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**LEGAL PROBLEMS INHERENT IN THE
DEVELOPMENT OF GEOPRESSURED AND
GEOTHERMAL RESOURCES IN LOUISIANA**

Final Report

By
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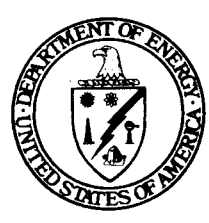
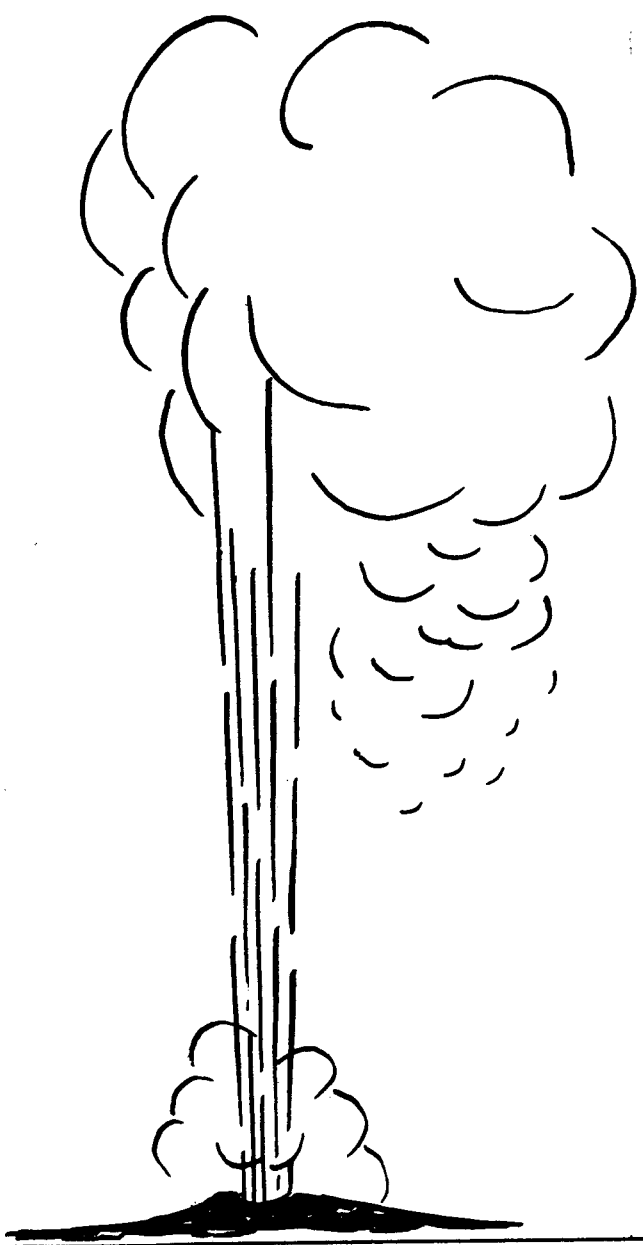
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Louisiana State University
Institute on Mineral Law
Baton Rouge, Louisiana
and

Louisiana State University
Advanced Studies and Research
Baton Rouge, Louisiana



**U. S. DEPARTMENT OF ENERGY
Geothermal Energy**

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IN THE DEVELOPMENT
OF GEOPRESSURED AND GEOTHERMAL
RESOURCES IN LOUISIANA

FINAL REPORT

PREPARED FOR U. S. DEPARTMENT OF
ENERGY

Under Contract No. E (40-1) - 5257 (Energy
Research and Development Administration)

by

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March, 1978

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PREFACE

The following report is the result of research sponsored by the U.S. Department of Energy, Louisiana State University at Baton Rouge and the Law Center of Louisiana State University. Needless to say, it reflects only the views of the authors and it is neither presented or represented as reflecting the opinion of the sponsoring agency or institutions, nor do the latter assume any responsibility for the accuracy or validity of any part of it.

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CHAPTER I

INTRODUCTION - SCOPE AND NATURE OF THE REPORT

It has generally been known for many years that there are zones of hot, highly pressurized aquifers lying several thousand feet below the surface of the earth roughly paralleling the Gulf Coast of Louisiana and Texas. These aquifers, which ordinarily are referred to as being geopressured, have been considered to be little more than unfortunate accidents of nature which increased the cost and risks of drilling for and producing the hydrocarbons which are found in great quantities in the same region. In recent years however there has been a growing awareness that the finite supply of the hydrocarbons on which our highly industrialized society is based makes imperative the development of alternate energy sources. As a result attention was directed to the geopressured aquifers as a possible source of such energy. The presence of hot, high pressured water found over such extensive area led to speculation that if the water could be produced in sufficient quantities its heat and pressure could serve as a significant and useful alternative to fossil fuels. As the geopressured zones were considered in this light and as the mechanics of their creation became better understood it was realized that not only might the heat and pressure of the water contained in them be converted to useful energy there existed an excellent possibility natural gas in the form of methane or other lighter hydrocarbons existed in solution in them and could be extracted in the course of producing the water. Although the relative volume of such hydrocarbons was believed to be modest (estimates ranging from a maximum of 40 to 100 cubic feet of gas per barrel of water), the tremendous size of the reservoirs and their extensive occurrence along

most of the Gulf Coast offered the possibility of producing truly significant amounts of natural gas. Accordingly, several years ago the United States Energy Research Development Administration (whose functions have since been transferred to the Department of Energy) began cooperating with various university, industry and scientific groups to sponsor research appraising the resource and the problems its development might entail. The present report represents one aspect of that research. It is directed to a consideration of the legal and related problems which may be encountered if the resource is found to be useful and capable of development in the State of Louisiana.

Before entering upon a discussion of the geopressured resource proper and the problems which may face its developer, a few comments may be in order as to the premises upon which this report is based and of the purposes for which it has been prepared. Legal problems do not exist except in the context of some human activity as it relates to a desired end or goal. Consequently, the problems which may be encountered in the development of the geopressured resource are inextricably related to the methods by which it will ultimately be exploited and the economic and technological considerations underlying those methods. Since the authors began work on this report there has been a very definite shift in emphasis by those interested in the resource. The early research was primarily directed to evaluating of the energy potential of the heat and pressure of the water. It was contemplated that this energy might be used to generate electricity or perhaps serve as a source for process heat and power for industrial applications. It was generally believed that, if methane was found in the water, it might serve as a useful byproduct

which would enhance the economic potential of the resource and perhaps provide sufficient additional value to justify what might otherwise prove to be marginal uses of the water. In recent months and particularly following the disastrous winter of 1977, more attention has been directed to the potential the resource may offer as a source of natural gas and the heat and pressure of the water, although not ignored, have been considered somewhat incidental to what is now believed may be the resource's most significant value. Such a shift necessarily results in a corresponding change in the importance of the various legal problems which the development of the resource may engender. If one envisions a large scale multi-well development of a reservoir covering many square miles producing large quantities of hot, high pressured water, removing from that water large quantities of methane and generating electricity with the heat and pressure it contains, the legal problems encountered will be different, much more complex and infinitely more difficult to resolve than will be the case if the envisioned development consists only of a single well drilled by the operator of a small nursery using the water as a source of heat for his greenhouses or if the heat and pressure are substantially ignored and the primary economic value of the reservoir is the methane and other hydrocarbons which are extracted from it. In the latter case although a well producing such methane will present vastly different economic and technological problems and entail significantly different risks to the operator than is the case with ordinary natural gas production it will nonetheless also bear considerable similarity to existing natural gas development and operation and this fact will undoubtedly influence the nature of and solution to the problems caused by its development.

Whether the development of the resource ultimately takes one or the other of these forms or some as yet unenvisioned mode is unimportant for present purposes. What is important, as it is hoped this report will demonstrate, is that the legal, environmental and institutional problems which will ultimately face the developer are greatly dependent upon the type and nature of the activity he intends to conduct as well as the economic parameters within which he is free to operate. Consequently, the scope of this report has been made as broad as possible and is perhaps to some degree more general and less specific in certain areas than the authors would have desired. Some of the concerns expressed in it will be irrelevant if the development proceeds along one line rather than another and some problems which do not now appear to be particularly significant may ultimately be found to be most critical to the success of the venture in terms of its legal implications. For this reason it may to some degree be said that the study is premature in light of the unanswered technological problems which surround the development of the resource. However, in the authors' view such is not actually the case. By defining the legal framework available for the resource's development and describing the consequences of its development in several modes, persons interested in it should be able to better evaluate the significance of some problems which are as yet unresolved and have available a foundation upon which the contractual arrangements for its development may be modeled. The study may also illustrate some of the perhaps less obvious problems of a given type of development which will be caused by the legal and institutional framework within which it will occur.

There is a substantial body of Federal law which will influence and regulate certain aspects of the resource's development which has not been analyzed by this report. This includes the numerous federal environmental regulations and statutes and those relating to the leasing of and operations on Federal lands. The geopressured developer will undoubtedly have to contend with these. They have not been discussed in detail in this report, although reference has generally been made to their existence where relevant. This omission is both intentional and not believed to be significant. The scope, nature and impact of the federal regulations upon such activities have been the subject of other studies and are well documented. Their application in Louisiana presents little that is unique or significant.

Louisiana's system of private law, including that relating to property and contract matters, is largely based on the civil law of the continent rather than the common law of England from which the system prevailing in the rest of the United States was derived. Although the institutions available in Louisiana for the regulation of contracts and property rights are, on the whole, such as to permit substantially the same results as prevail in the rest of the country, much of the terminology used and many of the concepts upon which these results will be based are unique to the state. For this reason it may appear to the reader who is already familiar with the law of Louisiana that the authors' have devoted an inordinate amount of time to an exposition of the fundamentals of this legal system. It was assumed that many persons who may be interested in this report will be generally unfamiliar with Louisiana's system. A brief explanation of the legal framework within which the development will

have to occur, particularly as that framework touches directly upon the development of the geopressed resource, should not only be useful but may be indispensable to an understanding of the problems created by the development of the resource and techniques for solving those problems.

Many of the statutes and regulations which may touch upon the development of the resource are scattered throughout Louisiana's Statutes and Codes. For a report of this nature to be truly useful it should assemble, insofar as possible, those regulations and statutes which have a bearing upon the development of the resource. The authors' have attempted to do this.

It may therefore be said that the purpose of this report is to discuss generally the legal framework within which the geopressed resource will have to be developed in Louisiana; to identify those problems which may be created by its development within that framework; to offer, where possible, solutions to those problems or at least to indicate techniques or devices which might be considered in their resolution, and finally to assemble a compendium of those statutory or regulatory provisions which may regulate or affect the resource to the end that it might serve as a handbook for the evaluation of the legal and institutional problems which will face a prospective developer, when and if the development of the resource is undertaken in Louisiana. As with any attempt to deal with a broad range of concerns which are of interest to a variety of persons, the results may not be entirely satisfactory to anyone. For this the authors offer no other apology.

CHAPTER II

THE ORIGIN AND NATURE OF GEOPRESSURED RESOURCES¹

The Gulf of Mexico is one of the world's oldest ocean basins having been formed during the earliest phase of continental drift some one hundred sixty million years ago. The present area of the Gulf (about 580,000 square miles) is apparently but a small remnant of what was once a much greater body, its size having been diminished by sediments carried into the basin from the erosion of the middle part of the North American continent. The earliest deposits appear to be of late Pennsylvanian Age (about 250 million years ago) and comparatively speaking, are not significant, being generally less than 3000 feet in thickness.

Some time during the Jurassic Period, which began about 150 million years ago, the area then encompassing the Gulf Basin became relatively isolated from the rest of the world ocean. This permitted a long period of intensive evaporative activity which in turn resulted in the deposition of an extensive deposit of salt known as the Jurassic Louann Salt.

During the Cretaceous time (beginning about 130 million years ago) the basin floor began to subside and the salt bed was covered by deposits of shale and limestone. The weight of these deposits combined with the tilting of the perimeter of the basin floor as a result of its subsidence forced some of the lighter and more plastic salt upwards through the overlying sediments in plugs or domes and extruded a large part of the rest forward and downward into the sinking basin.

During the Tertiary Period, beginning about 70 million years ago, there was a tremendous increase in the sedimentation of the basin. These sediments, consisting primarily of sand and clay were largely

deposited in typical deltaic formations extending into the gulf and overlaying the earlier deposits. The earliest depositions primarily occurred along what is now the lower Texas Gulf coast. The principal area of deposition later shifted to the north and east and since the early Miocene Period (beginning 21 million years ago) has been along what is now the Louisiana coast. This sedimentation was also accompanied by further continental sinking of the basin floor. The filling of the Gulf basin during this period apparently occurred in a number of cycles corresponding to the major deltaic deposits of the principal river systems carrying them. The magnitude of the sedimentation which has occurred since the beginning of the Tertiary Period is difficult to imagine. The deposits cover an area several times that of the present Gulf and in some places appear to be in excess of 30,000 feet thick.

The later depositions of sand and clay had the same effect upon the underlying salt bed as did the earlier Cretaceous limestone and shale, that is, part of the lighter and more plastic salt was extruded in great plugs toward the surface, some actually reaching it, and the mother body tended to be squeezed forward into the basin as it sank.

When a new delta was created by the shifting of a river system it would override older formations and form a wedge of deposits that gradually thickened to the gulfward and then thinned at the outer edge as they tapered downward to the Gulf floor ultimately assuming a somewhat lenticular shape. The weight of these new deposits, through a rather complicated geologic process, caused the earlier deposits lying under them to fracture and slip downward into the basin in thick blocks along distinct lines of cleavage paralleling the rim of the basin. This slipping was also accompanied by a rotation downward along the rear (or northern) edge of

the block at the point of fracture. This created a series of somewhat dome shaped sand and shale beds separated into large blocks along faults that generally parallel the northern rim of the basin which are frequently pierced and fractured by the extruded plugs of salt.

These deposits were then covered by additional deposits, which in some cases formed thick beds of impermeable shale creating a "ceiling" over the earlier deposits. This ceiling prevented the vertical migration of the water contained in the earlier deposits. The shape of the blocks created by the fracturing process and the presence of large faults along their northern and upward edges resulting from the process of slipping also effectively served to prevent the horizontal migration of the water. The trapping of the water prevented the settling and compaction of the deposits which would ordinarily have been accompanied by its extrusion.

Large blocks of sediments thus exist which are undercompacted because of the inability of water originally found in them to escape, and in which much of the pressure of the overburden is supported by the interstitial water trapped within them. The pressure of this water thus reflects a part of the overburden load. These areas occur at rather distinct depths and tend to have a "ceiling" which varies from place to place along the coast at depths ranging generally from 6,000 to 18,000 feet. When these zones are penetrated by drilling one encounters large relatively unconsolidated aquifers under pressure and at temperatures in excess of the normal gradients associated with their depth. The transition into these zones is sometimes quite abrupt and they are commonly referred to as being geopressured.

The geopressured deposits are hotter than normally pressured ones because the upward movement of the water has been stopped for millions

of years. Water is a rather poor conductor of heat and the undercompacted clay is a good thermal insulator, and since the specific heat of water is several times that of the associated mineral grains, the water has accumulated and stored considerable geothermal heat which would ordinarily have been carried with the water through the overburden to the surface and disseminated into the atmosphere.

There is empirical evidence indicating the amount of dissolved solids in the water may increase with depth and that the water nearest the top of the geopressured zones is in some cases relatively pure. It has been postulated that the aquifers for a few thousand feet below the top of the zone may contain water having less than ten thousand milligrams per liter of dissolved solids and that some water may even be potable and contain less than one thousand milligrams of solids.

Modern geologic opinion tends to the view that the tremendous deposits of oil and gas which are found along the Gulf coast were formed through the action of pressure and heat upon organic material contained in the sediments. A substantial amount of these hydrocarbons may have been created in the deposits which now comprise the geopressured zones. Hydrocarbons which are dissolved in superheated, highpressure formation waters will come out of solution as petroleum and natural gas whenever the pressure is released and the temperature drops or where the salinity of the water is increased. Where aquifers containing such hydrocarbons in solution were such as to permit the flow of water into less pressured areas, suitable for the accumulation of hydrocarbons, oil and gas deposits were formed. In those cases where water has been trapped and remains under high pressure and heat as in the geopressured zones, it is thought that it may be saturated with methane.

Consequently, it is believed that if such high-pressured, high-temperature waters are produced in sufficiently large quantities significant amounts of methane can be extracted from them and at the same time their heat and pressure may serve as a useful source of energy for conversion into electricity or other significant forms.

The economic value of these geopressured deposits essentially depends upon a number of factors, which to some degree also serve to establish parameters defining the type of legal and institutional problems which will be encountered in their exploitation. The most important of these factors are: 1) the heat of the water; 2) the pressure of the water; 3) the porosity and permeability of the aquifer; 4) the source and nature of the "drive" contributing to the continued maintenance of the reservoir pressure; 5) the areal extent and thickness of the aquifer; 6) the amount of methane in the water; and 7) the nature and amount of dissolved solids in the water.

Before entering upon a consideration of the legal problems which the development of the resource may present, it is appropriate to briefly describe the significance of each of these factors to the development of the resource as a useful source of energy.

1. Heat. The temperature of the earth increases with depth. Such increases are relatively modest at depths to which wells can be drilled with present technology unless they have somehow been enhanced as in the case of the geopressured resource. The temperatures which are expected to be encountered in the geopressured zone are estimated to be between 250 and 400 degrees fahrenheit although substantial quantities of fluids at the higher range have not yet been precisely identified. It appears doubtful that aquifers whose temperatures are less than 250 degrees contain

useful amounts of energy and existing research has been based upon the premise that fluids with temperatures in the 300 to 350 degree range will be of primary importance.

2. Pressure. To be usable the pressure in the formation must obviously exceed by a significant amount the hydrostatic pressure of the fluid column at the depth from which it is being produced as well as the frictional losses incurred in the production process. This latter factor means that the well head pressure which may be obtained from a given reservoir pressure is also a function of the size of the well bore. Generally speaking, the reservoir pressures which are anticipated in the geopressured zones, although high, will not permit "working pressures" much in excess of 1500 to 2500 pounds per square inch at the surface assuming a fairly large well bore and rather high rates of production.

Significant pressure losses, as well as temperature declines, may occur in transporting the water through pipelines. Accordingly it has generally been assumed that the utilization of the energy from these sources will have to occur relatively close to the point of production.

3. The Porosity and Permeability of the Reservoir. The porosity (the ability of a formation to contain fluids) and permeability (the ability of fluids to flow through the formation) primarily determine the rate at which the aquifer will deliver water into the well bore, and have little direct legal significance. However, the uses of the resource which are presently contemplated will require substantial quantities of the water to be produced at high rates. Those aquifers with high porosity and permeability may be the most suitable for use. High porosity and permeability may also indicate a high degree of undercompaction in the reservoir. The extraction of large quantities of water from such aquifers

over a long period may result in subsidence or compaction of the producing formation to a greater extent than would be the case if more compacted and consolidated formations were utilized. This may enhance the risk of surface subsidence or tectonic activity.

4. Source of the Reservoir Energy. There are three potential sources of energy which may contribute to the pressure of the aquifer producing the geopressured resource and which will thus directly influence the length of time a given reservoir may be expected to produce water at pressures which are above normal.

The first is simply that resulting from the compression of the water itself. Although it is perhaps commonly assumed water is incompressible this is not, in fact, the case. Water at 10,000 pounds per square inch pressure actually will be compressed to .955 of its volume in the free state. While this is a relatively small amount, the total energy inherent in such compression can be quite large when one is dealing with the volumes encountered in aquifers of the size which may exist in the geopressured zones. One study, postulating a reservoir of 100 feet effective thickness and covering an area of 50 square miles, concluded that the compression energy alone could maintain production rates and pressures in eight wells producing 40,000 barrels per day each for a period of 8 years.

The second source of potential reservoir energy is the weight of the overburden which is being supported by the aquifer. If it is assumed that as the water is produced, the overburden will settle and compact the producing formations then the pressures will be to some extent maintained so long as the process continues.

A third source of potential energy closely related to the second is found in the fact that much of the water in the producing aquifers

(which will primarily be unconsolidated sands) appears to have been forced into these sands from adjacent deposits of shale. In theory at least, as the pressure is relieved within the aquifer the adjacent shale beds should also settle and extrude additional water into the sands thus creating a form of "water drive" which will maintain the excess pressure.

Although having little direct bearing upon the legal problems inherent in the development of the resource the nature of the processes at work in maintaining the pressure do have legal significance. For example, if the subsidence of the overburden is a significant source of reservoir energy, whether it will have any effect upon surface contours must be considered. The nature of processes also indicate that the energy source will have a finite life and that the reservoir should be considered depletable. In the case of large aquifers of unknown or poorly defined limits some consideration may have to be given, at least by regulatory agencies, to the possibility that valuable accumulations of hydrocarbons may also exist within them and of the effect a reduction of pressure might have upon the ultimate production of such hydrocarbons. Finally, a reduction of pressure in the aquifer will reduce its capability of holding methane in the solution, and some part of the dissolved methane may come out of solution while it is still in the reservoir. Whether and to what extent an accumulation of this methane might occur at favorable locations is not known. The existence of such accumulations may give rise to difficult questions as to the rights of the persons possessing interests in the land under which the reservoir lies to enjoy and produce them.

5. The Methane Content. The amount of methane which water can hold in solution is a function of its pressure, temperature, and the amount of dissolved solids it contains. Some studies indicate the

geopressured water could contain up to 40 cubic feet of methane per barrel. Some more recent studies would indicate 80 to 100 cubic feet per barrel to be a possibility. That small quantities of free methane may exist in the aquifers and be produced with the water must be considered a possibility. The methane content of the water is perhaps the most crucial parameter to the economic value of the resource. Taken by itself 350 degree water with 2000 pounds per square inch working pressure does not appear to afford sufficient energy for the economic generation of electricity in significant quantities under present economic conditions although some industries might find such water useful for process heat or power. At present it appears the absence of significant quantities of methane will render the resource of doubtful immediate economic value. It is of course possible that improvements in technology for the extraction of energy from low temperature, low pressure fluids and the increasing cost of alternate energy sources may improve the situation. On the other hand, if methane is encountered in large enough volumes (assuming a continued escalation in the price of natural gas) it is not inconceivable that the resource could be useful as a primary source of gas with heat and pressure being considered essentially byproducts. For example, a well producing 25 thousand barrels of water per day containing 40 feet of methane would produce a million cubic feet of gas per day. By current standards this would be considered an acceptable rate of production for a gas well, if one does not take into consideration the increased difficulty and expense involved in producing and disposing of water in such large quantities. If gas is encountered in the higher ranges which have been postulated (80 to 100 cubic feet per barrel) and if the water can be produced under circumstances which will permit it to be easily

disposed of without adverse environmental effects there appears to be a point at which the value of the gas will itself be the predominant consideration in the economics of the venture.

Although the purpose of this study is not to evaluate the economic feasibility of the resource, whether or not the dissolved gas or methane is considered to be a "byproduct" or whether it might be economically produced in its own right without regard to the usefulness of the heat and pressure of the water may have far reaching effects upon the legal principles and devices which will regulate its use and determine its ownership.

6. Size of Reservoir. The useful appropriation of energy from geopressed sources will almost certainly require production of large quantities of water over long periods of time. For example, one study indicates that a 25 megawatt generating plant (which is certainly modest by contemporary standards) would require continuous production from eight wells each producing 40,000 barrels of water per day for a period of 20 years. To support such high levels of production over such a long period the reservoir being drained must certainly cover an extensive area. The study in question postulated the eight wells would be drawing from an area of approximately 50 square miles.

To justify construction of the facilities which may be required to exploit the resource and perhaps satisfy investors or regulatory agencies of the feasibility of the project it may be necessary for the developer to have assurance that the integrity of the reservoir will be preserved; that he is vested with right to exclusively produce water from it over the life of the venture and that he has an effective means of preventing others from conducting activities which are prejudicial to the operation of the venture. Other forms of mineral development seldom required effective

control of such vast areas and the legal devices and techniques which have been devised for their development may prove to be unduly complicated or expensive if applied to the geopressured resource.

7. The Amount of Dissolved Solids. One of the most obvious problems with which the developer of the resource will be confronted is the disposition that can be made of the water after the energy contained in it has been extracted. Obviously the higher its salinity or the greater the content of other solids the fewer options he will have and the more difficult it may become to satisfy environmental concerns. On the other hand, if the water is relatively pure and uncontaminated, questions may be raised as to whether the depletion of such aquifers for energy purposes is in the public interest in light of the increasing demand upon existing water supplies.

FOOTNOTES TO CHAPTER II

1. The description of the geothermal resource contained in this chapter is a composite of data generally available from numerous sources. The most complete and comprehensive summaries of the resource and the technological problems it presents are found in: Jones, Geothermal Resources of the Northern Gulf of Mexico, Geothermics II, (Special Issue 1970); Proceedings: First Geopressured Geothermal Energy Conference (1975); Proceedings, Second Geothermal, Geopressured Energy Conference (1976); Geothermal Energy, (Energy Technology Review No. 4, 1975).

CHAPTER III
AN APPROACH TO THE DEVELOPMENT
AND REGULATION OF GEOPRESSURED RESOURCES

In considering the feasibility of exploiting a geopressured resource two questions immediately come to mind. The first and most obvious of course, is who owns it, or perhaps more properly, who possesses the right to produce the water and extract its heat, pressure, and methane for useful purposes? The second is in what manner may the owner of the resource alienate his rights?

