOURCE OWNERSHIP ALTERNATIVES

The question of whether ownership of geopressured-geothermal resources lies with the surface estate or the mineral estate affects the School Land Board (SLB) only for those tracts that the SLB controls or participates only in the mineral estate. These lands include mineral relinquishment lands and lands patented to navigation districts.

On those lands that are currently under lease "for oil, gas, and other minerals" if the geopressured-geothermal resource is determined to be a mineral, the lessee may be able to produce geopressured-geothermal resources under his current lease. According to General Land Office personnel, only leases issued 15 to 20 years ago include the phrase "oil, gas, and other minerals," but some tracts are still held by production under those types of leases.

Currently the SLB leases rights only in oil and gas. This type of lease would allow the SLB to lease for production those geopressured-geothermal resources tracts currently leased for production of oil and gas.

There remains a question of whether the methane in geopressured-geothermal formations would belong to the geothermal lessee or to the oil and gas lessee. This question will probably have to be solved by the courts or the legislature. However, it seems clear that the Texas Geothermal Resources Act intended that the methane in solution in geothermal formations be a byproduct and that the energy other than methane from geothermal formation not be wasted.

Some potential problems could be solved with the adoption of a more specific definition of "geopressured-geothermal well." The Railroad Commission of Texas rules require that a geopressured-geothermal well be completed within a geopressured aquifer. A geopressured aquifer is defined as "a water-bearing zone with a pressure gradient in excess of .5 pounds per square inch per foot and a temperature gradient in excess of 1.6°F per 100 foot depth." (RRC Rule 051.02.02.079(26)) Also, the School Land Board could amend its current oil and gas lease to exclude from the definition of "gas" any byproduct of geothermal energy.

7. PROTECTION OF CORRELATIVE RIGHTS

Texas will probably use the rule of capture to designate ownership of geothermal resources. The rule of capture is a separate consideration from the question of whether the mineral estate or the surface estate has the right to produce the geothermal resource. Because reservoirs containing such substances as oil, gas, water, or geothermal resources lie under more than one piece of property, the rule of capture is designed to designate ownership after the resource is brought to the surface. Roughly stated, the rule of capture designates the owner of the resource as whoever reduced the resource to possession. This designation is not determined by the ownership of the property under which the resource originally lay, so long as the resource was captured from the producer's own property. Unauthorized directional drilling, in which the well is started on the producer's property but bottoms under someone else's property, is not allowed under the rule of capture. However, a lawful producer may "capture" all of the substance from a reservoir, even though the substance originally lay under his neighbor's land. This is called draining, and most oil and gas leases require the lessee to drill a well if it is determined that the lessor's property is being drained by another producer in the reservoir.

In the early days of oil and gas production, the rule of capture fostered a race to produce more of the substance immediately without consideration for the long-term production that could be had.

This led to the regulation of oil and gas production to "prevent waste." The RRC of Texas has the duty to promulgate rules that prevent waste of oil, gas, and geothermal resources. One of the practical effects of such regulation is the protection of correlative rights; i.e., the rights of all owners of land overlaying a reservoir.

The major RRC rule to prevent waste is Rule 37, the statewide spacing rule. (RRC Rule 051.02.02.037) Rule 37 states in part:

> (A)(1) No well for oil, gas or geothermal resource shall hereafter be drilled nearer than twelve hundred (1200) feet to any well completed in or drilling to the same horizon on the same tract or farm, and no well shall be drilled nearer than four hundred sixty-seven (467) feet to any property line, lease line, or subdivision line; provided that the Commission, in order to prevent waste or to prevent the confiscation of property, may grant exceptions to permit drilling within shorter distances than above prescribed when the Commission shall determine that such exceptions are necessary either to prevent waste or to prevent the confiscation of property . . . .

Section D of Rule 37 provides for increasing or decreasing the distances designated in Section A, at the discretion of the RRC. Section E directs the plugging of any well drilled in violation of this rule; Section F provides for the closing of any well drilled without notification of approval by the RRC.