The nature of the resource is such that substantial amounts of capital will obviously have to be committed to any project for its development and use. Accordingly, if one assumes private ownership and development, legal devices must be available to permit the property owner, the developer, and the user of energy to allocate the risks and benefits of exploitation in a manner consistent with its economic realities. Furthermore, in light of the considerable area which such a development is likely to cover, the length of time which may be required for its successful completion and the large amount of capital which may have to be invested for the facilities necessary to conduct the venture, these devices must have a fairly high degree of certainty and permanence and must not be unduly expensive or complicated to institute and maintain.

The development of the resource will obviously entail the extraction and disposition of large volumes of extremely hot and perhaps highly mineralized water from a large area of the ground. Any large scale exploitation will involve the construction and operation of extensive production and generating or other facilities necessary to capture and

utilize the energy found in the resource. By definition such activities will significantly modify the existing environment and some method must be available to ensure that any adverse consequences to society do not outweigh the benefits gained from them.

The legal devices which have been developed for the conduct and regulation of other types of endeavors, such as the exploitation of oil and gas, the mining of hard minerals, and the regulation of water rights provide models from which one may fashion the devices required to develop geopressured resources and regulate their use. In using such models however, it must be realized that economic considerations have as much, if not more to do with the form in which legal transactions are cast and the substance of their provisions than do the physical characteristics of the activity or the resource. Any attempt to mold the development of geopressured resources into the arrangements which have been developed for the exploitation of other kinds of energy may be totally inappropriate despite a superficial resemblance between them. Comparing the geopressured resource with oil and gas and attempting to regulate its development by the arrangements devised for the latter because both require extraction by the drilling of wells or because methane is present in the geopressured water, or equating the development of a geopressured resource with production of water and regulating it by the rules devised for the allocation, apportionment and transfer of the risks to use water for irrigation or industrial purposes, because the heat and pressure of the geopressured resource are contained in water or suggesting that the resource be "classified" as a "mineral" and thus inferentially asserting that it should be regulated under general mining laws because water may be scientifically classified as a "mineral" all represent techniques which may create the illusion of certainty and comfort since one can

then point to an existing body of "law" to "answer" difficult questions. They may none the less prove detrimental in the long run if the underlying assumptions as to the type and nature of investment and the risks of development and operation upon which such rules are based are not appropriate for the geopressured resource.

The devices which will be used for its development will have to fit within the framework of existing legal regimes or of those which the legislature may be prevailed upon to adopt. However, they should be fashioned in light of the needs of the parties who desire to exploit the resource and the interest of society in it rather than by choosing patterns which may be inappropriate to those needs merely because of some supposed similarity in the physical characteristics of the resource or the activity required for its exploitation.

The authors suggest that the desire to apply existing devices for such reasons is somewhat apparent in the current literature. Thus, in the Gulf Coast area there is the tendency to assume the exploitation of the geopressured resource is analogous to oil and gas development. The geopressured leases in general use are adaptations of standard oil and gas leases. The discussions of the legal systems are centered upon whether the resource may be classified as a mineral for the purpose of placing it within the framework of the rules regulating the exploitation of oil and gas.¹ On the other hand, persons looking at geothermal development in those western states which have a highly sophisticated body of water law, tend to view it as "water" and wish to regulate it within the framework devised for it.² In other areas, there is an obvious desire to classify geothermal resources as a "mineral" so that it may be regulated under the laws which have been devised for the exploitation of minerals generally.³

Some of these approaches may be appropriate and as a matter of convenience the scheme for regulation of the resource will probably be fashioned within the existing legal structure by analogy or extension. It is suggested that the matter should be approached pragmatically and functionally with a recognition that the development of the geopressed resource may involve problems and conflicts which should be resolved on their own merits. The attaching of labels such as "gas" or "mineral" or "water" to the resource, if used as a physical description of its constituent parts is one thing. To use such labels to characterize the legal nature of its ownership and of the methodology for its development so as to incorporate by reference an existing body of law will undoubtedly give results which are incompatible with the basic nature of the resource and the realities of its development.

What devices then are available which can be used to fashion and regulate a legal regime for the exploitation of the geopressed resource? What problems do they present? What changes or other modifications should be made in them to make them compatible with the desires of the parties engaged in the activity and with the justified expectations and interest of society. These are the questions which this study will essentially explore.

FOOTNOTES TO CHAPTER III

1. Overbeck, The Geopressured Geothermal Resources of Texas 5 Geothermal Energy Magazine 18 (1977);
Hudson, Salt Water is a Mineral: Ownership of a Natural Resource of Increasing Importance in Oil Producing States, 50 Texas Law Review 448 (1977).
2. Vranch and Musick Geothermal Resources: Water and other conflicts encountered by the Operator, Proceedings, Geothermal Resources Development Institute (1977), Chapter 6.
3. Randall, Acquisitions of Geothermal Rights, 1 Idaho Law Review 49 (1964); Brooks, Legal Problems of the Geothermal Industry, 6 Natural Resources Journal 511 (1966). See also Olpin, The Law of Geothermal Resources, Rocky Mountain Mineral Law Institute 123 (1969) where the author discusses essentially the same problems with respect to western geothermal resources.



CHAPTER IV
OWNERSHIP OF THE RIGHT TO EXPLOIT A GEOPRESSURED RESOURCE
AND
HOW IT MAY BE CONVEYED

I. IN GENERAL

The threshold question which must be addressed in determining how the geopressured resource may be developed is whether the right to exploit it is public or private; that is, whether it is owned by the landowner under whose land it is found or whether it may be said to belong to the public so that the right to its exploitation may be granted and regulated exclusively by the state.

II. IS THE GEOPRESSURED RESOURCE PRIVATELY OWNED?

Article 448 of the Louisiana Civil Code defines the word estate, as "... anything of which riches or fortunes may consist." The word "things" as used in the Code is synonymous with "estate". Article 449 says "things" are either susceptible or insusceptible of private ownership. Things insusceptible of private ownership are declared to be either common or public.

A. Things Insusceptible of Ownership

Article 450 defines "common things" as:

Those the ownership of which belongs to nobody in particular, and which all men may freely use, conformably with the use for which nature has intended them; such as air, running water, the sea and its shores.

Article 482, declares "common things" are never susceptible of private ownership. The tenor of Article 450 obviously indicates the examples given are not exclusive but only illustrative. It is difficult however, to determine whether a thing not expressly identified as such falls within the category of common things. This is recognized by Planiol, when he writes, concerning the French Civil Code whose provisions are much the same as Louisiana's:

The greatest confusion exists at the present moment in regard to the nature of the principle which would be at the basis of this distinction (of common, public and private domains).²

Aubry and Rau would include solar heat and the right to travel through the air in the list of common things under French law.³

The only indication of a generic trait expressed in Article 450 itself is that nature has created such things so that everyone may take of them what he needs personally without depriving anybody else of them.⁴ This however is not true of the sea or its shores, and obviously does completely explain the basis for the classification.

One source of the difficulty is that the genesis of this classification of things is found in the Roman law and to that extent it may be considered as being based more upon historic than logical considerations. The Romans included within the general classification of common things those things that were considered incapable of being owned for a variety of reasons. Some were not susceptible of ownership for social, political or religious reasons; some as a result of historic accident and some because it was not considered possible to exercise exclusive dominion over them--which was considered an indispensable attribute of ownership.⁵

Articles 3415 and 3416 dealing with wild animals, embody a principle, which is historically of similar origin to the concept of common things and serves somewhat the same purpose. The articles are found in the Chapter of the Code entitled "Of Occupancy".⁶ Article 3412 defines occupancy as

A mode of acquiring property by which a thing belonging to nobody becomes the property of the person who took possession of it, with the intention of acquiring a right of ownership upon it.

Articles 3415 and 3416 then provide that wild animals and birds become the property of the person who captures them. Inferentially they also declare such creatures have no owner while they are in the wild state. They may be captured by anyone even while they are upon the lands of another, although the Code also recognizes that a person may prohibit the public from hunting them upon his property.⁷ To some degree the classification of common things functionally operates in the same manner. Air and water from streams obviously may be appropriated in part and when reduced to possession the substances become owned by their appropriator.⁸

The state from time to time has also defined other kinds of things in such a manner as to create the impression that they are somehow the common property of all of its inhabitants. For example, Section 1 of Article 9 of the 1974 Louisiana Constitution provides:

The natural resources of the state, including air and water and the healthful, scenic, historic and esthetic quality of the environment shall be protected or conserved and replenished insofar as possible ...

In a sense the classification of things which are not owned also serves to establish the limitations of ownership. Civil Code Article 505 declares ownership of land "carries with it all that is directly above and under it" and that the owner "may make upon it all the plantations

and erect all of the buildings which he thinks proper and construct below the soil all manner of works, digging as deep as he deems convenient and draw from them all benefits which may accrue ...". If one assumes all land in the state is inherently susceptible of private ownership, and thus theoretically may be private, it is obvious that most things which are declared to belong to no one, such as air, running water and wild animals, may at all times be on or over someone's land.

If Article 505 were read in isolation one might receive the impression that the ownership of land carries with it the right to prohibit an airplane from flying over it or to appropriate all game on it or water running through it. However, when the article is read within the total context of the Code including those articles defining common things it is apparent that the idea intended to be communicated is that ownership of land includes only those things necessary to the enjoyment of the land itself, and that it does not include those things over or under the land over which dominion cannot be effectively exercised or which are unnecessary to its enjoyment. Space above the land is owned only as incident to the use of the land. Accordingly, flying an airplane over another's property would not be deemed a violation of the latter's rights of ownership unless, for example, the flight occurred at such a level as to impede or substantially interfere with the owners right to use his land. ⁹ Furthermore, the inability of a landowner to exercise exclusive dominion over running water or game in its wild state exclude them as being "owned" by him merely because they cross his land.

Another and perhaps unintended consequence of a legislative declaration that certain things cannot be privately owned (provided the declaration is made at a period sufficiently early to prevent private rights from ever attaching), is that by a simple amendment the legislature

may assert that what is insusceptible of ownership shall thereafter be "owned" by the state. This has been the pattern in Louisiana.

The legislature has reclassified most of the things which the Code originally declared to belong to no one to the category of things "belonging" to the state. Running water must now be considered a public thing owned by the state,¹⁰ as must the sea,¹¹ and its shores.¹² Wild animals have also been declared to "belong" to the state.¹³ This reclassification leaves as those things which are not "owned", only the air, solar heat, and the right of air travel if one accepts Aubry and Rau's analysis.

B. Are Geopressured Resources Insusceptible of Ownership?

If one were to approach the question totally unencumbered by the past, it would appear the state might have an excellent case to assert that geopressured resources should be classified as things like the air, water, and wild animals which, although found upon or passing through the property of an individual, are not such as are owned by him merely because he is the owner of the land.

Certainly subterranean waters which percolate through the ground or deposits of fossil water laid down and concentrated by geological processes at work over vast areas which an owner of land cannot by any practical means confine and over which he can neither exercise exclusive possession or control in their natural state bear considerable resemblance to the kinds of things that have been expressly declared to be common and from which private ownership is excluded. This is particularly persuasive if one assumes that one purpose of classifying things as common or private is to define the limits of enjoyment which ownership of land gives and that such ownership implies dominion over that which is owned.¹⁴

On balance however, it does not appear that such an approach could withstand judicial scrutiny at this time. The law has generally considered the right to exploit substances of any kind lying beneath the surface of the earth to be so intimately associated with the ownership of land as to comprise an inseparable part of its value. Article 505 has been interpreted to give the owner of land broader rights with respect to things under its surface than to those in the air space above it.¹⁵

Oil and gas are to some degree considered fugacious minerals. They are not owned "in place" by the landowner and his rights with respect to them are defined as only permitting him to capture and reduce them to possession.¹⁶ Nonetheless, the right to appropriate them belongs exclusively to the owner of the land in which they are found and is considered to be an inherent attribute of that ownership.

Even though the right to appropriate a substance is vested in the landowner one may still argue the state could differentiate the right to capture a thing from the ownership of the thing itself and permit the former to be exercised only so long as it chooses to let "its" things be captured. It has done this with wild animals¹⁷ and, perhaps, other "common things" such as running water. Could it not do the same with the geopressured resource?

Such an approach would present the very formidable task of circumventing the principle first established by the U.S. Supreme Court in the case of Ohio Oil Co. v. State of Indiana¹⁸ and since accepted as a fundamental premise of property law in Louisiana as well as throughout the rest of the country. In that case the court held that while the states may variously classify the landowner's relationship to oil and gas as representing either the ownership of them in place or merely a right to reduce them

to possession, however characterized, such rights are so much an integral part of the value of the property that a state could not totally appropriate the minerals without in substance also depriving the landowner of a valuable property right for which compensation would have to be paid. The court's reasons for its holding were expressed as follows:

If the analogy between animals *ferae naturae* and mineral deposits of oil and gas, stated by the Pennsylvania court and adopted by the Indiana court instead of simply establishing a similarity of relation, proved the identity of the two things, there would be an end of the case. This follows because things which are *ferae naturae* belong to the "negative community;" in other words, are public things subject to the absolute control of the state, which, although it allows them to be reduced to possession, may at its will not only regulate, but wholly forbid, their future taking. *Geer v. Connecticut*, 161 U.S. 519, 525, 40 L.Ed. 793, 795, 16 S.Ct. Rep. 600. But whilst there is an analogy between animals *ferae naturae* and the moving deposits of oil and natural gas, there is not identity between them. Thus, the owner of land has the exclusive right on his property to reduce the game there found to possession, just as the owner of the soil has the exclusive right to reduce to possession the deposits of natural gas and oil found beneath the surface of his land. The owner of the soil cannot follow game when it passes from his property; so also, the owner may not follow the natural gas when it shifts from beneath his own to the property of someone else within the gas field. It being true as to both animals *ferae naturae* and gas and oil, therefore, that whilst the right to appropriate and become the owner exists, proprietorship does not take being until the particular subjects of the right become property by being reduced to actual possession. The identity, however, is for many reasons wanting. In things *ferae naturae* all are endowed with the power of seeking to reduce a portion of the public property to the domain of private ownership by reducing them to possession. In the case of natural gas and oil no such right exists in the public. It is vested only in the owners in fee of the surface of the earth within the area of the gas field. This difference points at once to the distinction between the power which the lawmaker may exercise as to the two. In the one, as the public are the owners, every one may be absolutely prevented from

seeking to reduce to possession. No divesting of private property under such a condition can be conceived, because the public are the owners, and the enacting by the state of a law as to the public ownership is but the discharge of the governmental trust resting in the state as to property of that character. *Geer v. Connecticut*, 161 U.S. 519, 525, 40 L.Ed. 793, 795, 16 S.Ct.Rep. 600. On the other hand, as to gas and oil the surface proprietors within the gas field all have the right to reduce to possession the gas and oil beneath. They could not absolutely be deprived of this right which belongs to them without a taking of private property.¹⁹

It is of course possible to argue that because of its peculiar nature and for historic reasons, water should be treated differently from those substances which have traditionally been considered as minerals and that the appropriation of the heat, pressure and methane in geopressured water should also be viewed as not coming within the ambit of the principles referred to. This also appears to be of doubtful validity.

The landowners right to reduce subterranean water to possession has been recognized by at least one Louisiana intermediate appellate court. In *Adams v. Grigsby*²⁰ the court was required to determine the nature of the ownership of subterranean waters. In deciding this issue, the Court noted that:

Underground waters are generally classified either as flowing waters ... in the nature of the underground streams and rivers or as percolating waters which seep or move slowly through underground sands or reservoirs without a definite channel or in the course that is uncertain or unknown.²¹

It then held that, however they are classified, the right to appropriate them is an integral part of the ownership of the land in the same manner and to the same extent as is the right to appropriate oil and gas. In fact, it pointed out that in fashioning a regime of ownership for oil and gas the early courts based their holdings, in part at least, upon

the similarity of the substances to water and applied to oil and gas²²
 what they perceived to be the rules relative to subterranean waters.

²³
 The Geothermal Energy Resources Act, about which more will be said later, also indicates that the right to exploit geopressed resources is vested in the owner of the land under which it is found. Section 801 defines geothermal resources as "all products of geothermal processes embracing... geopressed waters ... heat, natural gas dissolved in formation water... and other associated energy found in geothermal and/or geopressed water formations". Section 802 gives "regulatory authority over all geothermal exploration, drilling, development and production" to the State Department of Conservation. The act then extends the provisions of the Louisiana Conservation Act including²⁴ "particularly but without limitation, R.S. 30:5 and R.S. 30:9" to all geothermal operations. The sections of the Conservation Act referred to provide for the unitization of mineral interests and the allocation and apportionment among the various property owners of the minerals produced from such units. Section 804 gives to the State Mineral Board "exclusive authority to lease for the exploration, development and distribution of geothermal resources ... any lands belonging to the state or the title to which is in the public domain". Finally, the last paragraph of the act states that its provisions are not intended to "deny the legal right or remedy of any owner for the protection of his property interests that is otherwise available to such ownership under the law". While it is true the act does not explicitly declare geothermal resources belong to the owner of land under which they lie, its provisions are neither understandable nor workable unless one assumes this to be the case.

C. Are Geopressed Resources Public Things?

The second class of things insusceptible of private ownership are "public things", which Civil Code Article 453 says,

...are those, the property of which is vested in a whole nation, and the use of which is allowed to all the members of a nation of this kind are navigable rivers, seaports, roadsteads, and harbors, highways, and the bed or rivers, as long as the same are covered with water ...

Article 454 says, "things which are for the common use of a city or other place, as streets and public squares, are likewise public things." If the right to exploit the resource is deemed to be an integral part of the value of the land under which it is found then it would follow it is a private thing when under private lands and a "public thing" when under public lands.

The classification of public things is of different nature and the expression "insusceptible of private ownership" carries with it different connotations than is the case with "common things" which are declared to be insusceptible of ownership at all. Perhaps the most lucid explanation of the concept of public things as well as their relationship to common and private things is found in the exposé de motif of the revision of Title I of Book II of the Civil Code (in which are Articles 450 and 505 are found) recently prepared by the Louisiana Law Institute for submission to the legislature.²⁵ In that work the following comments were made relative to the nature of the classification of things which are declared to be public.

'Private ownership' or simply 'ownership' in the Louisiana Civil Code of 1870 is implicitly contrasted to 'public ownership', i.e., ownership under rules of public law rather than under the Civil Code. In this respect, 'public ownership' may be misnomer. Strictly speaking, under the Code, things which may not be owned by private persons, are things of the public domain over which the State and its political subdivisions exercise police power in the interest of all. Quite aptly, the interest of public bodies in things not susceptible of private ownership has been termed in France *domanialite publique* rather than *propriete publique*. See Yiannopoulos, *Civil Law Property Secs.* 30, 31 (1966). In France, the classification of state property into property of the public domain and property of the private domain rests on the ideas that property of the domain is governed by rules of public law and that property of the private domain does not differ at all from property held by private persons.

In Louisiana it would be contrary to reality to assert that any kind of state property is essentially subject to the rules governing private ownership. All state property is exempt from seizure and not subject to prescription. Further, if alienation of state property is legally permissible, it has been made in accordance with special procedures. Still further, no conceptual distinction is made today in Louisiana between public law ownership and private ownership under the Civil Code. On the contrary, statutes and jurisprudence indicate that certain things which in France would be considered to be within the public domain, are "owned" in Louisiana by the state or by its political subdivisions. Thus, the theory of the public domain, incorporated in the Louisiana Civil Code of 1870, is fully dispensable today. In Louisiana, property of the State and its political subdivisions may be classified into property which according to constitutional and statutory provisions is inalienable and thus insusceptible of private ownership (public things) and property which may be alienated and owned by private persons (private things of the State and its political subdivisions). Accordingly, in the proposed text, public things are defined as those which are owned by the State and its political subdivisions in their capacity as public persons.

Public things that belong to the State are such as running waters, the waters and bottoms of natural inland navigable water bodies, the territorial sea, and the seashore. Public things that belong to the political subdivisions of the State are such as streets and public squares.²⁶

In essence then, "public things", are those things which are for the time being "owned" by the state or one of its subdivisions. For example, the ownership of the beds of navigable streams in Louisiana is declared to be public.²⁷ This has been deemed to vest the state with the same rights over the area covered by the water as if it were privately owned. The state may lease the bed of navigable river to grow oysters on it or to drill for and produce oil and minerals from under it.²⁸ In general, with reference to public things, the state is considered to be a "proprietor" or owner of a thing the use of which is dedicated or devoted to some public purpose. Furthermore for a thing to be "public"²⁹ it must have been "acquired" by the State in its sovereign capacity. Unless the geopressed resource can be equated with things that are common--that is not owned by anyone they must be considered as being owned with the land under which they are found. There would appear to be no basis for holding them to be public, unless the lands over them are also public. This is borne out by the Geothermal Energy Resources Act which indicates the geopressed resource may be leased by the state when they are found under "public lands". The clear inference is that the right to lease them is determined by the ownership of the land and if they are under private lands the owner of the latter should have the same right.

D. Conclusion

On balance, there would appear to be little doubt that the right to exploit geopressured resources must at this time be considered to be private property (except where they are under public lands) although as will be developed later, such right is also susceptible of very broad and extensive regulation by the state. If the rights are private property the legal framework within which the exploitation of the resources must presently occur is prescribed by the Louisiana Mineral Code as supplemented by the provisions of the Civil Code.

III. LOUISIANA'S PROPERTY REGIME - A GENERAL DESCRIPTION

Louisiana's basic property regime, unlike that prevailing in the rest of the country, is not founded upon the Common Law of England but is derived from the Civil Law system prevailing in most of the western world and ultimately finds its genesis in the Roman Law.

The principles and rules regulating the ownership of property under this system are found in the Civil Code of the State. The Code, largely modeled after the Code Napoleon of France, was originally adopted in 1808. While modified extensively in 1825 it has since served, with only minor revisions, as the basic foundation of Louisiana's system of private law. The Code obviously did not contemplate the extensive mineral development which has since occurred in the state and which represents such an important part of its wealth. As previously mentioned, in those countries from which the Law of Louisiana was derived, minerals were largely considered as a prerogative of the State. Consequently, the Civil Code does not directly deal with the subject and provides little real help in classifying or regulating contracts for such purposes.

When extensive mineral deposits were discovered in the state the courts were thus faced with the problem of how contracts for their exploration and development should be fitted into the state's property system. As a result the mineral law of Louisiana to a large degree was developed by the courts between the years of about 1920 and 1974 by relying upon basic principles found in the Civil Code and adapting them to the peculiar exigencies of the industry.

In 1974, after a decade of work by the Louisiana Law Institute, a comprehensive mineral code was presented to and adopted by the legislature. This code now regulates the regime of ownership which prevails in Louisiana for the exploration, development and production of minerals and other substances from the earth. It largely codifies the law which was developed prior to its enactment and to this degree represents a restatement and extension of the principles which the courts had worked out for that development. Accordingly, some comments as to the nature of Louisiana property law generally and the early development of Louisiana's mineral law in particular are required to fully understand its provisions and the problems of integrating the devices for developing geopressured resources into it.

A. Basic Principles of Louisiana's Property System

Under the Civil Law ownership of land is allodial. Estates as known in the common law are nonexistent. The distinction between legal and equitable titles is unknown. In theory, ownership consists of three basic elements: usus, fructus and abusus. Usus is deemed to be the right to use a thing or, perhaps more properly, to exclude others from use. Fructus is the right to enjoy the fruits and revenues of

thing. Abusus is the right to dispose of the thing. When all of these elements are united in one person and are unencumbered by rights belonging to anyone else, ownership is said to be perfect.³¹ This in a general way approximates the fee simple title which prevails in the Common Law.

Ownership may be dismembered into its constituent parts but the means by which this is done is actually quite limited. Several persons may own property in indivision as co-owners. This, although dividing the rights of ownership, is technically not a dismemberment of them since each co-owner is deemed to be fully vested with all of the rights of ownership but in indivision with his co-owners.³² A dismemberment of the exclusive right to enjoy some aspect of, or right over property in less than perfect ownership, with a few exceptions not relevant to the subject under consideration, may only be accomplished by the imposition of a servitude upon the property.

A servitude may be broadly defined as a charge upon land in favor of a person or another tract of land which creates a limited right to use (or to prohibit the use) of the land for the benefit of the person or estate in whose favor of it is established. The servitude is a device of great flexibility and variety. Building restrictions, rights of ways or easements, usufructs (which may be likened to the common law life estates) and even the obligation not to make a work upon one's land which may injure his neighbor ("a nuisance") are all varieties of servitudes.

An owner may also lease the exclusive right to use his lands to another. The ordinary lease however is a contract between the owner and the lessee and does not directly confer upon the lessee any interest in the property. The lessee's rights are personal (contractual) and not real, although if the lease is properly recorded they are protected

against subsequent alienations of the land.

All dismemberments of ownership are subject to two largely unarticulated but fundamental precepts which permeate the Civil Law of property. First, a thing should not be removed from commerce indefinitely by restraints on its use or disposition. Second, perfect ownership of a thing should be restored as often as possible by the reunion of its constituent elements and the extinction of useless or unnecessary charges.

The first is exemplified by the fact that a servitude must have for its object some benefit to the estate or person in favor of whom it is established. The law allows only the creation of servitudes that have some useful purpose. Unreasonable whims of the parties or those things which serve no socially useful purpose may not give rise to their creation. This utility does not have to be purely economic, it may be social or even aesthetic. Nor does it have to exist at the time the servitude is created, a possible convenience or future advantage is sufficient. But if it is evident that a charge placed upon the land serves no purpose related to its use or enjoyment or to that of other lands it generally will be invalid.³³

An example of the second is found in the fact that although servitudes may, in theory, be perpetual, they prescribe (are extinguished) if they are not used during any continuous ten year period.³⁴ Thus a right of way across property, if not used, will after ten years be extinguished by operation of law and the land freed of its burden. This is a matter of public policy that cannot be contracted against.³⁵ Another example is that co-owners of property have an absolute right to partition it.³⁶ They may require that it be divided in kind so that each acquires a segregated part of the property or, if such division cannot be made

without diminution in the value of the property, they may demand it be judicially sold and the co-ownership thus eliminated. This right of partition can never be absolutely contracted away although limited restrictions upon it may be agreed to.³⁷

B. The Jurisprudential Development of Louisiana Mineral Law

1. The Mineral Servitude

One of the first questions of mineral law with which the courts were faced was how the attempt by one person to sell to another the minerals "under" his land should be characterized. Landowners, unmindful of any problems such a sale might cause, and certainly influenced by similar developments in other states quite early began the practice of "selling" such minerals or "reserving" them in the sale of the land. In a series of cases in the 1920's the Supreme Court held that under Louisiana's system, the only dismemberment of ownership which could be recognized in such a case was a servitude and that there could be no "mineral estate" distinct from and independent of a so-called "surface" estate. This being the case they then concluded that any attempt to create sub-surface rights, sell minerals in place or otherwise deal with a so-called mineral estate, by whatever term it might be described or however it might be done, can only be considered as imposing a servitude upon the land.³⁸ Perhaps the most important consequence of this development was that it called into play the Civil Code articles declaring all servitudes were subject to the prescription of non-use.³⁹

A mineral servitude was ultimately defined as giving to its possessor (the owner of the "minerals") the right to attempt to produce the minerals and to appropriate them to his own use if his efforts were successful.

To constitute a use of such a servitude (and thus interrupt its prescription) the efforts do not have to be successful--but they must constitute a good faith attempt to discover and produce minerals if they are encountered. 40

2. The Mineral Lease

The early characterization of a mineral lease (as distinguished from a "sale" of the minerals) was unclear and for some time it was thought it might, in substance, be a form of servitude. ⁴¹ In a series of cases culminating in 1938 with Gulf Refining Co. v. Glassell ⁴² the Supreme Court finally concluded that a mineral lease was essentially the same as any other lease of lands authorized by the Civil Code. Mineral leases were thus held to be subject to the same general principles as leases for agricultural or similar purposes. Consequently, in many respects the fundamental characteristics of a mineral lease differ from those of a mineral servitude. The most significant of these differences is found in the fact that a lease, under the Civil Code, is not considered to be an interest in property, as is a servitude, but is merely a contract between the lessor and lessee, creating personal, rather than real rights. Leases were not subject to prescription of non-use but they were required to have a term. ⁴³ The normal pattern of the oil and gas lease, having a fixed or primary term of a stated period with a provision that it will continue in effect thereafter for as long as oil and gas is produced was approved as meeting that requirement. This was rationalized on the grounds that the depletable nature of petroleum deposits was such that the term of such a lease is both certain and finite although perhaps indeterminate at a particular time. ⁴⁴ The royalties payable under a mineral lease were held to be rent for the use of the premises. ⁴⁵ The failure of the mineral lessee to perform his obligations or pay his rent

timely was held to give rise to an action for the dissolution of the lease.⁴⁶ A mineral lessee could not bring any of the real actions to protect his possession or vindicate his title and had to rely upon his lessor for such protection.⁴⁷ This was later alleviated to large degree by legislation extending to the lessee the right to directly bring such actions.⁴⁸

3. The Mineral Royalty

The third major development occurred in 1939 in the case of Vincent v. Bullock⁴⁹ in which the court was faced with the problem of characterizing a mineral royalty interest or, what is sometimes called in other states, a "non-participating" mineral interest. Such an interest could not be classified as a servitude because it did not give the owner the right to conduct any activities upon the property but merely entitled him to receive a portion of the minerals if and when they were produced. The court concluded such an interest was in the nature of the "sale of a hope" recognized by Civil Code Article 2450, which says "a sale is sometimes made of a thing to come, as of that which shall accrue from an estate, of animals yet unborn, or such like other things although not yet existing" and by Article 2451 which states, "it also happens sometimes that an uncertain hope is sold as where the fisher sells a haul of a net before he throws it". Using these as a foundation the court held that a mineral royalty constituted a charge upon the land and was a real right or form of property interest.

Subsequent cases held that while a mineral royalty was not a servitude it was a "lesser" right than a servitude, inferentially making it subject to all of restrictions and limitations which the Civil Code established

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 for servitudes. This was apparently based upon the idea that a servitude is a limited alienation of two of the basic elements of ownership--the usus and fructus and the royalty while having a different theoretical foundation is a similar but more limited dismemberment of one of the same elements, the fructus.⁵¹ It was not deemed logical that it could last for a longer period or give more extensive rights than a servitude. In any event, and for what ever the reason, the principle became well established. Thus it was held that a royalty interest prescribes in ten years if production does not occur.⁵² Since the owner of a royalty had no right to conduct operations upon the property it was also held that a dry hole or other unsuccessful effort to produce minerals did not interrupt prescription.⁵³

4. The Executive Right

Another type of interest in minerals recognized by the jurisprudence is the executive right. In the case of Mount Forest Fur Farms of America v. Cockerell⁵⁴ the court was called upon to interpret a sale reserving a "perpetual royalty" and the "perpetual and exclusive right to make and execute mineral leases". The argument was made that the two rights in substance amounted to a servitude. The court refused to accept this and held that the reservation had created a mineral royalty together with the right to execute leases upon the land and that the latter constituted a separate but valid charge upon the property. The extent to which the right to execute leases might be dismembered from the ownership of the land remained uncertain prior to the adoption of the Mineral Code and there were only a handful of cases dealing with the matter.⁵⁵

IV. THE LOUISIANA MINERAL CODE

A. Substances Covered

Article 4 of the Mineral Code states its provisions are applicable to "all forms of minerals including oil and gas". It then declares they are also applicable to "rights to explore for or mine and remove from the land the soil itself, gravel, shells, subterranean water or other substances occurring in or as a part of the soil or geological formations on or underlying the land". The Article is significant in two respects. First, it declares the Code regulates the right to explore for and remove from the land any substance of value occurring naturally in it. This will obviously include the geopressed resource no matter how it may be characterized for other purposes. Secondly, the Article deliberately differentiates "forms of minerals including oil and gas" from "the soil itself, gravel, shells, subterranean water or other substances occurring naturally in or as a part of the soil or geological formations on or underlying the land". Accordingly, the fact that the Code makes the rules applicable to the development oil, gas and other recognized forms of minerals also applicable to the geopressed resource does not give support to any inference that the resource should be characterized as a "mineral" for some other purpose. In fact it might be argued that the Article through its deliberate differentiation between "minerals" and "subterranean water and other substances" underlying the land is indicative that the geopressed resource is something other than a mineral. However,⁵⁶ the official comments by the redactors of the Article indicate it was drawn to be as neutral as possible on the question of what substances are minerals by stating "the purpose of including oil and gas within the meaning of the term 'mineral' has no relationship whatsoever to the problem of construing particular conveyances to determine whether

specific substances are included or excluded from the terms of an instrument".

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The Comments then make reference, with approval, to a statement by the Louisiana Supreme Court that

the term mineral is not a definite one but it is susceptible of limitations according to the intentions of the parties using it and in determining its meaning regard must be had not only to the language of the deed in which it occurs, but also to the relative positions of the parties interested and to the substance of the transaction which the deed embodies.⁵⁸

Consequently, Article 4 should properly be held to merely affirm that whether or not a particular use of the word "mineral" in a transaction or statute will encompass the geopressured resource or any other substance is a matter to be determined by the particular context of its use. The fact that a substance may be so characterized in one transaction does not mean it should be similarly construed in another. Furthermore, and this seems to be the principle purpose of the deliberate wording of Article 4, such a characterization will be irrelevant to the question of whether the regime established by the Mineral Code will regulate its development.

Although Article 4 differentiates "minerals" from other substances occurring in the soil, the Code thereafter uniformly refers to the substances which it regulates as "minerals". The redactors for convenience apparently chose to generally refer to any substance which is extracted from the soil as a "mineral". This is entirely consistent with the avowed purpose of Article 4--to make it clear such usage is not a technical one nor controlling as a matter of legal characterization for any other purpose. For convenience the authors will also generally refer to geopressured servitudes, leases or other rights to the resource as

"mineral contracts" or "mineral rights". It must be understood however that this carries with it no connotation as to whether the resource should be held to fall within the ambit of a particular contract or statute referring generally to "minerals".

B. The Nature of The Landowner's Rights in Minerals

Article 6 defines the nature of the landowner's rights with respect to liquid or gaseous substances under the ground as follows:

Ownership of land does not include oil and gas and other minerals occurring naturally in liquid or gaseous form, or any elements or compounds in solution, emulsion, or association with such minerals. The landowner has the exclusive right to explore and develop his property for the production of such minerals and to reduce them to possession and ownership.

This codifies the "non-ownership" theory of minerals as jurisprudentially developed in the cases previously referred to.

Article 15 then establishes the rights of the landowner to deal with the substances covered by the Code by providing "a landowner may convey, reserve or lease his right to explore and develop his land for production of minerals and reduce them to possession". Article 16 amplifies this by declaring that "the basic mineral rights that may be created by a landowner are the mineral servitude, the mineral royalty and the mineral lease". It further notes that this enumeration is not intended to prevent the creation of other mineral rights. As a matter of fact there are at least two types of mineral rights which are expressly recognized in the Code. These are the executive right⁵⁹ and the interests created out of a mineral lease.⁶⁰ It is also evident from this article that great flexibility is to be afforded to the landowner whc

wishes to convey, reserve or lease his right to explore and develop his land for the production of minerals or other substances.

Article 16 does express one fundamental limitation on the right of the landowner to create mineral interests. It provides "mineral rights... are subject either to the prescription of non-use for ten years or to the special rules of law governing the term of their existence". If there are no "special rules" governing the term of the mineral right it is subject to the prescription of non-use.⁶¹ The only provisions in the Code specially authorizing a term for mineral rights, in lieu of prescription, are those relating to mineral leases and those providing that certain privately owned rights under public lands are imprescriptible.⁶² Therefore, it may be said as a general proposition that when public lands are not involved all mineral interests except mineral leases or interests derived from them are subject to extinction by prescription.

C. The General Nature of Mineral Rights

Article 18 declares all mineral rights are incorporeal immovables.⁶³ They are alienable and heritable. Their situs is in the parish in which the land burdened by them is located and all sales, contracts or judgments affecting them are subject to the laws of registry.⁶⁴

D. Mineral Servitudes Under The Code

Chapter 4 prescribes the rules regulating the mineral servitude which is defined as a right of enjoyment of land belonging to another for the purpose of exploring for and producing minerals and reducing them to possession and ownership.⁶⁵ It is extinguished by prescription resulting from non-use for ten years.⁶⁶

1. Prescription of the Servitude

Articles 28 through 41 set forth detailed rules regulating the prescription for non-use. As will be noted later these are most significant in determining whether existing servitudes or leases which describe the substances they cover by such general language as "all of the oil, gas and other minerals" or "all minerals" may give to the owner the right to exploit the geopressed resource or to claim the methane produced with it.

The prescription of non-use of a servitude commences from the date on which it was created.⁶⁷ It is interrupted by good faith operations⁶⁸ for the discovery and production of minerals. Article 29 declares that to be in good faith such operations must be (1) commenced with reasonable expectation of discovering and producing minerals in paying quantities at a particular point or depth, (2) continued at the site chosen to that point or depth, and (3) conducted in such a manner that they constitute a single operation although actual drilling or mining is not conducted at all times. Prescription is interrupted on the date actual drilling or mining operations are commenced, and commences anew on the last day⁶⁹ on which such actual drilling or mining operations are no longer conducted. Preparations for mining or drilling, such as geological or geophysical exploration or surveying or the clearing of the site or the hauling and erection of materials necessary to conduct the operations do not interrupt⁷⁰ prescription.

Although the articles regulating the prescription of non-use are largely couched in terms of what constitutes an "interruption" of prescription they must also be viewed as standards by which one may determine whether a servitude has been "used". It will be recalled from the general

discussion of servitudes that the Civil Code declares a servitude is extinguished if the owner fails to exercise it for ten years. The drilling of a dry hole (in case of oil and gas) or the conduct of other unsuccessful mining operations is considered a use of the servitude and thus an interruption of prescription. This is because the mineral servitude was viewed as the right to attempt to produce the minerals as well as to actually reduce them to possession. Article 29 codifies earlier jurisprudential holdings that such an attempt must be in good faith and that to be in good faith such operations must be conducted with a reasonable expectation of discovering and producing minerals in paying quantities.

Article 29 thus affirms that unless a person claiming to have used his servitude can demonstrate that there was a reasonable expectation minerals in "paying quantities" would be discovered and produced as a result of his efforts he will not be held to have been in "good faith". This is equivalent to declaring he has not exercised the rights which have been granted to him by the landowner.

While "paying quantities" is not directly defined in connection with the servitude articles, a definition of the term is found in the part of the Code dealing with mineral leases where it is declared that to be in paying quantities the production allocable to the total original right of the lessee to share in the production under the lease must be sufficient to induce a reasonably prudent operator to continue production in an effort to secure a return on his investment or to minimize any loss. While this definition is not completely appropriate for determining whether the drilling of a well under a servitude was made with the hope

that production in paying quantities would be encountered the idea it expresses is obvious--the efforts must be expected to be profitable.

Article 29 codifies a general principle recognized by the courts in a variety of cases involving mineral contracts. One of its earliest applications is found in Louisiana Petroleum Co. v. Broussard et al.⁷²

In that case the defendants contended prescription of a mineral servitude had been interrupted by the drilling of a well on the premises. The court found that the operator evidently began operations with the full intention of drilling to a depth at which oil or gas, if present, might be expected reasonably to be found, yet he did not do so, "but abandoned the well at a depth at which it was known in the field, among drillers and oilmen, that neither oil nor gas could be expected reasonably to be found, in paying quantities, the abandonment being due probably to the fact that he encountered salt water". Following this abandonment, he also abandoned the property, for he made no further effort to explore for minerals on it. The court held that the abandonment, at that stage, placed the operations, so far as prescription was concerned, in the same position as if none had been conducted. The reasons for this conclusion were explained as follows:

To use a servitude, so as to interrupt prescription, is to use it in the manner contemplated by the grant or reservation. This ruling finds support in articles 796 to 800, inclusive, of the Civil Code, touching the mode of use of servitudes and, in connection there with, prescription. The servitude, in this instance, was granted for the purpose of exploring for oil, gas, and other minerals and converting them to possession, if they were discovered and the servitude existed for that purpose. Reference must therefore be made to the object of the grant--not for the purpose of determining whether there had been a breach of any obligation that might exist to develop, but to determine whether there has been such use as to interrupt prescription.

No ironclad rule can be established to determine whether there has been such use. It may be said, however, that, in a mineral servitude where the exploiting, though begun, has been stopped or abandoned at a depth at which there was no reasonable hope of discovering minerals in paying quantities, the use is not such as to interrupt prescription.⁷³

Other cases have consistently reaffirmed the basic principles expressed by the court and now embodied in Article 29.⁷⁴

It is true Article 38 provides that prescription of a servitude is interrupted (and it is thus being "used") so long as minerals are produced with the intent of saving or otherwise using them for some beneficial purpose even though they are not being produced in paying quantities. However, the Comments to this article note it is assumed that the operator who is producing minerals which are not being obtained in paying quantities will still have to demonstrate that his efforts are "in good faith".

Article 38 is in harmony with the jurisprudence. *Mays v. Hansbro*, 222 La. 557, 64 So.2d 232 (1953). The concept of production in paying quantities is peculiar to lease administration and is appropriate to the lessor-lessee relationship. However, the test for use of a servitude should not be that minerals be produced in paying quantities as long as the production is in good faith. Economically, it does not seem that a servitude owner or his lessee would be likely to continue a losing operation for any extended period of time. Therefore, as a matter of fact, it seems that more often than not production continued for any length of time will be in paying quantities. However, it is quite possible that production might be continued for a short period of time in good faith in an attempt to make a particular property pay. Even though unsuccessful, such attempts should be recognized as uses of mineral servitudes as long as they are in good faith and the production is put to beneficial use.⁷⁵

Article 38 thus appears to be but another expression of the principle that the efforts of the owner need not be successful to constitute a use of his servitude. It does not contradict the underlying assumption

of Article 29 that they must be directed in good faith towards profitable development.

It appears from the Code as a whole, and from the jurisprudence antedating it, that the owner of a mineral servitude who claims he has preserved his servitude by using it must demonstrate his activities were reasonably designed to find and produce a commercially exploitable mineral deposit. A corollary of this proposition is that a mineral servitude, in the ordinary case at least, does not confer the right to mine a deposit that is not by any reasonable standards susceptible of profitable development.

2. Freedom of Contract With Respect To Servitudes

Chapter 4 also prescribes rules illustrative of the proposition mentioned in connection with Article 15 that the nature and extent of the charges which a landowner may place upon his land in the form of servitudes, be they mineral or otherwise, may take a variety of forms. A single mineral servitude is established on a continuous tract of land notwithstanding that certain horizons or levels are excluded or that the right to share in production varies as to different portions of the tract or different levels on horizons.⁷⁶ An interruption of prescription applies to all minerals included in the act creating the servitude and to all modes of its use.⁷⁷ A mineral servitude is ordinarily perpetual (if used) but may be limited to a particular term.⁷⁸ The parties may stipulate that a lesser period of prescription will be applicable to their arrangement.⁷⁹ Article 72 finally expressly recognizes what the others imply by declaring that the parties to an act creating a mineral servitude may alter the applicable legal rules prescribed by the Code subject only to the limitations provided in Articles 73 and 79. These

in substance place only two significant limitations upon such freedom:

(1) A single mineral servitude may not be created on two or more non-contiguous tracts of land;⁸⁰ (2) Although the parties may either fix a term for a mineral servitude or shorten the prescriptive period they may not make any contract which would have the effect of avoiding the effect of prescription or of making the period longer than is stipulated in the Code.⁸¹

E. Mineral Leases Under The Code

1. Basic Nature

A mineral lease is defined as a contract by which the lessee is granted the right to explore for and produce minerals.⁸² Unlike a servitude a single lease may be created on two or more non-contiguous tracts of land and operations on any part of land covered by the lease will continue the lease in force and effect as to the entirety of the leased premises.⁸³ Although the mineral lease is not subject to the prescription of non-use,⁸⁴ it must have a term. To insure that the basic policy of the state with reference to the extinction of unexercised rights is honored and to prevent the indefinite removal of property from commerce the Code expressly provides that a mineral lease may not be continued for a period of more than ten years without drilling, mining operations or production.⁸⁵ If the terms of a lease permit such a continuance, then the period stipulated is reduced to ten years.⁸⁶

This limitation, as well as the provision that a servitude prescribes in ten years if not used--may constitute a considerable impediment to the large scale development of the geopressed resource unless its developer can secure the unitization of the reservoir either conventionally

or by order of the Louisiana Commissioner of Conservation. Without some such form of communitization the rights to an entire reservoir could not be maintained unless a well were drilled upon on each separate lease and each separate servitude within its boundaries. It is a matter that must be carefully considered and planned for by any prospective developer of the resource.

2. Obligations of the Lessor

The mineral lessor is bound to deliver the premises he has leased⁸⁷ and to refrain from disturbing the lessee's possession. A lessor impliedly warrants title to the interest leased. Liability for the breach of such warranty is limited to the recovery of any money paid or other property received for the execution and maintenance of the lease⁸⁸ and any royalties received for production from the lease.

3. Obligations of the Lessee

Article 124 expresses certain principles which were primarily developed in connection with oil and gas leases and which may not be entirely appropriate to the development of the geopressured resource. They are however significant to the interpretation of existing mineral leases. It provides that a mineral lessee, although not under a fiduciary duty to his lessor, is bound to perform the contract in good faith and to "develop and operate the property leased as a reasonably prudent operator for the mutual benefit of himself and his lessors". The Comments indicate these provisions were intended to codify, as a matter of law, those obligations which the courts had held were ordinarily implied by the terms of the usual oil and gas lease. These have customarily been

referred to as the "implied obligations" of the lease. They are also referred to as the obligation of the lessee to act as a "prudent operator".

In Louisiana the implied obligation to act as a prudent operator has been characterized as incorporating at least four separate and distinct

features: ⁸⁹ First, there is an obligation to develop known mineral producing formations; Second, to explore and test all portions of the

leased premises after discovery of minerals in paying quantities; ⁹⁰ Third, to protect the leased property against drainage by wells located on neighboring property and; Fourth, to produce and market minerals discovered and capable of production in paying quantities.

Whether and to what extent these particular obligations will be extended to the geopressured resource under the general injunction that the lessee has a duty to act as a "reasonably prudent operator" is of course, uncertain. The particular obligations of the oil and gas lease were founded upon a recognition that in a lease containing a fractional or percentage royalty, the return to the lessor is essentially dependent upon the future production from the property. Since this return was viewed by the courts as the principal consideration to the lessor for the lease they held that the arrangement must have contemplated an undertaking by the lessee to explore and develop the property for the mutual benefit of himself and his lessor and to maximize the return to the lessor to the extent it was compatible with the actions that would be taken by a prudent operator actively interested in the development of the properties. ⁹¹

"The law of this state is well settled that the main consideration of a mineral lease is the development of the lease premises for minerals and that the lessee must develop with reasonable diligence or give up the contract; further, that as to what constitutes development and reasonable diligence on the part of the lessee must

conform to, and be governed by, what is expected of persons of ordinary prudence under similar circumstances and conditions, having due regard for the interest of both contracting parties ...⁹²

If, as appears will probably be the case with geopressured leases, the landowner's primary return will be a royalty of some sort measured by the production or profits from the lease one should expect the courts to interpret the obligations of a geopressured lessee in the same manner. It is uncertain as to whether a lessee may totally stipulate against reasonable development of the premises as a prudent operator.⁹³ However, the Code provides that the parties to a lease may agree as to what will constitute reasonably prudent conduct on the part of the lessee. The extent and limits of the lessee's obligations may thus be reasonably defined by the terms of the lease. It is obviously a matter which must be carefully considered in the preparation of a geopressured lease.

4. Production Must Be In Paying Quantities

When the term of a mineral lease is dependent upon continued production from the property that production must be in paying quantities.⁹⁴

The requirement that production must be in paying quantities to maintain a lease which is dependent upon production is based upon the same assumption as to the nature of a mineral lease which gave rise to the implied obligations to develop the property as a prudent operator. That the implied obligations of the lessee to develop the properties and the requirement that such efforts must result in production in paying quantities are both based upon the same principles is well illustrated by the case of Caldwell v. Alton Oil Co., Inc.⁹⁵ There the lessor sued to obtain a declaration

that a lease he had executed had expired by its terms. The lease provided it would continue so long as oil and gas was produced. The lessee, apparently admitting production from the premises was unprofitable, argued that the terms of the lease only required he be producing oil or gas and that its profitability was irrelevant. In rejecting this argument the court said:

The second ground of complaint is much more serious. The form of the lease is different from most of such leases which have been brought before this court.

The usual and customary stipulation is that the lease shall remain in force so long as oil or gas is produced in paying quantities.

In the instant lease the words "in paying quantities" are omitted.

From which it is argued by the defendant that the quantity of oil produced has nothing to do with the continued life of the lease; that just so long as any oil at all is produced from the well the lease cannot be declared forfeited.

We are not prepared to give our approval to such a proposition.

This court has repeatedly held that the main consideration of such a lease is the development of the land for oil and gas and that the lessee must either develop with reasonable diligence, or give up the lease.

A development that falls short of a reasonable production which would bring a net profit to the lessee and furnish an adequate consideration to the lessor for the continuance of the lease might well be said to be no development at all within the contemplation of the parties.

To hold that any production, however small, and in less than paying quantities, gives to the lessee the right to continue the lease indefinitely and with no obligation to further development, would be contrary to the established rule of jurisprudence, and would be writing for the parties a contract which they never intended to make.

It was never contemplated that the lease under consideration should be continued for all time to come upon the mere production of oil in quantities not sufficient to compensate the lessee and totally inadequate as a consideration to the lessor for continuing the lease.⁹⁶

That this is the basis for the requirements of Article 126 is also recognized in the Comments to the article where its provisions are explained as follows:

One of the prime motivations of the requirement that there be production in paying quantities is that the lessee should not be permitted to maintain the lease indefinitely merely for speculation or other selfish purposes.⁹⁷

In summary then, it may be said that like the mineral servitude, the Code expressly recognizes what the jurisprudence before it had clearly held--a mineral lease confers on the lessee the right (and obligation) to develop and produce commercially exploitable deposits of the substances it affects.