Section G of the statewide spacing rule (Rule 37) outlines specific provisions for subdivision of property subsequent to the application of the spacing rule. These provisions cover wells tapping a continuous reservoir and multiple reservoirs under the same property.

Section J of Rule 37 denies the considerations of a new application unless the applicant can show changed conditions, which are limited to material changes in the physical conditions of the reservoir; material changes in the distribution or allocation of allowable production in the area surrounding the tract; additional permits granted by the RRC for wells in the area surrounding the tract; and any additional evidence pertaining to the applicant's property rights which were not known by the RRC at the time of any previous hearing or applications. All of the changed conditions bear the qualification that they materially affect the recovery of resources from the applicant's tract.

Section K of Rule 37 provides for the granting of exceptions pertaining to the total depth of the proposed well in the original application. However, if a well is subsequently recompleted to greater depth than originally proposed, a new permit must be obtained.

Section M defines lawful directional drilling: "Wells that were deviated, whether intentionally or otherwise, prior to April 1, 1949, and are bottomed on the lease where permitted, are legal wells." The following will be determined from sworn testimony and authenticated data at a hearing: the well completion date; that the bottomhole location is on the same lease as the surface location; that the bottomhole location is neither in violation of the permit to drill nor a specific RRC order; that the present operator nor his predecessor has not filed a false inclination or false directional survey with the RRC. A well that violates any of these conditions or that is in violation of a specific RRC order is an illegal well.

Under the provision of Rule 37 Section M, however, an operator may apply for a permit to drill a deviated well if he can prove that a vertical projection of the well surface is within the productive limits of the reservoir.

8. SUBSIDENCE LIABILITY

Liability for subsidence resulting from withdrawal of the geopressured-geothermal resource is another unresolved issue. If geothermal energy and associated resources are held to be underground water, landowners would have a cause of action if associated subsidence is a result of negligence or malice by the party withdrawing the resource. If geothermal energy and associated resources are held to be minerals, it is likely landowners have a cause of action without bearing the burden of proof of negligence or malice.

The most recent case dealing with subsidence is Friendswood Development Company v. Smith-Southwest Industries, Inc., hereinafter referred to as Friendswood (Friendswood Development Co., et al. v. Smith-Southwest Industries, Inc., et al; Cause Number B-6682, in the Supreme Court of Texas).

The Friendswood case deals only with subsidence caused by the withdrawal of percolating groundwater. Whether or not geothermal energy and associated resources is a percolating groundwater is an unanswered scientific and legal question. Sec. 52.001(3) of the Texas Water Code defines underground water as "water percolating below the surface of the earth and that is suitable for agricultural, gardening, domestic, or stock raising purposes, but does not include defined subterranean streams or the underflow of rivers . . . ."

If the courts hold that geothermal energy and associated resources is percolating groundwater, then the geothermal resources would be subject to the Friendswood holding that " . . . if the landowner's manner of withdrawing groundwater from his land is negligent, willfully wasteful, or for the purpose of malicious injury, and such conduct is a proximate cause of the subsidence of the land of others, he will be liable for the consequences of his conduct. The addition of negligence as a ground of recovery shall apply only to future subsidence proximately caused by future withdrawals of groundwater from wells which are either produced or drilled in a negligent manner after the date this opinion becomes final."

The dissenting opinion in the Friendswood case, written by Justice Jack Pope, indicates that liability for negligent withdrawal of minerals has always existed. Justice Pope cites Gregg v. Delhi-Taylor Oil Corp. and Holmes v. Delhi-Taylor Oil Corp. (Gregg v. Delhi-Taylor Oil Corp., 162 Tex. 344 S.W.2d 419 (1961); Delhi-Taylor Oil Corp. v. Holmes, 344 S.W.2d 420 (1961)):