5. Assignments and Subleases

The basic difference between a mineral servitude and a mineral lease is that the servitude is a right of enjoyment⁹⁸ (a "property interest"), whereas the lease is a "contract".⁹⁹ Accordingly the normal rules relating to the assignment of contractual rights apply to the assignment of mineral leases. A lessee's interest may be assigned or subleased in whole or in part but he is not relieved of his obligations to the lessor unless he has been expressly discharged in writing.¹⁰⁰ The writing may be in the contract itself.¹⁰¹ Absence some special provision to the contrary a person who acquires a mineral lease and assigns or subleases it to a third person will remain responsible to the lessor for all the obligations of that lease, including the payment of royalties and any damages which may be caused by the operations of the transferee.

A sublessee is deemed to have no contractual relationship with the lessor.¹⁰² Originally he could neither be sued by the lessor, nor was he entitled to deal with the lessor as though he had any interest in the

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 lease. The Code modifies this to some extent in Articles 131 and 132. The first provides that a lessor must accept performance of the lessee's obligations by an assignee or sublessee whether or not the assignment or sublease is filed for record. The second provides that an assignee or sublessee is bound by any notice or demand made by the lessor on the lessee unless the assignment or sublease has been filed for record and the lessor is notified in writing of it. The mere recordation of the assignment or sublease does not give the benefits of this provision to the assignee or sublessee and written notice of the transfer must also be actually given to the lessor or he may continue to deal exclusively with the assignor or sublessor.¹⁰⁴

6. Remedies For Breach

Another implication of the contractual nature of the mineral lease is found in Article 134. It provides that if the terms of a mineral lease are violated, the aggrieved party is entitled to any appropriate relief provided by law. The relief normally available to an aggrieved lessor is to sue for the past due rent and any damages caused by the breach and to cancel or dissolve lease for its remaining term.¹⁰⁵ Dissolution of the lease is a remedy which is available to the lessor for the breach of its obligations as a matter of right.¹⁰⁶ Articles 135 and 136 temper this somewhat by providing that a demand or "putting in default" is required before a suit or cancellation can be had.¹⁰⁷ Dissolution for the failure to pay royalties is to be granted only if the conduct of the lessee is such that the remedy of damages is inadequate to do justice.¹⁰⁸ This restriction does not extend to other causes for dissolution. A lease may be dissolved either partially or in its entirety and a decree

of partial dissolution may be made applicable to a specified portion of the land; to a particular stratum or strata, or to a particular mineral or minerals.¹⁰⁹

F. Miscellaneous Provisions

The Code also prescribes detailed rules and regulations for the mineral royalty¹¹⁰ and the executive right.¹¹¹ These make very few changes to the rules previously regulating such interests although they do amplify and make certain much which was previously doubtful in the case of the executive right. Inasmuch as these are apt to be of minor concern to the developer of the geopressed resource they need not be discussed in detail here.¹¹² The Code does contain other provisions which should be mentioned because of their potential impact upon the subject.

The rules regulating co-ownership, although generally codifying principles found in the Civil Code, are worthy of mention because of the frequency with which divided or "fractional" interests are encountered in mineral development.

The Code permits a co-owner of land to lease his interest for mineral purposes and to impose mineral servitudes upon it.¹¹³ However in such a case neither the lessee nor the mineral servitude owner may exercise the rights granted or develop the property over the objection of any other co-owner of land¹¹⁴ nor can he compel a partition of the land.¹¹⁵ The combined effect of these articles is such that a prospective developer of the resource, to obtain the unfettered right to operate upon the property, cannot ignore or fail to obtain his rights from all of the co-owners of the land no matter how small and insignificant their interest may be. A failure to do so will create the risk of an injunction--

possibly at a time when other commitments have been made and a delay could jeopardize the entire development. To some degree this problem may be circumvented by the compulsory unitization of the property by the Commissioner of Conservation.¹¹⁶

The Code also provides that one co-owner of a mineral right (which includes both leases and servitudes) may not exercise those rights without consent of the other co-owners and that mineral rights owned in indivision are subject to partition upon the demand of any co-owner.¹¹⁷ Accordingly, when one deals with fractional or undivided interests extreme care is required to see that all co-owners are bound to recognize and concur in the operations being conducted.

V. TO WHAT EXTENT MAY EXISTING MINERAL RIGHTS AFFECT THE GEOPRESSURED RESOURCES

A. The Problem

Most of Louisiana has been the subject of intensive mineral development for many years. Consequently, there are numerous mineral servitudes, royalties, leases and other rights covering much of its area.

One of the first problems facing any prospective developer of a geopressured deposit will undoubtedly be whether existing mineral rights may include the right to exploit the resource or any constituent part of it, particularly the methane which may be dissolved in the water.

The typical mineral servitude in Louisiana has probably been created by an act selling or reserving "all of the oil, gas, and other minerals in, on, under or that may be produced from the property;" or "all of the

minerals under" the land.¹¹⁸ The oil and gas leases in use also typically describe the substances leased as including "oil, gas, and other minerals" or by equally broad terms ending with a general classification such as "other minerals."¹¹⁹ There has been surprisingly little litigation through the years construing such instruments. However, in that which has occurred, the courts have been thoroughly consistent in their approach to the problem of determining the limits of such grants.

The characterization of a mineral sale as a servitude; the differentiation between the basic nature of servitudes and leases; the flexibility given a landowner to impose an almost infinite variety burdens upon his land in the nature of servitudes and leases and the periodic extinction of all mineral rights has precluded the development in Louisiana of any concept of a separate "mineral estate" presumptively comprehending a recognized category of substances.¹²⁰ The courts have, therefore, approached the problem of defining whether a servitude or lease gives to its owner the right to exploit a particular mineral or conduct a particular activity as being primarily one of determining the nature and extent of the rights intended to be granted by the act creating the interest. In so doing, they have consistently looked to the intention of the parties to decide whether or not an activity may be deemed to be fairly within the limits circumscribed by the document creating the rights.

B. The Jurisprudence

The first case dealing directly with the subject was Huie Hodge Lumber Company v. Railroad Lands Co.¹²¹ There the court was required to determine whether an instrument reserving to the seller of property all rights to "iron, coal and other minerals" included the right to explore

for and produce oil and gas. The court held that the question was one of contractual interpretation saying "it is our duty to ascertain and construe according to the intention of the parties, the rights which may have been intended to be conveyed or reserved to the seller." In ascertaining this intention, the court first found that at the time of the reservation (1888) petroleum deposits were unknown in Louisiana. It then noted that the examples given in the act, iron and coal, were of a different nature than oil and gas. Applying the ejusdem generis doctrine it concluded that only "hard" minerals would seem to have been contemplated by the parties. The court found further evidence of an intention to limit the conveyance to "hard" minerals in the absence in the instrument to any reference to boring, drilling, laying pipelines or the other incidents of petroleum production. It concluded the reservation did not include the right to produce oil and gas deposits under the property.

In Holloway Gravel v. McKowen,¹²² the Supreme Court was called upon to determine whether the reservation of "all the minerals, oil, and gas," included the right to mine gravel deposits. Noting that gravel was not ordinarily considered a "mineral" in the same category as oil and gas it held the act did not give the right to mine gravel deposits. In doing so it basically used the same approach as the court in Huie Hodge. In its opinion the court made the observation previously cited in connection with the interpretation of Article 4 of the Mineral Code that:

"the term mineral is not a definite one ... but is susceptible of limitation according to the intention of the parties using it and in determining its meaning, regard must be had not only to the language of the deed in which it occurs but also the relative position of the parties interested and to the substance of the transaction which the deed embodies."¹²³

The most recent application of these principles is found in the River Rouge Minerals, Inc. v. Energies Resources of Minnesota.¹²⁴ The case involved the interpretation of a mineral lease. It is obvious from the opinion the Court did not consider that the nature of the agreement affected the principles used to decide the case. The question presented was whether the lease, which granted the right to produce "oil, gas and all other minerals," included the right to strip mine lignite on the property. The Court relying upon the Huie-Hodge and Holloway decisions affirmed that its task was to determine the intention of the parties to the agreement and that in so doing, it must look to the entire contract and the situation of contracting parties at the time they entered into the agreement. It then pointed to several factors as being indicative of an intention not to include the mining of lignite within the terms of the lease. While the lease had provisions regulating the laying of pipelines, building of tanks, power stations, telephone lines, and other facilities consistent with oil and gas operations, it had no such provisions which would be appropriate for strip mining. The royalty payments for "other minerals" stipulated in the lease was 12 1/2 percent. This was shown to be appropriate for oil and gas production but extremely high, if not prohibitive, for the mining of lignite. Citing the general policy of maintaining property in commerce, the Court observed that to hold the rights included lignite might delay its development because of the excessive royalty. It was argued by the lessee that lignite was known to occur in the area at the time the lease was granted; and it, therefore, must have been within the contemplation of the parties when they referred to "other minerals." The court, however, found that at the time the lease was granted such deposits were not considered to be

economically minable, and concluded it was unlikely the parties would have included them within the meaning of "other minerals." Finally, the court was impressed with the fact that the strip mining of coal or lignite would have rendered that portion of the property being mined totally unusable for other purposes although the lease clearly contemplated concurrent operations might be conducted on the same premises by both lessor and lessee. It found the mining of lignite was not included within the terms of the lease.

There is no reason to believe that if the courts are presented with the question of whether the right to drill for and exploit the geopressured resource falls within existing mineral servitudes or leases, any different approach will be taken although the solution to the problem may require the Court in many cases to make a somewhat different analysis than that used in the Huie Hodge; Holloway and River Rouge decisions. In those cases the courts were able to glean from the "four corners" of the instruments under consideration factors which tended to support the arguments of one side or the other as to the probable intention of the parties. Those factors may not, in all cases, be as available or as clear to the court in instances involving the geopressured resource. It is not unusual for mineral sales or reservations to simply reserve "all of the minerals" under a given tract of land with very little, if any, further reference to how the rights granted are to be exercised. Furthermore, given the similarity of ordinary oil and gas operations to the development contemplated for the geopressured resource, some of the factors discussed in the Huie-Hodge and River Rouge cases would, if anything, support the view that the geopressured resource should fall within the ambit of the ordinary oil and gas lease. For example, both will be developed by the drilling of wells, and require the laying of pipelines, the installation of tanks, separators and so forth.

Nonetheless, it is the authors' opinion that, when existing mineral contracts are construed in light of their basic nature as recognized by the courts and defined by the mineral code, they should ordinarily not be held to include the right to develop the geopressed resource.

C. General Principles for the Interpretation of Agreements:

When a court is called upon to construe indefinite or general terms in an agreement on the basis of the supposed intention of the parties, it would be naive to assume it is actually determining a clearly held understanding between the parties as to what was intended by them in a particular case. In most instances the fact that the parties used general or indefinite language probably indicates that they did not have any specific understanding as to precisely what the contract was actually intended to comprehend. At the same time it must be admitted that they obviously meant something by the use of the such terms. How is this to be determined in the absence of evidence of specific communications between the parties which might serve to limit or define the extent of their agreement?

The problem is not unique nor is it confined to the mineral area. Articles 1945-1962 of the Civil Code comprising a chapter entitled "Of the Interpretation of Agreements" establish the principles by which the court is to be guided in interpreting contracts. Article 1959 provides:

However general be the terms in which a contract is couched, it extends only to the things concerning which it appears that the parties intended to contract.

This article amplifies the general principle that agreements are to be given effect in the manner intended by the parties:

Courts are bound to give legal effect to all such contracts according to the true intention of all the parties.¹²⁵

While the Civil Code also declares "that the intent is to be determined by the words of the contract when these are clear and explicit and lead to no absurd consequences",¹²⁶ the courts of Louisiana have always considered that they are required to construe the language of the contract by viewing it from the same perspective as that of the parties to the transaction. Consequently, it is well settled that ambiguity or indefiniteness within the instrument itself is not the sole criterion as to whether extrinsic evidence may be introduced to explain its meaning. Evidence as to the circumstances under which the contract was entered into and the situation of the parties at that time is always admissible, even where the contractual language at issue appears to be clear.

One of the best expressions of this rule is found in Adeline Sugar Factory Co. v. Evangeline Oil Co.¹²⁷ where the court said:

Defendant offered parol evidence to establish this defense by showing all the facts and circumstances surrounding the parties at the time of the existence of the contract and to explain the nature of the subject to which it referred. Plaintiff resisted the introduction of any evidence which would in any way vary or contradict, enlarge, restrict, or explain the contract, contending that the contract spoke for itself.

The court allowed the testimony to be introduced, and plaintiff reserved a bill of exceptions. The correctness of that ruling meets us at the threshold of the case. We think there was no error in the ruling. That question has been several times submitted to this court for decision and has been answered in favor of the right to admit testimony for consideration by the court.¹²⁸

This is also the approach used by the Court in the three cases discussed above. The jurisprudence and Code thus enjoin the Court in interpreting a contract to view its language from the perspective of the parties to the agreement in light of those things which it appears they intended to contract. The effect of these principles is to prevent the resolution of a dispute as to the meaning of words used in a contract from degenerating into an argument as to "literal" or "dictionary"

definitions or as to whether or not a word is intrinsically "ambiguous" and to require the problem to be viewed from a broader perspective -- that of determining what objectives the parties desired to attain by their agreement and how they envisioned those objectives would be effected.

Finally, after all of the evidence is before the court, the matter may still be doubtful. How then is the problem to be resolved? The law also provides the answer by establishing presumptions as to intention in given cases and, by what is the same thing, by declaring the effects of certain contracts which are assumed to be normally implied by the agreement of the parties, thus also defining the nature of the arrangement that the law presumes the parties intend by their undertaking.

In the situation presently under consideration, the presumptions established by the Civil Code as to manner in which charges upon property should be interpreted coupled with the basic presuppositions of the law as to the nature of mineral contracts, lead to the conclusion that, as to those servitudes and leases presently in existence, the burden of proof should be upon the holder of the rights to demonstrate that the exploitation of the geopressed resource was deliberately considered to be an activity which the parties contemplated would or could be undertaken.

D. Charges Upon Land Are to Be Strictly Construed

Article 753 of the Civil Code declares:

"Servitudes which tend to affect the free use of property in case of doubt as to their extent or the manner of using them, are always interpreted in favor of the owner of the property to be affected."¹²⁹

This article has been interpreted as an expression of the more fundamental principle of Louisiana's property regime that ownership should not be unnecessarily fragmented, and dismemberments should be permitted only as long as they serve some useful purpose and do not remove property from commerce.

Servitudes are restraints upon the free disposal and use of property and are not, on that account, entitled to be viewed with favor by the law. In consequence of this servitudes claimed under titles are never sustained by implication--title creating them must be express as to their nature and extent as well as to the estate which owes them and the estate to which they are due.

'It must, as near as possible, specify the nature of the servitude, limit it, and distinguish it, so that there may be no doubt as to its nature, and the use that can be made of it.'¹³⁰

This principle of interpretation has been recognized as applying to mineral servitudes:

Ultimately, we conclude that, where the instrument could as reasonably be interpreted either way, the proper interpretation is that which least restricts the ownership of the land conveyed, as in the case of mineral servitudes. (citations omitted) In so concluding, we rely on the legislative mandate that 'Servitudes which tend to affect the free use of property, in case of doubt as to their extent or the manner of using them, are always interpreted in favor of using them, are always interpreted in favor of the owner of the property to be affected.' LSACivil Code Art. 753. See McGuffey vs. Weil, 240 La. 758, 125 So. 2d 154.¹³¹

One of the most distinctive features of Louisiana's mineral system is its insistence that mineral contracts which are not reasonably utilized for the exploration of and production from the land, should not be permitted to remain as charges upon it for purely speculative purposes:

The parties to a contract in which a mineral servitude is either granted or reserved may stipulate that the servitude will expire or terminate within a period of less than ten years, but they cannot stipulate effectively that it will continue or remain in effect without use for a period of more than ten years. A provision in any such contract to the effect that the mineral servitude will not be subject to the prescription of ten years, liberandi causa, or that it will continue in effect for a period of more than ten years without use, is unenforceable. This firmly established rule is based on public policy, it being the public policy of this state that a debtor, or an obligor in the case of a mineral servitude will not be permitted to renounce in advance the benefit of the prescription which may release him or his land from

obligation. LSAC.C. art. 3460; *Hightower v. Maritzky*, supra; *Lewis v. Bodcaw*, 167 La. 1067, 120 So. 859 (1929); *Nabors Oil & Gas Co. v. Louisiana Oil Refining Co.*, 151 La. 361, 91 So. 765 (1922); *Munn v. Wadley*, 192 La. 874, 189 So. 561 (1939); *Gueno v. Medienka* 238 La. 1081, 117 So.2d 817 (1960)...

A number of schemes or devices have been employed from time to time in attempts to circumvent the established public policy of this state that the prescription of ten years which applies to mineral servitudes cannot be waived or renounced in advance or before the prescription has accrued. The appellate courts of this state, however, have consistently refused to enforce agreements which were found to be schemes or devices to circumvent or avoid this public policy. See *Childs v. Porter-Wadley Lumber Co.*, 190 La. 308, 182 So. 516 (1938); *Patton's Heirs v. Moseley*, supra; *Roy O. Martin Lumber Co. v. Hodge-Hunt Lumber Co.*, 190 La. 84 181 So. 865 (1938); *Ober v. McGinty*, 66 So. 2d 385 (La. App. 2d Cir. 1953); *Hicks v. Clark* 225, La. 133, 72 So.2d 322 (1954); *Union Producing Co. v. Parkes*, 40 F. Supp. 163 (W.D. La. 1940).¹³²

The relationship of prescription to the policy encouraging the free alienability of land referred to, was recognized in *Gueno v. Medlanko*¹³³ where the Supreme Court said:

"In this connection, it is to be borne in mind that it is contrary to the public policy of this State to hold property out of commerce and this Court has consistently applied the liberative prescription of ten years in dealing with the exercise of mineral rights."¹³⁴

An excellent example of the interplay between the canons of construction set forth in Civil Code Articles 1945-1959 which command the court to determine the intention of the parties in construing their agreements and the presumptions of Civil Code Article 753 which require that charges upon the land be narrowly construed, is found in *Delahoussaye v. Landry*,¹³⁵ which also provides an interesting parallel to the problems at hand. In that case the plaintiff purchased certain lands from the defendant. In the sale the defendant reserved, as a servitude, the right to take wood for the "utility of" certain lands adjacent to those being sold. At

that time the lands, for the benefit of which the servitude was reserved, were unsettled and uncultivated. A short time thereafter the defendant occupied them and began raising cotton. Several years later he converted them to a sugar plantation and constructed a sugar mill upon them. The mill was apparently powered by wood-burning boilers which materially increased the amount of timber which the defendant had been cutting from the lands of the Defendant. The Plaintiff then sought to enjoin the defendant from cutting timber for use in the mill.

Upon appeal the defendant in substance argued that the terms of the agreement were clear and unambiguous; that looking at the circumstances of the parties it was obvious that they contemplated future indefinite uses would be made of the rights since no use at all was being made of the lands at the time the rights were created and that he should be permitted to cut timber so long as it was consistent with the use to which he was then devoting the land. The court rejected his argument and granted the relief sought, holding;

About the period of defendant's purchase, cotton, corn & C., were the sole products of cultivation in the neighborhood. There was but one sugar house in the whole parish which was shortly after abandoned. The district judge, in view of the situation of the land, and the condition of the country at the remote period of the sale, was of opinion that the change in the culture of the defendant, twenty years after the purchase, from cotton to sugar, would essentially change and augment the burthen of the servitude, and that the provision of the quantity of wood necessary for the manufacture of sugar from the lands of the vendor, could not have been in the reasonable contemplation of the parties at the time of making their contract; nor did the judge consider that, according to the rules of law, for the interpretation of servitudes, the right claimed by the defendant could be supported.

In this opinion of the judge we concur. At the time this servitude was created, it was not onerous, and the estate affected could support it without deterioration. Sugar

was not then one of the staple products of the State. The present wants of the plaintiff, for the new product of his land, increase many fold, and may increase still more, the burthen; so that what was originally within the province of the parties, agreed to as a common or ordinary servitude may become a devastation, and destroy the value of the burthened estate.¹³⁶

E. The Basic Nature of Mineral Rights As Defined by the Mineral Code

The Mineral Code is obviously not directly determinative of the intention of the parties to a particular transaction, nor could it be applied to transactions entered into before its enactment to broaden or restrict the extent of rights vested on its effective date.¹³⁷ However, the Code not only sets forth particular rules for the regulation of mineral contracts but also, by its codification, the legislature has expressed the general principles and basic concepts which underly and give unity to the jurisprudence which had developed prior to its enactment. To this extent it presents a useful framework within which one may view and interpret existing contracts. That is, the Code may conveniently serve as a basic and highly authoritative doctrinal statement as to the nature of ordinary mineral contracts against which the reasonableness of the contentions of competing parties may be weighed in a particular controversy.¹³⁸

The manner in which Article 4 defines the substances which the Code affects is a recognition of the proposition that the word "mineral" standing by itself is inherently indefinite and cannot serve as a matter of law to determine whether right to exploit a particular substance is vested in the possessor of a mineral contract using the term.

It has already been demonstrated that the Mineral Code assumes mineral contracts contemplate the prompt exploitation of commercial

deposits within the land. The articles expressive of this are founded upon jurisprudential assumptions extending back to the earliest days of mineral development in the state. These assumptions were so consistently applied in the interpretation and construction of such contracts that it may be said the courts considered them to be almost conclusive as to their nature. The Mineral Code recognizes this and now prescribes them as rules of law although they originally resulted only from the courts' perceptions as to the nature of the arrangements contemplated by the parties to transactions they had under consideration. This is no doubt, justified on the ground that the Code, within broad limits, defines the normative effects of transactions leaving the parties largely free to contract to the contrary. However in the absence of a clearly expressed contrary intention, the principles it enunciates must be viewed as the normal parameters within which the courts should determine the intention of the parties to a mineral contract.

One of the prime motivations of the requirement (in a mineral lease) that there be production in paying quantities is that the lessee should not be permitted to maintain the lease indefinitely merely for speculative or other selfish purposes.¹³⁹

Although a mineral servitude owner cannot be required to develop the property by the landowner, the basic policy of the law is equally clear. He is expected to exercise the rights given him within a reasonable time or lose them by prescription.

A predial servitude is a charge on a servient estate for the benefit of a dominant estate. There must be a benefit to the dominant estate.¹⁴⁰

Predial servitudes are perpetual in the sense that if properly used they do not terminate upon the lapse of any period of time ... Of course, if there is no longer a need or if the utility of the servitude is exhausted the servitude may be declared terminated.¹⁴¹

In light of these principles and of the injunctions in Civil Code Article 753 that charges upon lands are to be limited to those things which the parties clearly intended, it is difficult to see how the parties could have contemplated the mining or exploitation of a substance which was not, at the time they contracted, reasonably considered to be minable and which was, in fact, then demonstrably incapable of profitable exploitation.

If at the time a mineral contract was entered into zones of high pressure, high temperature aquifers under the earth were either unknown, or if known to exist, their potential for commercial exploitation as a source of energy was not considered practicable and was, in fact, impossible, language of a general nature granting the right to exploit "minerals" should not be considered to have ordinarily been intended to include them.

To use a servitude ... is to use it in the manner contemplated by the parties ... in a mineral servitude where there was no reasonable hope of discovering minerals in paying quantities the use is not such as to interrupt prescription.¹⁴²

The law ... is well settled that the main consideration of a mineral lease is the development of the leased premises for minerals.¹⁴³

A development that falls short of a reasonable production which would bring a net profit to the lessee and furnish an adequate consideration to the lessor for the continuance of the right might well be said to be no development at all within the contemplation of the parties.¹⁴⁴

This is not to say that a lease or servitude could not be created which would vest in its owner the right to conduct an activity which is not presently practicable for one reason or the other and which may be based upon a perception that economic or other factors may cause such rights to become valuable in the future. Nor is to say that a servitude or lease expressly given to exploit a "geopressured resource" would

necessarily be invalid merely because it could not be demonstrated that such exploitation could be economically conducted at the time the right was given. The question at issue is not could such rights be created, but rather, have they been created by a particular agreement? In interpreting that agreement in accordance with the rules laid down in Article 1959, the courts should assume that, absent some special agreement to the contrary, a mineral contract, be it a servitude or lease, contemplates the prompt exploitation of economically recoverable deposits. The Code and jurisprudence previously discussed supports the conclusion that general language in a servitude or lease describing the substances which are to be exploited should be deemed to include only those activities which were at the time generally viewed as falling within the category of substances which could be so exploited. The right to mine a substance should not be held to fall within the ambit of "things with reference to which the parties intended to contract" merely because, long after the creation of the rights, circumstances unanticipated by the parties may have caused such substance to become valuable.

There may be other substances not presently considered valuable which have uses now totally unknown and which, because of the rapidity with which society is changing and technology is developing, in the near future may become extremely valuable. When that occurs, the holders of "mineral" rights will undoubtedly contend the right to mine them is given by the general language of their conveyances. But if they cannot today identify such substances or produce them profitably in any manner, one should not say that the parties intended them to be covered by a general reference to "minerals" if the characterization of mineral

contracts as reflected by the Code and the jurisprudence is accepted and the canons of interpretation required by Articles 753 and 1959 are applied. In short such an interpretation would mean that the parties contemplated the servitude owner would be required to use rights which cannot be used in good faith to preserve his rights and the lessee would be obligated to explore for and develop that which is unknown and undevelopable.

F. RIGHTS UNDER EXISTING CONTRACTS TO PRODUCE THE METHANE IN THE RESOURCE.

The determination in a particular instance that the right to exploit a geopressured aquifer for its heat and pressure is not included within the terms of a grant of the right to exploit "minerals" may not entirely dispose of the problem. Most mineral leases or servitudes will undoubtedly give the owner the right to produce natural gas. One must therefore consider whether the owner of such rights would have any claim to the methane which might be produced as an incident of a geopressured operation. Methane is the principal constituent of natural gas although other more complex hydrocarbons are ordinarily contained in it. The small amount of data presently available indicates the gases dissolved in the geopressured water, although predominantly methane, in fact contain essentially the same type of hydrocarbons so that the methane which is ordinarily referred to as being contained in the geopressured resource is probably indistinguishable from natural gas.

As long as the methane cannot be produced economically -- i.e. in "paying quantities" -- for its own value from the geopressured aquifer the answer to the question would appear to be fairly certain. It has already been demonstrated that mineral lessees or servitude owners do

not own the gas in place.¹⁴⁶ They only possess the right to search for¹⁴⁷ and produce such minerals as can be produced in paying quantities. The mineral lessee must develop the premises, if he can do so, by producing¹⁴⁸ the substances in paying quantities. The use of a servitude must be such that a reasonable expectation exists that minerals will be encountered¹⁴⁹ "in paying quantities". If it cannot be demonstrated that the methane which is dissolved in the geopressured water is capable of being produced for its own value in paying quantities the production of that methane as an incident to or byproduct of another process would not appear to be an appropriation of anything the mineral lessee or servitude owner has a right to obtain or reduce to possession. Consequently, its production by the landowner (or his lessee) in a geopressured well should not be deemed to be an interference with the rights of an oil and gas lessee or servitude owner nor should they have any claim to it.

The question is obviously to some degree an economic one. It is entirely possible that technology may be developed or the economics of the energy situation may change to such an extent as to permit the methane in a geopressured aquifer to be produced at a profit without regard to its heat or pressure. If this occurs the problem will become more complex, and the answer more difficult of satisfactory resolution. There has never been any indication by the courts that a lessee is limited to the production of oil or gas by the technology which existed at the time his rights are created. Certainly the history of the industry demonstrates that economically unproductive reservoirs may be made profitable by advanced techniques or changes in the economic situation. No one has ever questioned, and it is doubtful that they would ever question, the right of a mineral lessee, who had produced a gas deposit to depletion, to go back into the reservoir and by the application of

new technology again restore production in paying quantities, so long as his rights have otherwise been maintained. The history of some of the oil fields in the state is a record of continually improving techniques to extract oil from reservoirs which otherwise would have been long since economically depleted.

If methane contained in the geopressured water is considered to be natural gas and it is assumed that a conveyance or lease of the right to produce "gas" grants the right to produce any natural gas which might be found in any form and produced in any manner during the term of the lease or servitude, it is then reasonable to say that if a geopressured deposit ultimately proves to be economically productive of methane for its own value, such a lease or servitude would grant the right to so produce it.

On the other hand, if the question which the courts have indicated to be critical to the issue is considered -- which is whether the contract of the parties as expressed by them can be fairly said to include the right to conduct a particular activity on the land, then an equally respectable if not more persuasive argument can be made that the right to produce the methane dissolved in the geopressured aquifer should not be held to be within the ordinary contemplation of the parties to existing agreements.

The terms of most oil and gas leases demonstrate that the "gas" intended to be covered by them is that which exists as deposits in definable reservoirs. This has been the universally understood premise upon which the petroleum industry has been built. There is admittedly a resemblance between the methods used to produce oil or gas and those contemplated for producing geopressured waters containing gas. However the work which has been conducted to date strongly indicates that there is also a vast difference in the technology that will be required to

develop and utilize the geopressured resource and recover the methane dissolved in it and that which is presently used for the exploitation of petroleum and natural gas. ¹⁵⁰ In fact, the existence of the present study as well as the vast amount of research effort which is being expended on the problems of and techniques for development of the geopressured resource should be indicative that the resource is commonly viewed as something distinctly different from natural gas as that term is commonly ¹⁵¹ understood today.

There is a distinct possibility that the production of methane from geopressured waters, even for its own value, would require the presence of facilities and the conducting of activities upon the land of considerably greater magnitude (and perhaps portending greater risks) than is the case with ordinary oil and gas operations. Furthermore, as will be noted later in the discussion of the terms of geopressured leases, the economics of geopressured development are apt to differ materially from those of the ordinary oil and gas operation.

The presence of extensive saline aquifers under much of the state has been well known for years. That these waters hold any promise of economic value is a very recent concept. If a feasible method of extracting salt or other substances in commercial quantities from such water should also be developed, one might well be faced with the situation where an oil and gas lessee, a "salt" lessee, and a geopressured lessee would all claim the right to produce and utilize the resource. Although in theory there would be nothing inconsistent in holding such rights were intentionally granted to all three parties by the landowner it is doubtful that this is apt to be the case. It should not require resort to expert testimony by one experienced in the business to conclude that a lease of the right to mine salt at present ordinarily contemplates

exploitation of commercial salt deposits -- not the salt waters which are found to some degree beneath the surface of almost all of the land in the State. It is equally doubtful one should conclude that the lessor who grants a lease to drill for and produce "oil and gas" is ordinarily contemplating the production of from 20,000 to 40,000 barrels of hot brine per day from the land with its consequent disposal and handling problems to extract relatively small quantities of gas dissolved in it. Nor is the lessee who acquires such a lease apt to believe he has incurred the obligation to develop the lands for such purposes.

The courts have recognized that, in interpreting mineral contracts, the commonly held understanding as to the type of activity which will be incidental to the use of the rights is influential in defining the limits of the rights given. The Delahoussaye case discussed above found that the right to cut timber was limited to the amount implicitly contemplated by the parties at the time in light of the commonly understood uses to which such timber might be put at the time the rights were created. A somewhat parallel case from another jurisdiction of U.S. v. Polino¹⁵² where the court, using a similar approach, concluded that the right to mine coal reserved in a sale of land did not include the right to mine it by surface mining methods where such methods were not generally used in the area at the time the reservation was made. This has been the overwhelming conclusion of the courts when they have approached the question of whether a right to mine includes non-traditional and extraordinary methods that are more burdensome than the parties could reasonably have anticipated.¹⁵³

The case of Anse LaButte (LeDanois) Oil and Mineral Co. v. Babb,¹⁵⁴ although admittedly not directly in point, does involve a question bearing some similarity to the one under consideration and further illustrates consistency with which the courts have approached the problem

of interpreting mineral contracts. In that case the plaintiff was given the "exclusive right to drill, with the view of finding commercial substances of whatever nature" on certain lands. If he was successful within 90 days of the date of the contract, he then had the right to purchase the lands for a stated price.

There were surface indications of oil on the property and a well had been drilled some years previously out of which, in the words of the court, "there were tricklings of oil." The land was near the Avery Island salt dome, and the court observed that "the fact was known to everybody throughout the region that there was salt under the surface in varying quantities." After the contract was entered into, the plaintiff drilled two wells on the premises. The first was abandoned. The second produced about 8 barrels of oil a day, but the court found it was completed after the time fixed in the contract for the discovery of "commercial substances."

The plaintiff, however, claimed that the first well complied with the terms of the agreement because it was a "success" both as an oil producer, and as having "demonstrated" that there was a stratum of rock salt several hundred feet thick under the surface and that salt was a "commercial substance" as required by the agreement. The court rejected the argument in the following terms:

We do not think that the finding of oil in less than paying quantities, or the ascertaining of the presence of this stratum of salt several hundred feet below the surface, was a success in finding "commercial substances" within the meaning of the contract. The parties knew, at the time of entering into the contract, that oil would be found in small quantities, and that salt in more or less great quantities underlay that region; and therefore, in using a term expressive of uncertainty in the result of the exploration to be thereafter made, they must have had in mind something else than these dribblings of oil, or this salt buried out of reach under the earth. Facts of

public notoriety relating to the subject of a contract must be presumed to have been known to the parties at the time of making the contract, and the language used must be construed in reference to these facts. Woodruff v. Woodruff, 52 N.Y. 53.155

Although the matter is by no means certain, it is the authors' opinion that if the facts demonstrate, as they undoubtedly should in most cases, that it was universally assumed that commercial deposits of oil and gas would be accumulated in discrete reservoirs and produced by more or less standard methods, a lease or sale of the right to produce gas should be held to contemplate only the exploitation of such gas deposits by such methods. The fact that at the time the right was created small amounts of gas might be contained in solution in waters under the land -- which could not by any means then available be commercially produced -- should not lead to the conclusion that the right and obligation to produce such gas was intended to be granted to the lessee if years later circumstances changed sufficiently to permit the economic utilization of such gas by means of a new and different technology. For a court to hold to the contrary and be consistent with the jurisprudence, it must find such to have been the intention of the parties at the time the rights were created.

The problem under consideration, as well as that considered in the preceding section has been characterized as being one of ascertaining the intention of the parties to the various transactions - if not in a specific sense - at least in the generalized sense of determining whether the activities under consideration were consistent with the basic nature of the arrangement evidenced by the agreement. However, it must be recognized that there is also fundamental judgment which must be made by the courts which will be highly influential, if not determinative of the

issue in many cases and which will largely be unsupported by either the "law" or the "facts" of the particular case. Its essence may be expressed in the following question - (although it may also be expressed in a variety of other forms): Should a court, in the absence of positive evidence, ordinarily assume that when parties bargain for the right to produce "oil and gas" or other similarly identified substances they intend to confer the right to produce that substance if it occurs in any form or can be exploited by any means which may be developed or prove feasible during the term or existence of the right or should it be assumed they only intended to confer the right to exploit the substance as it occurs in forms and by methods substantially in accord with those prevailing, in terms of their magnitude and nature, at the time the agreement is made. As applied to the larger problem under discussion the question may be phrased as follows: Should a court assume that a sale or lease of "minerals" is intended to confer the right to exploit land by any means whatsoever to remove from it any naturally occurring substance which may during the existence of the right prove to be economically valuable. If the basic questions are answered in the negative then one is faced with the additional question of how the court should determine the limitations upon the rights of the mineral owner or lessee which are implied by such a negative answer.

It should go without saying at this point the authors favor answering the basic questions in the negative. This is based upon their appreciation of the general policy of the State that burdens upon land should be clearly expressed and reasonably determinable by persons who wish to deal with it, and the injunctions of Article 1959 which, it is submitted, recognizes that language is at best inexact and that all contracts should be fairly construed in light of the reasonable expectations of

the parties as to the obligations they are assuming and benefits they hope to obtain from their arrangement so as to not unduly expand either to the benefit of one party and the detriment of the other, or to reward one or the other with something that neither fairly contemplated at the time of their bargaining. Certainly the landowner who is asked to grant or lease to another the right to exploit his land for mineral purposes - or who bargains to purchase land reserving such rights to the seller must weigh the diminution which may result in the value of the land if the exploitation occurs against the benefits he will receive from it or the reduction in the price he may attain if he purchases the land with the burdens on it. On the other hand the lessee or servitude owner must weigh the risk and expense of developing the property against the return he may get if he is successful. The nature of mineral development ordinarily injects a considerable element of uncertainty into the process. Whether valuable deposits exist or whether they can be profitably developed are ordinarily, but not always, unknown factors. Furthermore the unknown nature and extent of occurrence of such deposits may also create considerable uncertainty as to the exact method by which such deposits may be exploited. The existence of such uncertainty has probably been the predominant factor which has shaped and molded the legal institutions customarily used to develop mineral deposits. However it must also be recognized that these uncertainties are ordinarily weighed by the parties in light of certain known and understood parameters so that while the magnitude of the risks being taken is frequently uncertain the nature of those risks and the consequences of success or failure are generally assumed to be understood. It is believed that the cases which have previously been discussed tacitly recognize this. For example in the River Rouge

case the court pointed to the fact that the evidence showed that a 1/8 royalty on "other minerals" as stipulated in the lease was "inappropriate" for lignite, although quite reasonable for oil and gas. The Delahoussaye case noted that the purchaser who permitted his vendor to reserve the right to cut timber for the "utility" of lands which were then not being used could not reasonably have anticipated they would be devoted to a use which would require such an extensive cutting as to totally denude his lands. In the Holloway case the court, in reaching its decision that the mining of sand and gravel was not within the terms of a "mineral" reservation was greatly influenced by the fact that the mining of gravel was totally incompatible with the purposes for which the land was being purchased and that the price paid for the land approximated its full value. Although the techniques for the extraction of oil and gas have changed in detail from time to time - the basic method of developing and producing them has remained largely the same. If it should become feasible to mine oil bearing sands by bringing them to the surface and there extracting the oil and if such a process would require the appropriation of large areas of the surface of the land, it is highly unlikely that a Louisiana court would or should hold that the landowner who had previously sold or leased the right to produce "oil and gas" would be burdened with obligations of such development.

If one returns to the central question at issue - which is what kind of substances did the parties contemplate would be exploited and what kind of activities did they believe would be conducted on the land as a result of their bargain, the burden should be upon the owner of the rights to demonstrate he bargained for and obtained the right to exploit a substance or conduct an activity which was not, at the time of the contract, of a type the parties to the agreement would normally have

contemplated. It is true that to answer the question as it has been posed by the courts and do justice to the parties in light of their respective expectations requires the exercise of judgment and the drawing of distinctions which were admittedly unanticipated by the parties who made the contract. But this is no more than is ordinarily required of a court when it must determine whether actions are "prudent", or "reasonable" or "negligent" and its difficulty should neither obscure the nature of the distinction that is to be made nor cause the court to fall back to some more arbitrary standard or test, simply because it is required to determine whether certain activities are such as should have been fairly within the contemplation of reasonable persons contracting in the manner and at the time of the transaction in question.

FOOTNOTES TO CHAPTER IV

1. The word "estate" as used in the Code does not carry with it connotation of tenure but ordinarily means that which is owned.
2. 1 Planiol, Traite Elementaire de Droit Civil Section 3064, (English Translation by Louisiana Law Institute, 1959.) It should be noted as Planiol also points out (§ 2186) that as early as 1919 the French Legislature made the hydraulic energy of tides, lakes and water courses a new and separate species of property, capable of being made into a franchise. It was, however, a public thing, not common. It must also be recognized in comparing Louisiana property law with that of other civilian jurisdictions that the latter do not have to act, or interpret their laws, within the constraints of the U.S. Constitution. Vested rights and contractual obligations may be dealt with in those countries with less restraint.
3. II Aubry & Rau, Droit Civil Francais, 46 (Translation by Louisiana State Law Institute 1966).
4. This implies that there is something in the character of the thing which renders it common. The implication is that the declaration in the Code is a recognition of a state of fact rather than an express grant by the sovereign for the public use of the thing.
5. See: Buckland, a Textbook of Roman Law, 18 (2d Ed., 1932), for a brief description of the concept of both those things which were not susceptible of ownership and the importance of dominion in the sense of practical detention of a thing to dominium or ownership, which he characterizes as being in the minds of the Romans, "legally guaranteeable value".

6. C.C. Arts 3412, 3425.
7. C.C. Art 3415.
8. As noted in Article 3412, occupancy is the manner by which a thing which "belongs to nobody" is acquired. Although the concept of property which has no owner is broader than "common" things - it may comprehend, for example, lost or abandoned property - it does include the possibility of reducing portions of common things, such as running water, to ownership.
9. See R.S. 2:381 et seq. regulating the height of structures and the use of lands near airports. The same problem of accommodating the concept of ownership as extending "from the heavens to hell" to air flight has been faced and resolved in the other American jurisdictions in much the same way and for the same reasons. See: U.S. v. Canby 328 U.S. 256, 66 S. Ct. 1062, 90 L.Ed. 1206 (1946), Griggs v. County of Allegheny 369 U.S. 84, 82 S.Ct. 531, 7 L.Ed 2d 585 (1962), and Jackson Municipal Airport Authority v. Evans 191 So.2d 126, (Miss. 1966).
10. R.S. 9:1101.
11. R.S. 49:3.
12. R.S. 9:1101, 49:3, 56:421.
13. R.S. 56:102.
14. See generally for a discussion of the historical evolution of the Civil law of property: Yiannopoulos, Louisiana Civil Law Treatise, 4 (1966) (Hereafter cited simply as Yiannopoulos.) There is some justification in the text of article 505 for differentiating rights to use the area above the surface from the right to conduct sub-surface operations.
15. However, it should be noted that at the time the article was originally written there was no conceivable use for the space above land except as

it related to the enjoyment of the land itself. At the same time mineral deposits were almost universally considered to belong to the sovereign, not the owner of the land, although the latter had certain preferential rights to them. It is probably more realistic to say that the law simply did not contemplate either air travel or geopressed resources and that the Code really affords little specific help in resolving the problems. See Planio, op. cit. note 2, page 418.

16. See page 41 infra.
17. Leger v. La. Dept. of Wildlife & Fisheries, 306 So.2d 391 (1975).
18. 177 US 190, 20 S.Ct. 576, 44 L.Ed 729 (1899).
19. Id.
20. Adams v. Grigsby, 152 So.2d 619 (La. App. 2d Cir. 1963).
21. Id.
22. Higgins Oil & Fuel Company v. Guaranty Oil Company, 145 La. 233, 82 So.206.
23. R.S. 30:800 et seq.
24. R.S. 30:802.
25. This has since been passed as Act 514 of 1977.
26. Id.
27. C.C. Art. 453.
28. Smith v. Dixie Oil Co., 156 La. 691, 101 So. 24 (1924).
29. This is not so obvious from the law itself. However, at least where land is involved, title to what is now Louisiana was acquired by the United States by purchase from France. Title was thus vested in the United States of America to all lands except those privately owned. Accordingly, for land to belong to the state in its public capacity it must have been acquired by some act of Congress or by virtue of its inherent sovereignty - under the so-called equal

footing rule, or have been acquired from a private owner. In any event, as to lands, the origin of public things is dependent upon acquisition of ownership by the state in the first instance not political considerations.

30. In addition to Planiol cited at note 14 above, see Aubry et Rau op. cit. note 3 at 438 for a discussion of the law of mines in France.
31. Yiannopoulos, 306.
32. Zengel, Elements of the Law of Ownership, 3 West's Louisiana Civil Code, Annotated, 1 (1952). This article contains an excellent and brief summary of the fundamentals of Louisiana's property regime.
33. See Expose de Motifs, Revision of Book II. Title IV of the Louisiana Civil Code prepared by the Louisiana Law Institute and published as a part of Act 514 of 1977.
34. C.C. Art. 789.
35. C.C. Art. 3460.
36. C.C. 1297.
37. C.C. Art. 1298, permits agreement against partition only for a "definite term." How long such a period may be is uncertain. A stipulation in a will against partition may not exceed 5 years. C.C. 1300.
38. Frost-Johnson Lumber Company v. Sallings Heirs, 150 La. 756, 91 So. 207 (1922) is considered the leading case. Others are Huie Hodge Lumber Co. v. Railroad Lands Co., 151 La. 197, 91 So. 676 (1922) dealing with "hard" minerals; Wetherbee v. Railroad Lands Co., 153 La. 1059, 97 So.40 (1923); Lee v. Gaigne, 154 La. 483, 97 So. 666 (1923); Wemple v. Nabors Oil & Gas Co., 154 La. 483, 97 So. 666 (1923) and Iberville Land Co. v. Texas Co., 14 La. App. 221, 128

- So. 304. (La. App. 1st Cir. 1930). The last case involved an attempt to divide the land "horizontally" and sell all below a certain depth by specific description.
39. "Servitudes are extinguished: . . . 2. By prescription resulting from the nonusage of the servitude during the time required to produce its extinction". C.C. Art. 783. "A right to servitude is extinguished by the nonusage of the same during ten years". C.C. Art. 789. See also C.C. Arts. 790-804.
40. Taylor v. Dunn, 233 La. 617, 97 So.2d 415 (1957) White v. Frank B. Treat & Son, Inc., 230 La. 1017, 89 So.2d (1956); McMurrey v. Gray, 216 La. 904, 45 So.2d 73 (1947); International Paper Co. v. La. Central Lumber Co., 202 La. 621, 12 So.2d 659 (1943); Hunter Co. v. Ulrich, 200 La. 536, 8 So.2d 531 (1942).
41. As late as 1939 an eminent authority postulated that a mineral lease was in substance a servitude, or at least the lease of a servitude. See: Daggett On Louisiana Mineral Rights, 14 (1939). It was not until 1958 that the court decided a lease of noncontiguous lands constituted a single lease, contrary to the servitude rules. Reagan v. Murphy, 235 La. 529, 105 So.2d 210 (1958). However it is apparent from the jurisprudence as a whole that from 1938 on the courts consistently looked to the Civil Code articles on lease to fashion the principles regulating mineral leases.
42. 185 La. 143, 168 So. 755 (1936).
43. C.C. Art 2686. Bristo v. Christine Oil & Gas Co., 139 La. 312, 71 So.2d 521 (1916). Strictly speaking a lease without a term or one which purports to be in perpetuity is terminable at the will of either party - although it may also be implicitly on a month to month or year to year basis depending upon the type of property.

44. Busch Everett Co. v. Vivian Oil Co., 128 La. 886, 55 So. 564 (1911).
45. Roberson v. Pioneer Gas Co., 173 La. 313, 137 So. 46 (1931); Logan v. State Gravel Co., 158, La. 105, 103 So. 526 (1925).
46. Bollinger v. Texas Co., 232 La. 637, 95 So.2d 132 (1957); Melancon v. Texas Co., 230 La. 593, 89 So.2d 135 (1956); Pierce v. Atlantic Refining Co., 140 So.2d 19 (La. App. 3d Cir. 1962); Hebert v. Sun Oil Co., 223 So.2d 897 (La. App. 3d Cir. 1969).
47. Gulf Refining Co. v. Glassell, 185 La. 143, 168 So. 755 (1936).
48. R.S. 9:1105; La. Code of Civil Procedure, Art. 3664.
49. 192 La. 1, 187 So.35 (1935).
50. Continental Oil Co. v. Landry, 215 La. 518, 41 So.2d 73 (1949); Humble Oil & Refining Co. v. Guillory, 212 La. 646, 33 So.2d 182 (1946).
51. It must be admitted that the courts did not articulate their reasons on precisely these grounds but this seems to have been the import of their reasoning. In the later cases they, in substance, appear to have viewed it as a right like a servitude, but one which did not carry with it the power to use the property.
52. See the cases cited at Note 50.
53. Union Sulphur Co. v. Lognion, 212 La. 632, 33 So.2d 178 (1947); Union Sulphur Co. v. Andrus, 217 La. 662, 47 So.2d 38 (1950).
54. 179 La. 795, 155 So.228 (1934).
55. For a general discussion of the executive right both under the Mineral Code and the prior jurisprudence, see: Risinger "Executive Rights, Chapter 6, Louisiana Mineral Code", 22d Annual Institute Mineral Law, 23 (1975), and Risinger, "Executive Rights in Louisiana", 16th Annual Institute on Mineral Law, 3, (1970).
56. The official comments do not form a part of the act. The Mineral Code was prepared by the Louisiana Law Institute under a mandate

by the Legislature. The comments represent the explanation of the work by the committee which prepared the act and occupy a position somewhat unique in the legislature sense - somewhat similar perhaps to the official comments to the uniform acts adopted in other jurisdictions. They may be taken to constitute not only an explanation of the act as a part of its legislative history, but a highly authoritative doctrinal statement of its purpose and meaning. The courts are free to disagree with both the explanations and policy given in the comments but they will undoubtedly be given great weight not only because they represent an indispensable part of the legislature background of the act but because they represent a highly authoritative consensus of scholars and practitioners in the field.

57. Comment, Art.4.

58. The statement is from Holloway Gravel Co. v. McKowen, 200 La. 917, 9 So.2d 228 (1942).

59. Art. 105.

60. Art. 126, 171. These are inferentially identified as being "overriding royalty, production payment, net profits interests, or other non operating interest." The Comments to Article 171 describe them as "passive interests in leases."

61. Art. 16.

62. Art. 149.

63. Art. 18.

64. Id.

65. Art. 21.

66. Art. 27.

67. Art. 28.

68. Art. 29.
69. Art. 30.
70. Id.
71. The test for paying quantities as set forth in the article contemplates that the lessee will have already drilled his well and thus incurred the expenses of development. Accordingly such costs are irrelevant to the question of whether it would be profitable to mine the deposit which is discovered. If an operating profit can be made from the production it will reduce the ultimate loss from excessive development or drilling costs and a prudent operator, having no other way to recoup those capital costs would probably do so. As applied to the servitude question the anticipated costs of development should be taken into account, if the assumption is that one who enters into a venture without a reasonable expectation of deriving a profit from it cannot be said to be conducting it in good faith, but has some ulterior improper motive - usually, in the case of a servitude - to hold it for speculative purposes without using the rights granted.
72. 172 La. 613, 135 So. 1 (1931).
73. Id.
74. Mays v. Hansboro, 222 La. 557, 64 So.2d 232 (1959) and cases cited therein.
75. Comment, Art. 38.
76. Art. 68.
77. Art. 40.
78. Art. 74.
79. Id.
80. Art. 73.