> Mr. Gregg, in the development of his mineral lease, was preparing to use a sand fracturing technique to open cracks and veins extending some distance from his lease and to alter the substructure of neighboring land. By use of hydraulic pressure the ruptures of the subsurface formations

would free greater quantities of gas. The rupture beneath the Delhi-Taylor's lands would create only small veins about one-tenth of an inch in diameter. This court regarded the creation of fissures on another's land as an invasion of property rights. 'The invasion alleged is direct and the action taken is intentional.' . . . While the drilling bit of Gregg's well is not alleged to have extended into Delhi-Taylor's land, the same result is reached if in fact the cracks or veins extend into its land and gas is produced therefrom by Gregg.' This court denied one landowner the right to interfere with the subsurface of lands beyond his own lease boundaries. The same principle was applied in Gregg v. Delhi-Taylor Oil Corp., 162 Tex. 38, 344 S.W.2d 419 (1961), and in Delhi-Taylor Oil Corp. v. Holmes, 162 Tex. 39, 344 S.W.2d 420 (1961).

In my judgment, the examples are indistinguishable from the present case. The geologic changes that the defendants are creating beneath the surface of the plaintiffs' land in the instant case are more severe than in the Gregg and Holmes cases. The plaintiffs made summary judgment showing that the defendants squeeze the water from the clay beneath plaintiffs' lands, and the clay is then compressed and compacted so that the layers become thinner. The subterranean strata beneath plaintiffs' land is wholly altered by the process. The process is permanent and irreversible. If one may not use pressure that alters the geologic status of one subsurface estate, how can we approve a process which reduces the pressure and which more grievously alters the subsurface estate? . . . In Gregg and Holmes, we correctly looked at the damage to the neighbors' subsurface estate that was threatened by one who had a complete legal right to capture from a wellbore on his own land the oil from beneath another's land. The right of capture did not carry with it the right to destroy or interfere with the geology beneath another's land . . . .

We thus reach the end result. Under our prior holdings compared with today's, one who mines for oil may not destroy his neighbor's subjacent geology; but the right to pump water, we inconsistently say, is the right to destroy the subsurface geology, the subjacent support and even the surface of the land. Defendants may pump the plaintiffs' land to the bottom of Galveston Bay . . . . Even when the right to mine had been granted by contract, we rejected a practice that would consume or destroy the surface estate. Consistent with that trend to avoid the destruction of the surface estate, we also made our decision in Getty Oil Co. v. Jones, 470 S.W.2d 618 (Tex. 1971). In Getty Oil, we protected the servient surface estate from the dominant mineral estate which did not more than interfere with an automatic irrigation system. If, therefore, this court will protect a servient estate in its operation of a watering system, surely we will protect an owner of an absolute property right to subjacent support from a neighbor whose practice is thrusting his land beneath the sea."

In Getty Oil, the court said that rights to the mineral estate was only for that which is "reasonably necessary" and the court would use evidence of the effects on the

use of the surface and the nature of alternatives available. The court stated that the mineral estate is the "dominant estate in the sense that use of as much of the premises as is reasonably necessary to produce and remove the minerals is held to be implicitly authorized by the lease, but that the rights implied in favor of the mineral estate are to be exercised with due regard for the rights of the owner of the servient estate."

In Brown v. Lundell a landlord brought an action against an oil and gas operator for the operator's negligent disposal of salt water that resulted in contamination of groundwater (Brown v. Lundell, 344 S.W.2d 863 (1961)). The court stated that the mineral estate cannot use "either the surface or subsurface in a negligent manner so as to damage the landowner."

If geothermal energy and associated resources are held to be underground water, then the Friendswood case would apply. If geothermal energy and associated resources are held to be minerals, then it is likely that landowners would have a cause of action although there are no cases directly on point.

9. SUMMARY OF GEOTHERMAL LEGISLATION INTRODUCED IN 66TH LEGISLATURE

S.J.R. 43 (VALE)

This resolution proposed a constitutional amendment creating a solar, wind, geothermal, and alternate energy fund within the state treasury under the administration of the comptroller. Net revenue from severance taxes on minerals, excluding oil, gas, and sulfur, could have been dedicated to the fund.