81. Art. 74.
82. Art. 114.
83. Id.
84. Art. 115.
85. Id.
86. Id.
87. Art. 119.
88. Art. 120.
89. See the official comment to Article 122 for an extensive discussion of these obligations as they have evolved in Louisiana.
90. Actually, the obligation is to immediately explore the premises for minerals. However the almost universal custom of leasing for a primary term with delay rentals being payable from year to year the first well ordinarily renders the obligation to explore important only after production occurs. The delay rental as its name suggests, is actually in theory a payment for the privilege of deferring the immediate commencement of exploratory activities required by the implied obligation.
91. Comment, Art. 122.
92. Carter v. Arkansas Louisiana Gas Co., 213 La. 1028, 36 So.2d 26 (1948).
93. "The parties may stipulate what shall constitute reasonably prudent conduct on the part of the lessee." Art. 122. However, if the lessee pays an adequate consideration to the lessor to hold the premises without development it would seem he could be relieved of most if not all of these obligations.
94. Art 124.
95. 161 La. 139, 108 So. 314 (1926).

96. Id.
97. Comments, Art. 126.
98. Art. 21.
99. Art. 114.
100. Art. 129.
101. Id.
102. Berman v. Brown, 224 La. 619, 70 So.2d 433 (1953); Broussard v. Hassie Hunt Trust, 231 La. 474, 91 So.2d 762 (1956).
103. Id.
104. Art. 132.
105. C.C. Arts. 2729, 2046. Comment, Art. 134.
106. Sohio Petroleum Co. v. Miller, 237 La. 1013, 112 So.2d 695 (1959); Melancon v. Texas Co., 230 La. 593, 89 So.2d 135 (1956).
107. The concept of a putting in default is extremely complicated. In essence it is the requirement of a formal demand for performance before an obligor may be deemed to have breached his obligations. It is not required where the obligor has actively taken some step incompatible with or in violation of his obligations. It thus is ordinarily required only where the breach consists of a failure to act. (i.e.) a "passive" breach. Even in that case, however, there are numerous jurisprudentially developed rules which eliminate the necessity for it. See Smith, "The Cloudy Concept of Default" 12th Annual Institute on Mineral Law 3 (1965).
108. Art. 141.
109. Art. 142.
110. Arts. 80-104.
111. Arts. 105-113.

112. The rules adopted by the Code as to the mineral royalty are not substantially different from those previously developed by the jurisprudence. The executive right has been considerably expanded. It is however only infrequently encountered in practice.
113. Arts 164-166.
114. Art 164.
115. Art 167.
116. See Chapter VII *infra* for a discussion of the effect of Unitization.
117. Arts 175, 177, 172, 173.
118. As previously mentioned, although the substantive effect of a mineral reservation or sale is the creation of a servitude, the form of the transaction is almost invariably cast in terms of a sale or reservation of the minerals themselves.
119. The form of lease which is perhaps most universally used in South Louisiana is printed by the M.L. Bath Companies and is identified as "Form 42 CPM-New South Louisiana Revised Six (6) - Pooling" or some variant of it. The granting clause leases to the lessee "the exclusive right to enter upon and use the land for the exploration and production of oil, gas sulphur and all other minerals"
120. Texas, in particular, seems to be moving toward a concept of a "surface" and "mineral estate" which as a matter of law is created by a mineral sale. See Oberbeck, The Geopressured Geothermal Resources of Texas, 1977.
121. 151 La. 197, 91 So. 676 (1922).
122. 200 La. 917, 9 So. 2d 222 (1942).
123. It will be noted this is the statement referred to the Comment to Article 4 of the Mineral Code as to the inherent indefiniteness of the term "minerals".

124. 331 So.2d 878 (La. App. 2d Cir. 1976); writs denied 337 So.2d 221; (1976).
125. C.C. Art 1945.
126. Id.
127. 126 La. 471, 52 So. 667.
128. Id.
129. This article is now article 730 after a revision of this section of the Code by Act 614 of 1977.
130. Parish v. Municipality No. 2., 8 La. Ann. 145 (1853).
131. Whitehall Oil Co. v. Heard, 197 So.2d 672 (La. App. 3rd Cir. 1967).
132. LeBleu v. LeBleu, 206 So.2d 551 (La. App. 3rd Cir. 1967).
133. 238 La. 1081, 117 So.2d 817.
134. 8 La. Ann. 549 (1853).
135. 3 La. Ann. 549 (1848).
136. Id.
137. "The provisions of this Code shall apply to all mineral rights including those existing on the date hereof; but no provision may be applied to direct already vested rights or to impair the obligation of contracts" Art 214.
138. In one of the most recent cases decided since adoption of the Code, GMB Gas Corp. v. Cox, 340 So.2d 638 (La. App. 2d Cir. 1976), the court said: "Although the Code clearly resolves the issue presented in this case, there may be constitutional questions presented in giving retroactive effect to the provisions of the Code that affect vested rights. To establish stability in this area of the law, the provisions of the Mineral Code should be followed on pre-code issues which have not been clearly resolved by the jurisprudence. This approach to the problem is supported

by the pronounced intent in the introduction to the Code by the Louisiana Law Institute that it is intended to be a codification of the already existing body of jurisprudence relating to mineral ownership in this state. The Code further represents an expression of the legislature as to what it considered the law should be in those areas where the courts had not specifically ruled."

139. Comment, Art 124.
140. Expose 'de Motifs, to Act 514 of 1977 Revising Title V of Book II of the Louisiana Civil Code.
141. Id.
142. Louisiana Petroleum Co. v. Broussard et al, 172 La. 613, 135 So. 1 (1931).
143. Carter v. Arkansas Louisiana Gas Co., 213 La. 1028, 36 So.2d 26 (1948).
144. Caldwell v. Alton Oil Co., Inc., 161 La. 139, 108 So. 314 (1926).
145. Karkalits and Hawkins, Chemical Analysis of Gas Dissolved in Geothermal Waters in a South Louisiana Well, Proceedings Third Geopressure-Geothermal Energy Conference, (1977).
146. Supra p 47.
147. Supra p 49.
148. Supra p 55.
149. Supra p 49.
150. See generally, the papers in Proceedings, Second Geopressured, Geothermal Energy Conference, (1976).
151. The Geothermal Energy Resources Act of 1975 (R.S. 30:800) in Louisiana and the Geothermal Resources Act of 1975 in Texas (V.A.T.S. Art. 5421-S) also may be taken as a legislative recognition that the

resource is something different and requires special regulation. Such facts of common knowledge should not be ignored in construing the agreements of parties. See page 147 Infra.

152. 131 F.Supp. 772 (U.S.D.C. W.Va 1955).

153. Grant or Reservation of Mineral Estate as Authorizing Removal by Strip or Open-Pit Mining, 70 ALR 3d 383 (1976).



CHAPTER V
DELICTUAL AND OTHER RESPONSIBILITIES
OF THE OWNER AND OPERATOR

I. THE SETTING

Before rational decisions can be made on large scale commitments to any project, one of the factors which must be considered is the potential liability resulting from accidents or other adverse or unintended consequences to other property owners or the public generally caused by its development or operation. The intelligent planning of operations also requires that consideration be given to the rights and obligations of others possessing interests in the land upon which activities are to be conducted in the reservoir being developed.

The geopressured resource, as described earlier, is basically hot salt water under high pressure perhaps saturated with methane. To harness the energy contained in the resource, deep wells must be drilled into the geopressured reservoir, the water brought to the surface, transported to the site of utilization, the energy extracted, and the water disposed of.

The operator of such wells will undoubtedly either own the property in full ownership, or hold his rights under a mineral lease or servitude. After a well has been completed, the water must be transported to the utilization site. The distance will probably not be great because of the energy lost in transportation. The number of wells needed will depend on the utilization to be made of the resource.

The energy in the resource will be converted to electricity, or used "on site" as for process heat. The disposal of the water obviously presents substantial problems since it must be done with minimum damage

to the environment. Unless the water is exceptionally pure or the location of the project is unusually fortuitous, the only method of disposal which presently appears to be feasible is reinjection into the earth at depths sufficient to prevent damage to fresh water and perhaps in excess of 5,000 to 6,000 feet.

The possibility that damage might occur to the person or property of others at any or all of these steps is apparent. Well blowouts, pipeline leaks, pollution (noise, air, and water), earth subsidence, seismicity induced by reinjection, pollution to existing water supplies, and damage to the water drives of existing oil and gas wells, all must be contemplated. Furthermore, these activities will apparently be occurring near coastal areas where environmental risks are enhanced and the ecological balance is particularly precarious. Other persons may possess rights to use the land or produce from the same reservoir. Conflicts between the operations of the geopressured developer and such other persons are a distinct possibility.

The effect upon the development of the geopressured resource of the extensive governmental regulations designed to protect the environment and ensure that industrial activities are conducted with due regard to society's perceived interest in these matters, is the subject of another section of this study. However, the rights and liabilities of the owner or operator and neighboring landowners or the public generally in the event something goes wrong or if the conduct of the enterprise causes undue interference with or inconvenience to the rights of others, will for the most part be resolved within traditional concepts of property and tort law. Conflicts with others claiming rights to the same lands or to produce from the same reservoir will be resolved in large measure by principles of property law.

II. AN OUTLINE OF LOUISIANA'S SYSTEM OF DELICTUAL RESPONSIBILITY

Louisiana's system for the resolution of damages caused by accidental or negligent conduct, while achieving in most cases, about the same results as prevail in other jurisdictions, is to some degree unique and based upon institutions developed in the Civil Law. Accordingly, it may be useful to briefly describe the system which presently exists in Louisiana and some of the consequences which that system might imply for the operator and owner of the resource.

All legal systems provide some redress for private wrongs between persons. At common law, this area of the law is characterized as "torts." In Louisiana, the "tort" of the common law is technically known as a "delict." The basis for delictual or tort responsibility is found in Articles 2315 and 2316 of the Civil Code.

Article 2315 provides in pertinent part that, "Every act whatever of man that causes damage to another obliges him by whose fault it happened to repair it." Article 2316 makes this more specific by providing that, "Every person is responsible for the damage he occasions not merely by his act, but by his negligence, his imprudence or his want of skill." These articles, found in the section of the Code dealing with Offenses and Quasi Offenses, make it clear that injury caused by the "fault" of a person (by act of omission or commission) creates a legal obligation that did not exist before the "fault" that caused the "damage." This obligation arises by the automatic operation of law; that is, it is a legal obligation.

A. Negligence as a basis for fault

The operative event giving rise to this delictual responsibility between the parties is the "fault" of one of them. Louisiana courts,

until recently at least, incorporated much of the common law of torts by holding "fault" was synonymous with negligent or intentional conduct. For this reason, the Louisiana law relating to delictual conduct developed in a manner very similar to that of its sister states; the basic premise being that a negligent action which was the proximate cause of an injury to another was compensable unless the damaged party was guilty of contributory negligence. Negligence was defined in the conventional manner as "the failure to exercise the degree of care which may be expected of a reasonably prudent individual under the same or similar circumstances."²

In recent years, the Louisiana Courts have begun to depart from the traditional analysis of delictual responsibility articulated in terms of whether it was the "proximate cause" of the injury in favor of another analytical approach which requires a somewhat similar inquiry, but which places responsibility upon a different theoretical basis and required the application of different techniques to determine tort or delictual responsibility.

While a detailed examination of Louisiana's evolving delictual doctrine is beyond the scope of this study, a brief discussion of the method of analysis presently being used by Louisiana courts in these cases is important because of the implications it portends for persons engaging in activities on lands owned or leased by them.

The method currently used in the Louisiana Supreme Court in determining delictual responsibility in negligence cases has been referred to as the "duty-risk" analysis.³ Under this approach, the inquiry takes the following form:

1. Was the conduct complained of a cause-in-fact of the harm?

This theoretically is a factual inquiry, the issue being whether the defendant's conduct was, in fact, a cause of the plaintiff's harm, but without the policy decisions or value judgments inherent in the concept of "proximate cause."

It is not necessary that the defendant's conduct be the only cause, it need merely be a cause of the harm.

2. Was the defendant under a legal duty imposed to protect against the particular risk involved? This inquiry is

proper in alleged violations of statutory and jurisprudentially developed duties. The question is also framed as, "Was the risk actually encountered within the ambit of protection of the rule alleged to have been breached?" This is obviously a subliminal determination of considerable flexibility. Courts must answer this question on a case by case basis. Rigid rules are not to be applied, and to a large degree the answer represents the court's subjective evaluation of competing social considerations which are rarely articulated. To some degree this inquiry fulfills the same function in the process as did the concept of "proximate cause" in the former system.

3. Taking into account the dangers created by defendant's conduct including but not limited to that which actually occurred in the case under consideration was the defendant's conduct negligent, sub-standard or blameworthy? This also must be

decided in each individual case by the standard of conduct that is expected of a "reasonably prudent person" under the circumstances presented. This standard of "reasonableness"

is one with which courts are very familiar and which has been used as a basis for responsibility in many areas for a diversity of purposes. For instance, it has long been the view that "reasonably prudent people" who drive automobiles keep a proper lookout, and will avoid collisions with cars which have stopped in their path. The failure to keep this proper lookout, when damage results, is considered negligent, and liability, therefore, attaches.

4. Was the plaintiff damaged; and if so, to what extent? The concept embodied in Article 2315 is that the obligor ("tortfeasor") is obligated to pay only those damages which he actually caused. It is because of this concept that punitive or exemplary damages are not allowed in Louisiana. The damaged party's recovery is restricted to those losses which he can prove that he actually sustained.

Recent examples of this "duty-risk" approach include holding that the statutory duty to put out warning flags behind vehicles stopped in the roadway was to protect against the risk of confused or inattentive drivers, and that

" . . . the risk of injury from a ladder lying on the ground, produced by a combination of defendant's act and that of a third party is (not) within the scope of protection of a rule of law which would prohibit leaving a ladder leaning against the house."⁶

The latter case also indicated that the traditional "guest-invitee-trespasser" classification used to define the duties owed to persons on one's premises may no longer be relevant in determining the extent of the duty owed by a property owner to persons on his property.

B. The Development of Non-negligent Fault

Early Louisiana cases indicated that "fault" under Article 2315 was confined to "negligence" or intentional conduct. In the famous case of McIlhenny v. Roxana Petroleum Corp.,⁷ the court held that where plaintiff's house was damaged by dynamiting, the cause of action must be brought under Article 2316, and negligence on the part of the defendant proven. The same result was reached in a similar case where the court said,

It was incumbent on the plaintiff to show . . . that the damaged condition . . . was caused by the fault or through the negligence of the defendant in improperly discharging these blasts of dynamite . . .⁸

Although cases such as this obviously fit the category of ultra-hazardous activities, which in most jurisdictions would give rise to a form of absolute liability, the Louisiana courts required a plaintiff to prove the defendant negligent before recovery was allowed. The burden of proof was occasionally lightened by the application of the doctrine of res ipsa loquitur.⁹ Although the doctrine in theory merely provides a presumption of negligence,¹⁰ in many instances it has the effect of imposing virtually absolute liability on the defendant.

In Fontenot v. Magnolia Petroleum Company,¹¹ the state Supreme Court in substance overruled the McIlhenny decision by holding the defendant liable for damages caused by dynamite blasting, and rejected the argument that negligence need be proven in cases where the defendant was engaged in an "ultrahazardous activity" by saying that they,

Prefer(ed) to base our holding on the doctrine that negligence or fault, in these instances, is not a requisite to liability, irrespective of the fact that the activities resulting in damages are conducted with assumed reasonable care and in accordance with modern and accepted methods.¹²

In these cases, when causation is difficult to prove, courts have drawn "reasonable conclusions" where damage immediately follows the

activity. This is so even when the defendant's expert witnesses testify that the plaintiff's damages could not have been caused by the defendant's activity, such causation being a "scientific impossibility."¹³

Finally, in Langlois v. Allied Chemical Corporation,¹⁴ the Supreme Court fitted its doctrine of virtual absolute liability for ultra-hazardous activities under Article 2315. In that case, a fireman breathed poisonous gas which had escaped from the premises of the defendant. The court said that "fault" in Article 2315 is not limited to negligence, and occurs whenever a standard of conduct which may be found in the Civil Code, statutes or ordinances is breached.¹⁵

Here we find that proof that the gas escaped is sufficient, and proof of lack of negligence and lack of imprudence will not exculpate the defendant. The defendant has injured this plaintiff by its fault and analogized from the conduct required under Civil Code Article 669 and others and responsibility for the damage attaches to defendant's under the Civil Code Articles 2315.¹⁶

As to what activities may be classified as "ultrahazardous", the court said,

The activities of man for which he may be liable without acting negligently are to be determined after a study of the laws and customs, a balancing of claims and interests, a weighing of the risks and the gravity of harm, and a consideration of individual and societal rights and obligations.¹⁷

Louisiana courts have had several opportunities to expand the treatment of ultrahazardous activities given in Langlois. Since damage caused by an ultrahazardous activity is compensable regardless of the care taken by the defendant, the crucial issue is whether or not a given activity should be classified as ultrahazardous. Restated, the question may be posed as, "What characteristics make an activity ultrahazardous?"

To be classified as ultrahazardous, an activity must involve a high degree of risk of harm to the property of others. Examples of these

types of activities are dynamiting,¹⁸ pile driving,¹⁹ construction,²⁰ and building demolition.²¹ This requirement is often joined with the requirement that the risk remain despite the exercise of reasonable care. If the exercise of ordinary caution will reduce the risk, the activity is not considered ultrahazardous. In this regard, one court has held that the inspection of boilers is not ultrahazardous, even though there is a risk of great harm, because "simple ordinary care and prudence" would have eliminated the danger.²²

The harm likely to be caused must also be great. This is a tacit recognition that the term ultrahazardous should not be applied to certain types of activities even if no amount of care can guarantee they will be perfect and damage free. Thus, a sewerline that backs up, though not caused by negligence, is not "ultrahazardous", because the damage caused is not sufficiently severe to justify the term.²³

To be considered ultrahazardous, the activity must also be either "unusual", or not appropriate to the area. Langlois uses the term "laws and customs" of the area to illustrate this requirement. In this regard, it can be seen that pile driving, sewer construction, and building demolition are not "customary" in residential neighborhoods, while sewer operations are.

The criteria apparently used in determining whether or not an activity is ultrahazardous are very similar to those found in the Restatement of Torts, 2d Section 520. The Restatement lists six factors to be considered in determining whether or not an activity is ultrahazardous:

- 1) The existence of a high degree of risk of some harm to the person, land or chattels of others;
- 2) The likelihood that the harm that results from it will be great;

- 3) The inability to eliminate the risk by the exercise of reasonable care;
- 4) The extent to which the activity is not a matter of common usage;
- 5) The inappropriateness of the activity to the place where it is carried on; and
- 6) The extent to which its value to the community is outweighed by its dangerous attributes.

The application of these principles in the above examples is easy to see. Even the last factor, though never held to be a deciding one, was acknowledged as a consideration in Langlois.²⁴

After finding that a complained of activity is ultrahazardous, some additional proof is required before recovery is allowed. In Holland v. Keaveney,²⁵ the court held that building demolition is ultrahazardous, but refused to award damages for the death of a dog stung to death by bees which had been released from the building by the demolition. The court said that while the activity was ultrahazardous, the defendant was not liable for damages which were unforeseeable; the dog's death being an unforeseeable consequence of the building's demolition.

The intervening negligence of a third party may also exculpate a defendant who is engaging in an ultrahazardous activity. In Gansloser v. Kansas City Southern Railway,²⁶ the court held that the intervening negligence of the driver of an automobile insulated the railroad from having to pay damages. Although the court did not specifically find the railroad to be an ultrahazardous activity, it approved dicta in another case²⁷ which said that the unforeseeable intervening negligence of a third party will insulate a defendant who is engaged in an ultrahazardous activity from damages.

Given these guidelines, is geopressured energy production an "ultra-hazardous activity"? The drilling, production, and transportation of hot salt water certainly subjects others to a certain degree of harm. Similarly, the damage if the water escapes is likely to be great. Drilling accidents such as "blow outs" do occur in oil and gas wells, especially in the high pressure zones, in spite of advanced technology and expertise, and in spite of the exercise of all reasonable care. Similarly, the production and transportation of the salt water is at least as "inappropriate" as pile driving or pipe line construction.

The inescapable conclusion is that at least some aspects of geopressured production are "ultrahazardous activities," and will subject the operator to strict liability for those damages which are foreseeable, and not caused by the intervening negligence of third parties.

C. The Extension of Liability into the Property Area

The significance of the Langlois case is found not only in its treatment of ultrahazardous activities, but in its holding that the violation of a statutory duty is synonymous with "fault" under Article 2315. In Langlois, Civil Code Article 669 provided the standard by which the defendant's conduct was measured. Several other statutes also provide standards, the breach of which may lead to liability based on Article 2315.

One of these has created particularly vexatious problems in determining the nature and extent of liability for damages caused by the use of land and has led to even broader basis for liability than that found in Article 2315.

Article 667 of the Civil Code provides,

Although a proprietor may do with his estate whatever he pleases, still he can not make any work on it which may deprive his neighbor of the liberty of enjoying his own, or which may be the cause of any damage to him.

Liability under Article 667 only attaches to "proprietors." Obviously, a landowner in perfect ownership is a "proprietor" for purposes of the Article, as is a lessee. Furthermore, both can be held liable under 667 for the same damage. Similarly, if a landowner authorizes another to conduct an activity on his land which constitutes a violation of Article 667, and which causes damage, both the landowner and his contractor are liable as proprietors. There is no indication, however, that the landowner must be joined in the suit.³⁰

. . . (t)he obligation of Article 667 has been enforced against the holder of a mineral lease . . . who has for this purpose treated as a proprietor, and to the extent that Article 667 was involved, it has been enforced against the holder of a long term lease. In these days of long term leases, complex mineral rights and horizontal property divisions it would be a mistake to limit the word 'proprietor' to its early nineteenth century connotation, thus ignoring modern developments in property rights.³³

The term "works" in Article 667 has also been construed broadly. A pipeline near the property boundary³⁴ fuel storage tanks,³⁵ a wall built on the property line,³⁶ seismic blasting,³⁷ using heavy equipment in construction³⁸ and pile driving,³⁹ were all held to be "works" under 667.

Any "neighbor" can bring an action based on 667. In addition to a neighboring landowner, a lessee,⁴⁰ servitude owner, or even a tenant farmer can maintain the action. The only requirement is that the plaintiff⁴¹ have some property interest.

As long as the standards of Article 667 are viewed as norms by which the conduct of a person can be measured in determining whether liability is imposed upon him under Article 2315, the article can be viewed as being little more than an expression of a general standard of

conduct for determining liability using traditional tort concepts.

The "duty risk" analysis appears to have been originally conceived to afford more precision in articulating what conduct may be "faulty," i.e. culpable, and of determining the limits of responsibility for such conduct. The necessity for finding the "duty" which the defendant has allegedly breached has also lead to a greater emphasis on the nature of the duty in question. Delictual responsibility arises, in theory at least, from the breach of a legal duty. If the duty is imposed as an incident to the ownership of property, its violation may result in a delict; but it may also be considered as a violation of a property right and call into play the rules of law designed to protect, or vindicate such rights. This distinction can sometimes be crucial in determining who may be liable, and what relief can be granted to the injured party.

Recent cases indicate that the courts are now beginning to consider Article 667 as primarily a principle of property law, rather than merely the statement of a legal duty imposed upon its owner, the breach of which constitutes "fault" under 2315. Article 667 is found in Title IV Book II of the Civil Code, which is entitled "Of Predial Servitudes." Article 666-669 are found in Chapter 3, "Of Servitudes Imposed by Law." Article 666 states: "The law imposes upon the proprietors of land various obligations toward one another . . . and those are the obligations described in the following articles."

When viewed in this context, Article 667 may be considered to establish a servitude, or charge upon the land in favor of adjoining lands. The violation of such servitude or charge is by definition an interference with the property rights of another and thus per se illegal. State negatively, Article 667 appears to be a limitation of the right of ownership, and any breach of its premises authorized by the landowner

constitutes an unlawful interference by him with the property rights of his neighbors, whether or not the activity is done in good faith or in the most careful manner. Furthermore, the obligation is one which is attached to the ownership of the land and to that extent is not personal but is real.

The first really clear use of this analysis by the Courts is found in Hero Land Company v. Texaco.⁴² In that case Texaco obtained a servitude from Alsue Corporation, along the line separating Alsue's property from that of the plaintiff, Hero. Texaco then constructed a high pressure gas pipeline in the middle of the servitude, running parallel with the property line, only 15 feet from Hero's property. Hero did not question the lawfulness of the servitude; the right of Texaco to construct the line, nor the manner of its operation, but contended that the close proximity of the pipeline caused damage by diminishing the value of its property. This diminution was said to occur because of the danger of explosion created by the presence of the pipeline. The lower court dismissed the case on an exception of no cause of action, which was affirmed by the Court of Appeal. Writs were granted by the Supreme Court which dealt with the question in the following way:

Does the construction of a hazardous high pressure gas pipeline adjacent to and within fifteen feet of the property line separating contiguous estates give rise to an action for damages caused by this proximity which impairs the market value and full use of the neighboring estate? The question is res novo in this Court. The legal principles set forth in Articles 667, 668 and 2315 of the Civil Code are relied upon to sustain the cause of action . . .

. . . A suit for damages instituted as a result of a proprietor's violation of the obligation imposed upon him by Article 667 of the Civil Code is not a tort action in the sense that deliction in its usual connotation is a necessary element. *Craig v. Montelepre Realty Co.*, 252 La. 502, 211 So.2d 627 (1968) *McCaleb, J.*, concurring.

As expressed in the Article, the principle is a limitation the law imposes upon the rights of proprietors in the use of their property. It is a species of legal servitude in favor of neighboring property, an expression of the principle of *sic utere*. An activity, then, which causes damage to a neighbor's property obliges the actor to repair the damage, even though his actions are prudent by usual standards. It is not the manner in which the activity is carried on which is significant; it is the fact that the activity causes damage to a neighbor which is relevant. *Chaney v. Travelers Insurance Company*, 259 La. 1, 249 So.2d 181 (1971). The article expresses, as this Court has often stated, a doctrine of strict liability which does not depend upon deliction. *Craig v. Montelepre Realty Co.*, supra; *Gotreaux v. Gary*, 232 La. 373, 94 So.2d 293 (1957); *Fontenot v. Magnolia Petroleum Co.*, 227 La. 866, 80 So.2d 845 (1955); *Devoke v. Yazoo & M.V.R. Co.*, 211 La. 729, 30 So.2d 816 (1947).

It does not follow, however, that Article 667 is the only basis upon which neighbors may seek redress for damages caused by proprietors in the vicinity. Article 2315 may also serve as a basis for recovery under appropriate circumstances. But when this authority is relied upon, fault must be proven. Article 2315 contemplates responsibility founded on fault, namely, negligence or intentional misconduct, including abuse of rights. The notion of fault in this context is conduct which violates the standard of reasonableness in the community, an act that a careful and prudent person would not undertake. By contrast, recovery under Article 667 may be granted despite the reasonableness and prudence of the proprietor's conduct, when the work he erects on his estate causes damage to his neighbor. *Lombard v. Sewerage & Water Board*, 284 So.2d 905 (La. 1973).

Recently in *Hillard v. Shuff*, 260 La. 384, 256 So.2d 127 (1972), this Court restated, as a universally accepted rule of law, the right of the owner of property to conduct thereon any lawful business not per se a nuisance, as long as the business is so conducted that it will not unreasonably inconvenience a neighbor in the reasonable enjoyment of his property. But every business, however lawful, must be conducted with due regard to the rights of others, and no one has a right to erect and maintain a nuisance to the injury of his neighbor even in the pursuit of a lawful trade, or to conduct a business on his own land in such a way as will be injurious or offensive to those residing in the vicinity. See also *Devoke v. Yazoo & M.V.R. Co.*, supra. Article 668 of the Civil Code, in substance, embodies the same principle.

The law, therefore, fixes the responsibility of proprietor to his neighbor, and Texaco is a proprietor and Hero is its neighbor, within the contemplation of Article 667. *Salter v. B.W.S. Corporation, Inc.*, 290 So.2d 821 (La. 1974). Thus, the only issue presented here is whether the allegations of this petition are sufficient in law to establish that the Heros have been damaged by the installation of the pipeline by Texaco in its servitude. If facts are alleged which would, as a matter of law, constitute damage to the Hero property caused by Texaco's installation and maintenance of the line, the petition states a cause of action. For, although Texaco may use its property (servitude) as it sees fit, it can not make any work on it which may deprive Hero of the liberty of enjoying its own, or which may cause damage to Hero. La. Civil Code art. 667.⁴³

The apparent rigorousness of this opinion, which on its face seems to indicate any activity however lawful and safe which injures or diminishes the value of adjacent lands might give rise to liability was tempered somewhat by the subsequent per curiam opinion of the court, denying an application for rehearing.

The application for rehearing argues that *Jeansonnie v. Cox*, 233 La. 251 96 So.2d 557 (1957) is contrary to our holding in this case. Apparently, defendants misunderstand the consequences of our opinion. We have not held that allegations of damage based upon a depreciation of land value because of ordinary constructions and activities on a neighbor's property necessarily state a cause of action. The opinion has held that allegations that the maintenance of an ultra-hazardous construction on defendant's servitude has caused them damage does under the factual allegation state a cause of action. We have remanded for trial on the merits to determine if the proof in support of these allegations entitled plaintiff to recovery of damages for the fault of defendant under the theory of abuse of right as expressed by La. Civil Code Arts. 667 and 668. (Emphasis of the Court)⁴⁴

The per curiam seems to distinguish the holding in this case from earlier cases which still viewed the cause of action as delictual, on the grounds that the "work" was ultrahazardous. It is not at all certain, however, that the Court was limiting the application of Article 667 to those cases involving ultrahazardous works. At best, it can only be

said that Article 667 is clearly applicable when the activity is ultra-hazardous, not that the Article will not be applied when the work is not ultrahazardous.⁴⁵

A duty similar to that imposed on the landowner by Article 667 is found in Article 660.

It is a servitude due by the estate situated below to receive the waters which run naturally from the estate situated above, provided the industry of man has not been used to create that servitude ...

The proprietor above can do nothing whereby the natural servitude due by the estate below may be rendered more burdensome.

This "Servitude of Drain" has the effect of imposing absolute liability on the owner of a dominant estate if he interferes with the natural flow of waters across his land or otherwise construct works or engages in activities which make the burden on the lower estate more onerous. In one case, a defendant mineral lessee allowed salt water to escape into a natural drain. The water ran onto plaintiff's land and damaged it. The plaintiff was allowed to recover because the defendant had made the natural drain "more burdensome" by allowing the salt water to enter it.⁴⁶

The prohibition in Article 660 against rendering the drain "more burdensome" is much broader than that of Article 667, but the theoretical basis for recovery is the same. Recovery based on Article 660 does not require resort to Article 2315, and may be made without showing "fault" on the part of the defendant. The result in both cases is the same, i.e., strict liability on the property owner based on principles of property law for all damage caused by a violation of the Article.

The courts have not been willing, under Article 660 to engage in any significant inquiry as to the reasonableness or social utility of

the activity complained of. The resolution of disputes under Article 660 have almost universally been approached as a matter of property law with its tradition of absolutism, when a violation of rights is at issue. Whether or to what extent the cases establishing and regulating liability under Article 660 may become merged with those involving Article 667 is uncertain.⁴⁷

The problem has been rendered more confused by the case of La Croix et. al. vs. Travellers Indemnity Company⁴⁸ involving a situation where certain sewer lines owned by the Town of Winnfield backed up and flooded the home of the plaintiffs. The lower court had found the town negligent in the operation of the system and that this negligence had caused the flooding of the plaintiffs' houses from the sewers. On appeal the defendant (the insurer of the town) contended the record did not support the finding of negligence. The court of appeals, reviewing the record, agreed with the defendant but imposed liability on the basis of Article 667 explaining its reasons as follows:

Although we find these facts do not support a finding of negligence, we do find the trial judge properly found the plaintiffs suffered damages which were caused by the sewer backing up. Further, the evidence clearly warrants imposition of liability on the basis of violation of La.C.C.Art. 667 as interpreted in Sharon v. Connecticut Fire Insurance Company and Carr v. City of Baton Rouge, supra....

In Carr v. City of Baton Rouge, supra, (decided after the lower court judgment in the case before us), the court found: the responsibility for the operation and maintenance of the sewer system devolved upon the municipality which was the "proprietor"; the "works" (the main sewer line) was an activity of the proprietor; plaintiffs were "neighbors" who suffered damage caused by the malfunctioning of the "proprietor's" sewer system; and plaintiffs were entitled

to recover for damage inflicted. Under the facts, the court concluded that even in the absence of negligence on the part of the town, plaintiffs were entitled to recover under Article 667. See Lombard v. Sewerage and Water Board of New Orleans, 284 So.2d 905 (La.1973).

The plaintiffs had also asked for damages for the diminution of the value of their property, relying upon the Hero Case, and an award for this had been given by the lower court. The appellate court set aside the award for this element of damage (even though it found the evidence "persuasive" that some diminution in value had been suffered in the market value of the property) interpreting Hero's holding as follows:

However, we find the sewer system was not an "ultra hazardous construction" as that term is used in the Hero Lands case. In view of our appreciation of the jurisprudence with respect to an award for diminution of property value under La.C.C. Art. 667, we find such an award is without sound legal basis and that portion of the judgment is reversed.

A writ was applied for the the Supreme Court. The court refused to grant it by a per curiam opinion stating;

"on the facts found by the court of appeal, the result is correct."

Justices Dixon and Dennis dissented on the grounds that

"the writ should be granted to clarify, if we can, Hero Lands vs. Texaco Inc. and the per curiam on the denial of rehearing. If anything is clear, it is that Hero does not require ultra hazardous activity before the neighbors can recover loss of value by a 667 violation."

It is significant that the court of appeals found that liability existed in the case even in the absence of a showing of negligence under Article 667 and restricted Hero (and the significance of ultra hazardous activities) to damages for diminution in value to the land (as distinguished from "physical" injury). Whether the per curiam rejecting the application

for the writ confirms this is not certain and reliance upon the court's reasons for refusing such applications is always dangerous. However, until the matter is clarified, one must assume that any injury may be brought under Article 667 without regard to whether the activity is ultra hazardous if it can be traced to an activity the courts can construe as a "work" on the premises.

Whether liability exists for damages caused by an activity on land, at least if it is characterized as "ultrahazardous," will probably be answered similarly whether one approaches the question as a violation of Articles 667 or 2315. There are, however, significant implications inherent in the resort to Article 667 as to who is responsible for the damage, as well as the remedies which are available for the vindication of the plaintiff's rights which are discussed later.

D. Parties Liable

1. Solidary Liability

Under traditional tort or delictual principles, a person is liable not only for his own acts that cause damage but also for the acts of those who, in the course and scope of their employment by him, cause damage to others.⁴⁹ Similarly, all who assist the person in causing damage to another are also liable to the damaged party.⁵⁰ This liability is termed "solidary." Solidarity is somewhat equivalent to the joint and several liability of the common law. Each solidary debtor is separately bound to pay the entire damages.⁵¹ If a party who is bound in solido is forced to pay the entire amount, he is entitled to contribution from the other solidary obligors for their virile portion of the debt.⁵²

A dangerous implication to land owners not yet fully developed results from the determination that, while a violation of Article 667

may give rise to an action in tort under Article 2315, the duties imposed by Article 667 are servitudes upon the land, and thus also real obligations owed by the land's proprietor.

The matter has become somewhat more clouded as a result of Act. 602 of 1975 which provides:

A. It is the public policy of the state that the responsibility which may be imposed on an agent, contractor, or representative by reason of the responsibility of proprietors under Article 667 of the Louisiana Civil Code shall be limited solely to the obligation of such agent, contractor, or representative to act as the surety of such proprietor in the event the proprietor is held to be responsible to his neighbor for damage caused him and resulting from the work of such agent, contractor, or representative, and only in the event the proprietor is unable to satisfy any claim arising out of such damage. The agent, contractor, or representative who is responsible for damages, as limited by this Section, shall have a right of action against the proprietor for any damages, costs, loss or expense which he may suffer in his capacity as the surety of the proprietor.

B. Nothing in this Section shall be construed to relieve a contractor of any liability which he may incur as a result of his own negligence or the improper performance of the work performed under the construction contract.

This recognizes primary responsibility for the violation of Article 667 rests upon the proprietor. It still leaves one the problem of whether responsibility for the contractor's actions may be directly and primarily imposed upon him under Article 2315.

There is respectable authority to support the proposition that a landowner who grants to another the right to conduct an activity which results in a violation of Article 667 will be liable for damages caused by the activity, even though the grantee is a lessee, servitude owner, or independent contractor, for whom, under traditional tort doctrine,

the owner would ordinarily not be responsible. This is also clearly, although implicitly recognized in Act 602 of 1975 discussed above, making the contractor "a surety" of the principal if his activities violate Article 667. There is, admittedly, some authority for the proposition that if the activity could have been conducted in a prudent and lawful manner which would not violate Article 667, the landowner is not responsible for the actions of his lessees or others on the land with his permission and not acting as his agent. The distinction, although somewhat indefinite, appears to be based upon the idea that where the activity can reasonably be conducted in a manner that would not violate the article, the landowner may assume his contractor or lessee will stay within those bounds and that if, in fact, he conducts the activity in such a manner as to cause injury to the neighbor, the landowner will not be responsible because the actions were both unforeseeable and unauthorized. Whether the owner could escape this responsibility as against the actions of a contractor is uncertain in light of the act just discussed.

In any event, a very plausible case can be made that the owner of land will be liable for damages which result to his neighbors or the public generally, if the cause of action can be fitted within the ambit of Article 667, without regard to whether the activity is conducted by an independent contractor, lessee or servitude owner. Furthermore, if such responsibility attaches, the landowner will also be responsible in solido for the entire amount.

2. The Effect of Unitization

The Louisiana Conservation Act the provisions of which have been extended by the Legislature to the development of geopressured resources,

present a further complication.

R.S. 30:9 (B) provides that the Commissioner of Conservation shall establish drilling unit(s) for each pool of oil or natural gas to prevent waste and avoid drilling unnecessary wells. R.S. 30:10 provides that where separately owned tracts of land are embraced within a single unit, the owners of the separate tracts may agree to pool their interests and develop their lands as a single unit; R.S. 30:10 (1) gives the Commissioner the authority to require the separate owners to pool their interests if he finds this necessary to prevent waste; R.S. 30:10 (1)(b) provides that the proportion of production allocated to each owner is considered as if it had been produced by a well drilled on his tract. The next subsection, R.S. 30:10 (1)(c), states that:

In the event pooling is required, the cost of development and operation of the pooled unit chargeable by the operator to the other interested owners shall be limited to the actual reasonable expenditures required for that purpose, including a charge for supervision. In the event of a dispute relative to these costs, the Commissioner shall determine the proper costs, after notice to all interested persons and a hearing.

Is the effect of these provisions to make all landowners within a unit liable for damages arising from the operation of unit facilities by the Unit operator? To restate the question more concretely, if A and B are lessees whose tracts have been unitized, is A liable for damages caused by a well which is operated by B on B's property? Does it make any difference whether A did not agree to the unitization which is forced on him by order of the Commissioner of Conservation?

The initial response is that A should not be held liable because he did not cause, nor could he prevent, acts which did not occur on his property by a person over whom he had no control, and who is appointed operator by the Commissioner. On the other hand, A is benefiting from the production on B's property. Should he not also bear his share of

the risk that B undertakes in drilling for their mutual benefit, especially as to innocent third parties who are injured?

It is doubtful that R.S. 30:9 and R.S. 30:10 were ever intended to grant a cause of action against the owners of tracts subject to a unitization order for the operator's actions. R.S. 30:10 (A) (1) (c) provides that the landowners must share the cost of development and operation of the unit, and that in the event an agreement cannot be reached, the Commissioner shall determine the proper costs. It is unlikely that "costs" were intended to include damages to third parties caused by the operator of the well.

Some cases, however, have seemingly construed R.S. 30:10 (1)(b) as having the effect of creating a joint venture on the part of the lessees.

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In Mire v. Hawkins, the court stated:

"When a drilling unit is created and the separate interests therein are forced pooled .. the effect is to convert the separate interests within the unit into a common interest so far as the development 58 of the unit and the drilling of the well is concerned."

The Court went on to say that "the cooperative effort in drilling the well .. should be an exercise of the mineral servitude of each owner ... regardless of where the well is located ..." (author's emphasis).⁵⁹ By using this language and attributing the act of drilling to the cooperative efforts of each owner, the court comes very close to the classic definition of a joint venture. Damages caused by one joint venturer are assessable against all.

Even more explicit language was employed in Superior Oil Co. v. Humble Oil and Refining Company.⁶⁰ There, plaintiff drilled a producing well after which the defendant petitioned for a unitization order which was granted by the Commissioner. The plaintiff sued for reimbursement of the defendant's pro rata share of the development costs in cash. The

defendant argued that the plaintiff could only recover the costs from production, and could not force the defendant to pay in cash.

In giving judgment for the plaintiff, the court said:

"The requirement of contribution should not be affected by the fact that the well was already in existence. The operator should no more be required to finance the joint enterprise in the one case than in the other. In this respect, when the defendant requested unitization of the well already successfully completed by plaintiff, in effect it became a joint adventurer"⁶¹ (author's emphasis).

This is the normal case, where the non-operating owner joins in the application for a unitization order. But what if the non-operating owner does not want to join his interest or involuntarily unitized by the Commissioner? If the courts also deem this a joint operation, the non-operating landowner would be treated as a joint adventurer, against his will, because of the order of the Commissioner of Conservation.

This result is not necessarily mandated by the cases. The court in Superior Oil specifically limited its holding to where the non-drilling owner has demanded the unitization, but it is, a possible interpolation from the above cases. In the proper situation, a credible argument could certainly be made that the nondrilling landowner or lessee should be held liable for damages caused by the fault of the operator of the unit on the theory that the two were joint adventurers.

On the other hand, the courts might well reject the idea that lessees whose interests have been involuntarily unitized are joint adventurers on the grounds that there was no voluntariness to their undertaking. But what then is the nature of their relationship? Certainly the cases and the statutes at very least indicate they are "co-owners" of the unit and its facilities.

If the ideas expressed in Mire v. Hawkins are pursued to their logical conclusions - That the "owners" of each tract become after unitization either joint ventures or "co-owners" of the unit (the latter being, in the authors' opinion, the most commonly held view in the oil and gas industry and the assumption upon which the industry has generally operated) it is not difficult to postulate that Article 667 will impose upon the unit owners responsibility to the public for the adverse consequences of unitized operations on the ground that they are "proprietors" of the unit.

Furthermore, the classification of the activity as "ultrahazardous" indicates that the owner of the mineral rights which are unitized, whether landowner or servitude owner, will be responsible for the actions of his lessee, if such activities cause damage to their neighbors.

It is true that to reach this conclusion one must extend the principles which have been previously discussed far beyond the limits within which they have been applied. That a landowner who had leased his land for mineral exploration might be responsible for the actions of the unit operator who is conducting operations on land far away, merely because his land has been unitized, without his consent and perhaps over his objection, does not appear to comport with conventional concepts of justice. However, in the authors' opinion, it is a result which may logically be said to follow from existing jurisprudence, and at best one can envision litigation with its attendant uncertainties and expense as a real possibility.

The trend toward expanding absolute liability and characterizing responsibility for activities conducted on land as being an obligation of ownership, renders it much more important for the lessor to assure

himself that his lessee is financially responsible and adequately insured. A continuation of the trend may well cause lessors of mineral rights to insist upon much greater control over the right of the lessee to make subleases or other transfers than has been the custom in the past.⁶²

3. Negligence of Independent Contractors

Louisiana follows the well settled rule that, ordinarily, the negligence of an independent contractor does not obligate his employer for damages.⁶³ However, it must be remembered that an independent contractor who causes damages without negligence may bind his principal if the activity can be classified as a violation of Article 667.⁶⁴ Consequently, assurance that contractors and sub-contractors who engage in the development of the resource are both financially responsible and adequately insured becomes not only a matter of prudent business judgment but a virtual necessity.

E. Defenses

The traditional tort defenses of contributory negligence and assumption of risk may, in proper circumstances, operate as a bar to recovery.⁶⁵ These defenses are seldom available where adjacent landowners have been damaged, however, because these landowners will not have been contributorily negligent. Simply by acquiring land in the area, landowners will not be presumed to have "assumed the risk" of damages caused by the fault of operators.⁶⁶ Similarly, estoppel principles will not be applied. According, the traditional defenses to a tort action, though recognized in Louisiana, have little application to type of cases presently under consideration.

F. The Relief Available to the Injured Party

1. Damages

Ordinarily, an injured party will receive money damage to compensate for injuries suffered as a result of the intentional or negligent acts of another. In commenting on this one court has said:

In awarding property damages to a party who has been injured through the legal fault of another, the primary objective is to restore the injured party in as near a fashion as possible to the state in existence at the time immediately preceding the injury.⁶⁷

Assessing the amount of damages recoverable in a specific instance can be very difficult. Louisiana courts have generally used three basic formulas to determine quantum: if possible, the cost of restoration is awarded; if the damaged property cannot be adequately repaired, the difference in the value of the property preceding and subsequent to the damage is awarded; or thirdly, if this amount cannot be fairly determined or if the cost of repairs exceeds the value of the thing damaged, the award is equal to the replacement cost less depreciation.⁶⁸

Damages which are merely speculative are not awarded, but if damages are shown to have occurred, the plaintiff's failure to establish the exact amount of his loss will not preclude his recovery. In these instances, the court must determine the amount as best it can, and much discretion is vested in the trial court in this regard.⁶⁹ Where there is no actual physical damage to the property, the court may award damages for the mere invasion of plaintiff's rights,⁷⁰ and the amount of such award is rarely overturned on appeal.⁷¹ It is also recognized that a plaintiff sometimes suffers losses over and above the physical damage to his property, as for instance a loss of rent receipts. Where this can be shown these losses are also compensable.⁷²

In addition to property damage, if personal injuries are involved, they are, of course, compensable. This is so regardless of whether

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recovery is based on negligence or strict liability. Mental distress is an element of damages, and if death should occur the damage award can be very high. Recovery for mental distress has been allowed in certain property damage cases. Usually, these are restricted to instances in which the home of plaintiff has been damaged by physical intrusion caused by defendant.⁷⁴

In computing property damage awards, an economic balancing approach is taken, and the value of the property is the most that can be awarded, exclusive of mental distress or the showing of some collateral primary loss.⁷⁵

2. Injunctive Relief

Injunctive relief is rarely available to a successful plaintiff in tort actions, because, by their very nature, these actions involve lawful activities which have gone awry and caused harm. Courts have been understandably reluctant to prohibit lawful activities, on the mere chance that something could go wrong and damage result.

Early cases rarely granted injunctive relief where damage to a neighbor's property was caused by works on land. The courts, influenced no doubt by the view that they were dealing with a form of delictual responsibility under Article 2315 held that it was improper to prohibit a person from using his own land in any way he saw fit, as long as the "use" was lawful.⁷⁶ Later cases, viewing violations of Article 667 as an interference with the property rights of the neighbor, have held that an injunction may be available to a landowner who is or may be damaged by works on neighboring property.⁷⁷

For an injunction to issue, the plaintiff must show that irreparable injury, loss, or damage may otherwise occur. The Court balances the interests involved, and if it finds that negligible further harm will

occur, that money damages will adequately compensate the plaintiff, or that a disproportionate harm would result from the issuance of an injunction, injunctive relief will be denied and monetary damages alone will be awarded.⁷⁸ The approach is apparently the same whether the cause of action is based on Article 667, 669, or 660.⁷⁹ Although it must also be said that there appears to be substantial support by some members of the Supreme Court for the proposition that if a violation of Article 667 is at issue, injury is not required to be shown. Again this is based upon the traditional absolutism attached to property rights. An interference with one's rights of ownership is per se unlawful and demonstrable injury need not be shown to prevent it.

G. Prescription

Article 3457 of the Civil Code defines prescription as "a manner of . . . discharging debts by the effect of time . . ." Article 3528 further states that:

The prescription which operates a release from debts, discharges the debtor by the mere silence of the creditor during the time fixed by law, from all actions, real or personal, which might be brought against him.

Prescription functions similarly to "Statutes of Limitation" at the common law, although, there is a theoretical difference in the two concepts. In Civil Law doctrine, the effect of prescription is the discharge of the obligation owed by the debtor, rather than merely⁸⁰ barring the creditor from asserting his claim.

The prescriptive period for actions based on Article 2315 is one⁸¹ year. Similarly, actions for damages brought under Article 667 have been held prescribe in one year, because of the similarity between these

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actions and those based on 2315. The prescriptive period for compensatory damages begins when the injury becomes apparent or should have been discovered; an action for the issuance of an injunction may apparently be brought whenever the activity is causing damage.

III. RECIPROCAL RIGHTS AND DUTIES OF PERSONS OWNING INTERESTS IN THE SAME LAND OR RESERVOIR

The discussion to this point has been limited to liability for damages to neighboring property owners or the public generally. The reciprocal rights and duties of the landowner, servitude owners, lessees, or others possessing interests in, or rights to the same property or mineral deposit must also be considered.

A. The Right To Exploit The Resource

As noted earlier, a landowner who wishes to explore for and produce deposits that underlie his property can do so himself, can grant a servitude to another, or can lease those rights to a third person.

Articles 6 and 8 of the Mineral Code ⁸³ allows the landowner to use his property in the most unlimited manner to discover and produce minerals which underlie his property. This right is limited only by Article 10 which provides that a person cannot deprive others with a share in the reservoir of their rights to also produce and enjoy the minerals. These Articles confirm that, with respect to fugacious substances regulated by the Mineral Code, the "Law of Capture" prevails. Lawful production on one's own land gives rise to no responsibility, even if drainage from ⁸⁴ under the land of another occurs. A right of action will only lie if ⁸⁵ intentional misconduct or negligent waste occurs. Although there are

no Louisiana cases so holding, the Comments to Article 10 indicate that negligent activities, such as a blow out that could have been prevented by due care, will give rise to damages in favor of those who have an interest in the common reservoir.⁸⁶

B. Concurrent Rights to Use the Surface

Article 22 of the Mineral Code provides that the owner of a mineral servitude is under no obligation to exercise it, but if he does so, he is entitled to use only so much of the land as is reasonably necessary for him to conduct his operations. Article 11 provides that the landowner and the owner of mineral rights must exercise their respective rights with "reasonable regard" for each other. The term "landowner" would obviously include anyone holding rights from the landowner since he could grant whatever rights he possessed (but no greater rights) to another. Inferentially the article should be applicable to lessees for different purposes such as an oil and gas lessee and a geopressed lessee. The Comments to Article 11 indicate that this is a flexible standard, which is designed to permit concurrent use of the land by all parties. Thus, a mineral lessee may not prevent the landowner from making improvements on the land, even though the lessee may suffer some inconvenience caused by the necessary operations of his lessee, such as road building, well site preparation, slush pits, and transmission lines.