The fund could have been used, as provided by law, for the acquisition of facilities and equipment used to exploit solar, wind, geothermal, biomass, and tidal and other hydraulic energy resources. The legislature could have authorized loans of up to 75 percent of the fund for acquisition and construction of these facilities and equipment (see also S.B. 796). The resolution died in committee.

S.J.R. 44 (VALE)

This resolution proposed a constitutional amendment authorizing the legislature to grant an exemption from property taxation for geothermal energy devices. Such an exemption already exists for solar and wind-powered energy devices. This resolution died in committee.

S.B. 793 (VALE)

This bill would have amended state tax statutes to exempt receipts from the sale, lease, rental, use, storage, or consumption of geothermal energy devices. These devices would also have been exempted from ad valorem taxation, except for repair and replacement parts not incorporated as integral components. The ad valorem exemption would not have become effective until the proposed constitutional amendment on geothermal property tax exemptions (S.J.R. 44) was approved by the voters. The bill prescribed procedures for claiming the ad valorem exemption by filing an application with the appropriate tax assessor; the comptroller would have been directed to prepare a manual to aid tax assessors in administration of the exemption. Finally, the bill would have exempted from the franchise tax corporations engaged in the manufacturing, selling, or installing of geothermal energy devices, unless more than 25 percent of the business's outstanding common stock was owned by corporations that were otherwise ineligible for the franchise tax exemption.

The definition of "geothermal energy device" did not really cross-reference the definitions in the Geothermal Resources Act of 1975. A geothermal energy device was defined as "that part of a system or series of mechanisms, including casings, pumps, and pump equipment, designed primarily to provide heating or cooling or to produce electrical or mechanical power or fuel by means of collecting or transferring the heat of the earth's interior." (emphasis added) The bill died in committee.

S.B. 796 (VALE)

This bill was to be a statutory followup to the proposed constitutional amendment (S.J.R. 43) creating a solar, wind, geothermal, and alternate energy fund. It would have taken effect if the voters approved the amendment.

The legislature would have been able to appropriate up to 75 percent of the fund for the making of loans to Texas residents or businesses for the acquisition and construction of solar, wind, geothermal, biomass, or tidal or other hydraulic energy devices used for the generation of electrical or mechanical power or for heating and cooling for residences, businesses, or manufacturing plants. The legislature would have been able to appropriate the remaining 25 percent for the making of loans to state agencies, for the same purposes, with respect to state-owned buildings.

Revenue for the fund would have come from a severance tax placed on coal, lignite, uranium, iron ore, salt, gypsum, lime, gemstones, clay, stone, sand, gravel, talc and soapstone, and helium. The tax would have equaled five percent of the market value (as determined by the comptroller). It would have been imposed on each producer of these resources within the state, at the time of the first sale or distribution of the resource.

Collection and administration of the fund would have been delegated to the comptroller. The bill had various provisions related to administration, enforcement, and auditing, and it prescribed civil and criminal penalties for producers who fail to pay their full tax. The comptroller was to establish priorities and eligibility standards for loans, taking into account the availabiility of other financing. Interest rates were to be not less than six percent nor more than ten percent. Prior to any allocation of the collected revenue, one percent of the gross value of the tax was to be set aside for administration and enforcement. The bill died in committee.

H.B. 1490 (HANNA)

This bill amended the Geothermal Resources Act of 1975, to establish that all geothermal resource system components are to be treated and produced as mineral resources. H.B. 1490 was passed by the legislature and becomes effective August 27, 1979.

Specific provisions of the bill are discussed in detail in previous chapters where applicable.

Briefly, the bill amends the definition of "by-product" in the Act to include any element other than those previously listed under "geothermal energy and associated resources," brought to the surface from a geothermal formation. Further, the bill amends the Water Code to give the Railroad Commission of Texas exclusive responsibility for waste control and water pollution prevention (surface and subsurface), resulting from activities associated with the exploration, development, and production of geothermal resources. The Railroad Commission of Texas would issue waste discharge permits associated with these activities, based on Texas Department of Water Resources water quality standards.

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