The "reasonable regard" standard, and the lessee's duty to act as a "reasonably prudent operator,"⁸⁷ will not only be applied where the lease is silent, but also where the lease is rather specific. In interpreting a lease clause which provided that the lessee had the right "to construct, maintain, and use roads, pipelines, and/or canals thereon for operations

hereunder or in connection with similar operations on adjoining lands" (authors' emphasis) the court said that the lessee's use of the surface must still be "ordinary, customary, and reasonable." Excavation of dirt for roadbuilding on adjacent property, was held not "ordinary and reasonable," and damages were awarded to the lessor.⁸⁸

If a lease is to be taken under circumstances where the operator envisions the land leased will be developed with adjacent properties as a single co-ordinated project, the draftsman preparing the document should be careful to ensure that such auxilliary rights as may be necessary to conduct activities on other properties are fully defined and carefully expressed.

The primary significance of the legislative determination that the parties' rights are correlative, is that it renders largely irrelevant the question of which rights were created first, or whose rights are derived from whom. Furthermore, these rights apply to any lawful surface user, as for instance a surface lessee. In interpreting Louisiana law on this point, one federal court has said that although a mineral lease antedated a surface oyster lease, the mineral lessee was under a duty to minimize damage to oyster beds.⁸⁹

There is no indication that this duty to minimize damage, an expression of the obligations now imposed on the mineral rights owner by Articles 11 and 122 of the Mineral Code, is restricted to "oyster cases." The correct interpretation is that a mineral lessee, in exercising his rights, must do so "reasonably," i.e., to minimize damage that he may cause to any concurrent user of the surface.⁹⁰

Since the Mineral Code acknowledges that the parties can modify their relationship by specific contractual provisions, the landowner⁹¹

who desires to insure that certain activities will be conducted only at specified locations, should cover these matters expressly in the lease. This also applies to the mineral rights owner who wishes to insure that he will be allowed to conduct his operations at specific locations on the property.

One qualifying observation might be made to these conclusions. Section 809 of the Geothermal Energy Resources Act provides in part as follows:

"The respective rights of the lessees under oil, gas, and mineral leases and of the lessees under geothermal leases are intended to be compatible and to be exercised reasonably by one with due regard to the other. However, in the event of conflict, the rights of the lessee under any oil, gas, or mineral lease heretofore issued on lands as set forth in Section 804 hereof and in effect on the effective date of this Chapter, shall not be diminished or limited by virtue of this Chapter or any provisions hereof."

The last sentence, when read in light of the first part of the section implies a form of primacy to oil and gas leases executed on or before the effective date of the Act over geopressured leases executed thereafter. However, a fair reading of its provisions indicates the purpose of the section was not to confer upon existing leases greater rights than they otherwise possessed. The last sentence should probably be viewed only as a recognition that the act was not intended to modify existing rights and, in substance in resolving a question as to the rights of those lessees the act itself could not be relied upon as creating any limitations to existing rights. Since, in the area under discussion, the law appears well settled that owners of property interests not having exclusive enjoyment of the premises and recognizing that others will enjoy concurrent rights of use are required to exercise their rights in a manner compatible with the rights of others, it would appear section 809 should not affect the results or the conclusion that rights of each are correlative.

C. Right of Ingress and Egress

It has always been recognized that the owner of a servitude, to make his rights meaningful, must be given a right of reasonable entry onto the property. Thus, the granting of a mineral servitude "give(s) the owner thereof the right of ingress and egress for the purpose of exploring and reducing to possession the minerals under the property so burdened."⁹² This right must be exercised reasonably, and if abused gives the landowner a right of action to collect damages.

Lease forms universally provide for these rights. The lessee is still subject to the "reasonableness" standard, however, and if he abuses his right of passage, he is liable for the damage that he causes.⁹³

D. Duties of the Grantee

As the grantor of mineral rights owes certain duties to his grantee, the grantee also owes reciprocal duties. Again, the Mineral Code is the point of departure.

Article 22 states that the owner of a servitude is obliged, "insofar as practicable," to restore the surface to its original condition at the earliest reasonable time. Damage caused to the land by necessary drilling operations need not be repaired.⁹⁴ The servitude owner must remove the works constructed by him as soon as possible after his use of the servitude has terminated.

The servitude owner may use only as much of the surface as is reasonably necessary to conduct his operations. If he uses more than he reasonably needs, he is liable to the landowner for the excess amount that he has used.⁹⁵ The same is true of a mineral lessee, although these restrictions are normally covered by the lease. Similarly, the "reasonable regard" standard should apply, not only to the amount of land needed to

conduct operations, but also to the placement of works; neither the landowner nor the owner of mineral rights should be allowed to ignore the legitimate needs of the other party.

If the mineral rights owner negligently damages the property, he is liable to the owner for the damage he causes.⁹⁶ Presumably, "negligence" includes the doctrine of *res ipsa loquitur* and strict liability for ultrahazardous activities.⁹⁷

The lessee's duty to restore the surface will generally be covered in the lease. Quite often, the lease also makes the lessee liable for all damage that is done to the property, whether caused negligently or by normal operations. These clauses will be enforced. It is important in this regard, that the lessor, if he is a servitude owner, correlate his lessee's duties to him with those he owes to the landowner. For example, Article 22 requires a servitude owner to restore the premises to its original condition "as soon as is practical after the use is concluded." Current oil and gas lease forms frequently call for the lessee to restore the premises to their former condition "at the termination of the lease." The drilling of a dry hole, or the abandonment of a well by a lessee who is otherwise maintaining his lease, might very well obligate the lessor (servitude owner) to restore the surface prior to the time he may require his lessee to do so.

If the lease is silent as to the lessee's duty to restore the surface, he still has that duty as a "reasonable operator" under Article 122.⁹⁸ The duty to restore the surface does not necessarily mandate restoration of the surface to its original condition prior to drilling. Under existing jurisprudence, incidental damage to the surface caused by normal drilling operations conducted in a prudent manner do not have to be repaired by a lessee. For example, loss of soil fertility due to the presence of necessary slush pits is not compensable.⁹⁹

If the mineral lessee subcontracts the work to an independent contractor, the lessee is not liable for the negligence of the contractor; the contractor is, of course, liable for his own negligence. 100

IV. CONCLUSION

The possibility of damage arising at any of the various steps from drilling the wells to final disposal is obvious. What should also be obvious from the preceding is that under any of several theories, if the geopressured substance escapes and causes damage, the producer is going to be held liable for those damages.

If surface subsidence is caused, or seismicity induced by reinjection, the producer will probably be held liable, even if he took all possible precautions. This liability can be theoretically justified by an application of Articles 667 and 2315. It is also possible that an injunction could be issued to prevent reinjection, if it could be proven that there would be a high possibility of induced seismicity.

If the resource provided the water drive for an oil or gas field, the producer should not be liable for damages. The "Law of Capture" should protect him from liability.

Other than this, however, the producer will probably be liable for all damages which occur. The damages which are possible if this hot salt water escapes could be truly astronomical. It appears that because of the high exposure to extensive damage claims, insurance sufficient to cover the loss completely would be impossible to procure. It would also appear that unless the operation furnished the possibility of high profit, exposure to such risks must be carefully weighed.

FOOTNOTES TO CHAPTER V

1. Book III, Title 5, Chapter 2.
2. Aucoin v. Lodrigues, 252 So.2d 758, 761 (La. App. 1st Cir. 1971).
3. Shelton v. Aetna, 334 So.2d 406 (La. 1976).
4. This is not to say that damage awards are sometimes very large. Indeed it sometimes seems that awards for "mental anguish", "pain and suffering", and "humiliation" are more "punitive" than "actual".
5. Dixie Drive-It Yourself v. American Beverage Co., 242 La. 471, 137 So.2d 298 (1962).
6. Hill v. Lundin and Associates, Inc., 260 La. 542, 256 So.2d 620, 622 (1972).
7. 122 So. 165 (La. App. 1st Cir. 1929).
8. LeBleu v. Shell Petroleum Corp., 161 So. 214 (La. App. 1st Cir. 1935).
9. Langlinais v. Geophysical Services, Inc., 237 La. 585, 111 So.2d 781 (1959).
10. Watkins v. Gulf Refining Co., 206 La. 942, 20 So.2d 273 (1944).
11. 227 La. 866, 80 So.2d 845 (1955).
12. Id.
13. Pate v. Western Geophysical Company of America, 91 So.2d 431 (La. App. 2d Cir. 1956).
14. 258 La. 1067, 249 So.2d 133 (1971).
15. Breach of a jurisprudentially developed standard of conduct also results in "fault". Hill v. Lundin and Associates, Inc., supra, n.6.
16. Langlois, supra n. 14.
17. Id.
18. Fontenot, supra n. 11.

19. D'Albora v. Tulane University, 274 So.2d 825 (La. App. 4th Cir. 1973).
20. Lombard v. Sewerage and Water Board of New Orleans, 284 So.2d 905 (La. 1973).
21. Holland v. Keaveney, 306 So.2d 838 (La. App. 4th Cir. 1975).
22. Graham v. Allied Chemical Corp., 341 So.2d 1196 (La. App. 1st Cir. 1977).
23. LaCroix v. Traveler's Indemnity Co., 333 So.2d 724 (La. App. 2d Cir. 1976); writs denied 338 So.2d 112.
24. *Supra*, note 14.
25. *Supra* n. 21.
26. 339 So.2d 498 (La. App. 2d Cir. 1976) writs refused, 342 So.2d 219 (La. 1977).
27. Town of Jackson v. Monuger Motors, 93 So.2d 697 (La. App. 1st Cir. 1957).
28. Hilliard v. Shuff, 260 La. 384, 256 So.2d 127 (1972).
29. Tunnage v. Eddy, 42 So.2d 382 (La. App. Or1. Cir. 1949).
30. Burgess v. Traveler's Insurance Co., 254 So.2d 163 (La. App. 2d Cir. 1971).
31. Hero Lands Company v. Texaco, Inc., 310 So.2d 93 (La. 1975).
32. Carr v. City of Baton Rouge, 314 So.2d 527 (La. App. 1st Cir. 1975), writs denied 318 So.2d 53.
33. Stone, "Tort Doctrine in Louisiana: The Obligation of Neighborhood", 40 Tul. L. Rev. 701, 705.
34. Hero Lands, *supra* n. 31.
35. Hilliard, *supra* n. 28.
36. Tunnage, *supra* n. 29.
37. Fontenot v. Magnolia Petroleum Company, 227 La. 866 80 So.2d 845 (1955).

38. Lombard, Supra, n. 20.
39. D'Albora, Supra, n. 19.
40. Salter v. B.W.S. Corporation, 290 So.2d 821 (La. 1974).
41. Stone, Supra, n. 33 at 711-712.
42. Hero, n. 31.
43. Id. at 96-97.
44. Id. at 100.
45. Since the Hero decision, one Appeals Court has allowed damages based on Article 667 where the "work" was specifically held to be ultrahazardous. Diminution of property value, however, was not allowed, based on the Hero, per curiam. La Croix, supra n. 23.
46. Greer v. Pelican Natural Gas, 163 So. 431 (La. App. 2d Cir. 1935).
47. In fashioning relief, the court may reject prohibitory injunctions and limit the relief to damages if it finds the injunction would be too harsh a remedy. See Young v. International Paper Co., 179 La. 803, 155 So. 231 (1934) and Moreland v. Acadian Mobile Homes Park, Inc., 313 So.2d 877 (La. App. 2d Cir. 1975), writs refused.
48. 333 So.2d 724, (La. C.A. 2d 1976).
49. La. Civ. Code art. 2320.
50. La. Civ. Code art. 2324.
51. La. Civ. Code art. 2082.
52. La. Civ. Code art. 2103.
53. D'Albora, supra n. 19.
54. "If the pile-driver caused injury through his independent negligence, his status as an independent contractor would

ordinarily insulate other parties . . . from liability."

Id. at p. 829.

55. "None of these parties can claim freedom from negligence. None can argue that the subcontractor did anything other than exactly what the contractor obliged him to do; which was what the lessee obliged the contractor to do; which was what . . . the owner obliged the lessee to do." Id.
56. D'Albora, supra n. 19 and Chaney v. Traveler's Insurance Co., 259 La. 1, 249 So.2d 181 (1971).
The implications of these cases are far reaching. In the Hero Lands case, for instance, could Hero have recovered from Alsue (the landowner) and the contractor who constructed the pipeline? If D'Albora and Chaney are followed, the answer would seem to be "yes", even though the servitude was perfectly lawful, and the contractor performed his work flawlessly.
57. Acts 1940, No. 157, now found at R.S. 30:1 et. seq.
58. R.S. 30:802.
59. 249 La. 278, 186 So.2d 591 (1966).
60. Id. at 186 So.2d 596.
61. Id.
62. 165 So.2d 905 (La. App. 4th Cir. 1964).
63. Id. at 908.
64. Most oil and gas lease forms presently in use permit the lessee to freely sublease or assign his lease rights without consulting the owner.
65. Ainsworth v. International Paper Co., 311 So.2d 629 (La. App. 3rd Cir. 1975). "As contrasted to an employee, an independent contractor is one independent in business who contracts to perform

a specified piece of work for another for a specified price, without being subject in the performance of the contract to the control and direction of his employer except as to the result contracted for; which contract is not subject to termination or discontinuance at the will of either party without a corresponding liability for its breach." Sones v. Mutual of Omaha Insurance Co., 272 So.2d 739 (La. App. 2d Cir. 1972).

66. D'Albora, supra n. 19.
67. Argonaut-Southwest Insurance Co. v. General American Oil Company of Texas, 277 So.2d 737 (La. App. 4th Cir. 1973).
68. Eagan v. Tri-State Oil Co., 183 So. 124 (La. App. 2nd Cir. 1938).
69. Roshoug v. Traveler's Insurance Co., 281 So.2d 785, 789 (La. App. 3rd Cir. 1973).
70. Id.
71. Maddox v. Louisiana Industrial Inc., 311 So.2d 278 (La. App. 3rd Cir. 1975).
72. Holcombe v. Superior Oil Co., 213 La. 684, 35 So.2d 457 (1948).
73. Layne Louisiana Co. v. Superior Oil Co., 209 La. 1014, 26 So.2d 20 (1946).
74. Tuten v. Shell Oil Co., 26 So.2d 20 (La. App. 1st Cir. 1946).
75. Bankston v. Farmer's Cooperative Gin, 116 So.2d 91 (La. App. 2nd Cir. 1959).
76. Hill v. Battalion Washington Artillery of City of New Orleans, 143 La. 533, 78 So. 844 (1918).
77. Roy O. Martin Lumber Co. v. Pan American Petroleum Corp. 177 So.2d 153 (La. App. 3d Cir. 1965).

78. Young v. International Paper, 179 La. 803, 155 So. 231 (1934).
79. Salter, *supra*, n. 40.
80. Poole v. Guste, 261 La. 1110, 262 So.2d 339 (1972).
81. Moreland v. Acadian Mobile Homes Park Inc., 313 So.2d 877
(La. App. 2d Cir. 1975), writs refused.
82. La. Civ. Code Art. 3528.
83. La. Civ. Code Art. 3536.
84. Dean v. Hercules, 328 So.2d 69 (La. 1976).
85. Passed as Acts 1974 No. 50, and found at R.S. 31:1 et seq.
86. Mineral Code, Article 8.
87. Higgins Oil and Fuel Co. v. Guaranty Oil Co., 145 La. 233,
82 So. 206 (1919).
88. See also, McCoy v. Arkansas Natural Gas Co., 175 La. 487, 143
So. 383 (1932), where the court in dicta indicated that
negligent conduct would give rise to damages.
89. Mineral Code, Article 122.
90. East v. Pan American Petroleum, 168 So.2d 426 (La. App. 3rd
Cir. 1964).
91. Vodopija v. Gulf Refining Co., 198 F.2d 344 (5th Cir. 1952).
92. Lauzon v. J.C. Trahan Drilling Contractor, Inc., 247 So.2d 236
(La. App. 4th Cir. 1971).
93. Mineral Code, Article 3.
94. Honn v. Skelly Oil Co., 224 La. 709, 70 So.2d 657 (1954).
95. Rohner v. Austral Oil Exploration Co., Inc., 104 So.2d 253
(La. App. 1st Cir. 1958).
96. *Id.*
97. Mineral Code, Article 22.

98. Smith v. Schuster, 66 So.2d 430 (La. App. 2d Cir. 1953).
99. Rohner, supra n. 91.
100. Comments, Mineral Code Article 11. It appears certain that not all ultrahazardous activities conducted on the land would be compensable. Certainly, damages of the type encountered in Hero Lands Co., supra, should not be recoverable, because the landowner would have consented to the damage complained of by granting the servitude. It would appear that so long as the grantee does not exceed the rights granted him, he will be free from damage claims by the landowner based on strict liability theories.
101. Smith, supra n. 94.
102. Rohner, supra n. 91.
103. Jurisich v. Louisiana Southern Oil and Gas Co., 284 So.2d 173 (La. App. 4th Cir. 1973).
104. Wemple v. Pasadena Petroleum Co., 147 La. 532, 85 So. 230 (1920).

CHAPTER VI
THE GEOTHERMAL ENERGY RESOURCES ACT AND
GEOPRESSURED LEASES ON PUBLIC LANDS

I. APPLICATION OF THE ACT TO PUBLIC LANDS

A. In General

The Louisiana Geothermal Energy Resources Act¹ was first passed in 1974. It was extensively amended in 1976.² The Act is designed to accomplish two basic purposes. First, it establishes a regulatory scheme for the development of the geothermal and geopressured reservoirs. Secondly, it authorizes the leasing of public lands for the development of the resource. It does not attempt to define how the resource should be classified for private property purposes nor is it probable that it could effectively do so in light of Louisiana's property system and the constraints of constitutional due process. However, as has previously been discussed in Chapter IV, the fact that the geopressured resource is recognized as being something different and unique, requiring separate regulatory authority and authorization for public leasing, may of itself be influential in determining whether the right to develop the resource should be considered to fall within the ambit of existing mineral leases or contracts which refer to oil and gas or other minerals. Furthermore, if future leases or contracts refer to "geopressured rights" or "geothermal rights", a court may be influenced by the definitions in the act and use them as reference points for determining how those terms might ordinarily be interpreted or understood. If this is the case, then difficulties are apt to be encountered by the developer who acquires his rights under contracts using such terms for reasons which will become evident as one studies the act.

The regulatory aspects of the act are discussed in the next chapter. This chapter will consider its effect upon state leasing practices and the procedure for obtaining a geopressured lease upon public lands.

Section 801 of the Act defines the resources as follows:

- (1) "Geothermal resources" means:
 - (2) All products of geothermal processes, embracing indigenous steam, hot water, hot brines and geopressured waters excepting, however, waters produced incidental to oil or gas exploration or production.
 - (b) Steam and other gases, hot water and hot brines resulting from water, gas or other fluids artificially introduced into geothermal and/or geopressured water formations.
 - (c) Heat, natural gas dissolved in formation water or which was dissolved in formation water and is produced at the geothermal and/or geopressured well bore, or other associated energy found in geothermal and/or geopressured water formations.
 - (d) Any byproduct derived therefrom.
- (2) "Byproduct" means any mineral or minerals, excluding oil and natural gas, which are found in solution or in association with a geothermal resource and which have a value less than seventy-five percent of the value of the total geothermal resource if utilized or not, because of quantity, quality, or technical difficulties in extraction and production of sufficient value to warrant extraction and production by themselves or which production would waste or not fully utilize the geothermal resource.

A close reading of this definition suggests that its authors were primarily concerned with the regulatory features of the Act and perhaps did not fully consider the effect of these definitions in a leasing or contractual context. The definition closely approximates the definitions used in the Federal Geothermal Steam Act ³ and it is hard to believe the authors did not use the latter as a model. However the federal act defines a "byproduct" as a mineral having a value less than 75% of that of the geopressured resource and which is not of sufficient value to warrant production for itself. The State act apparently reverses the latter requirement.

Thus if the definition in Section 801 of a geothermal resource is consolidated and restated for purposes of analysis one gets the following picture as it would apply to a geopressured reservoir. Geothermal resources are: (1) geopressured waters and other products of geothermal processes, (excluding those produced incidental to oil and gas exploration) including natural gas dissolved in formation waters in the reservoir which is produced by a geopressured well, and (2) any other minerals (excluding oil and gas) which are found in association with the geopressured waters and which are "byproducts" of the geopressured production. To be "byproduct" and thus part of the resource, the minerals must have a value less than 75% of the value of the total geothermal resources and (1) be of sufficient value to warrant production by themselves or (2) be such that if produced for themselves they would waste or not fully utilize the geothermal resource.

It is probable that the purpose of the rather intricate definition of a "byproduct" is to permit the Commissioner to regulate the production of any mineral which does not approach the value of the geopressured resource (i.e., is less than 75% of its value) and which would dissipate the geothermal pressured energy if produced for its own value. Thus, in the light of the Commissioner's general power to permit waste contained in Section 2 of the Conservation Act,⁴ he would have authority to require the utilization of the geopressured resource as a condition to producing the other mineral. However, if such a definition is utilized as a basis for defining the substances covered by a geothermal lease, the difficulty it presents are obvious.

B. "ByProducts" in a Geothermal Lease

The Geothermal Energy Resource Act regulates the terms of public leases by defining for purposes of the act "a geothermal lease" as one

by which the lessee is granted the right to produce "a geothermal resources and byproducts".

As noted, the definitions in Section 801 seem to exclude from the term "geothermal resource," all oil which is produced with or in association with the geopressured resource and natural gas which is not in solution or has not been dissolved in the formation water. Insofar as the conservation aspects of the Act is concerned, which will be discussed in greater detail later, little difficulty would appear be caused by such omissions since the Act extends to the geothermal resources the regulatory provisions of the Louisiana Conservation Act. This act covers, among other things, the production and development of oil and gas. Accordingly, the same provisions will regulate oil and gas production and geopressured production no matter how they are classified and the Commissioner, by his rule-making powers, will have ample authority to extend the provisions of an order affecting either to include the other if he deems it advantageous to do so. Consequently, the exclusion of oil and gas from the geopressured resource and the exclusion from the geothermal resource of geopressured waters produced in connection with oil and gas operations should not prevent him from regulating both under the ample authority he possesses.

It is when the definition is used to regulate the leasing of public lands that difficulty may be encountered, for while the Act adopts by reference the general procedures enacted for the leasing of public lands for oil and gas purposes, it contains a number of special provisions which are inconsistent with the oil and gas provisions. This may create difficulties to the geopressured operator who obtains a geothermal lease from the state unless the terms of that lease are broadened to cover substances other than those technically included

in the definition of the "geothermal resource". If the lease in question simply covers "geothermal resources" whether or not minerals other than gas dissolved in the formation are included within the rights given the lessee will be dependent upon whether these minerals, excluding "oil", fall within the definition of a "byproduct". The test is largely an economic one and appears to be inappropriate for the purposes of a leasing situation. The basic definition of a "byproduct" appears to cover only those substances which have a value of less than 75% of the value of the geopressured resource proper and which may be produced for their own value. This would appear to exclude from the ambit of a byproduct substances produced with or from the geopressured waters which have a greater value than 75% of the water and also those which are incapable of being produced for their own values - that is, what one would usually consider to be truly a "byproduct".

It is also difficult to envision what effect the last clause in the "byproduct" definition has upon the problem. This clause implies any substance having a value of less than 75% of the value of the geopressured waters is a byproduct if its production "would waste or not fully utilize" the geopressured resource. This again appears to have been written with the regulatory aspects of the act in mind. The commissioner could regulate the production of any substance if it would "waste" the geopressured resource. He could thus require utilization of the geopressured resource (to prevent its "waste") as a condition of producing the substance. However when one is using the definition to determine whether the substance is a "byproduct" under a geopressured lease and comes within the lessees rights to produce and retain it an entirely different problem exists. Does the definition mean that every substance produced with the geopressured waters is a "byproduct" since by definition its extraction would "waste"

the geopressured energy? If this is the case then the preceding clause requiring that the substance must be capable of being produced for its own value would be rendered meaningless. On the other hand the clause may be construed to include only those substances which cannot be extracted without the loss of the geopressured energy - that is those which cannot be produced unless one necessarily loses a part of the geopressured resource in its extraction. It seems illogical to give this meaning to the act since the result would be that a substance is a "byproduct" if it could be separately produced under circumstances where the geopressured resource could not be utilized but would instead be "wasted" but would not be a "byproduct" if it was only produced as an incident to a true geopressured operation.

It is highly doubtful that the fragmentation of rights to develop particular substances found in the geopressured waters which is implicit in Section 801 will prove to be practical. The exclusion of "oil" in any form may be particularly troublesome if some of the hydrocarbons encountered are not technically gaseous but liquid - such as "condensate" or gasoline. The apparent exclusion of true byproducts may give rise to difficult accounting and legal problems . . . could the developer reinject waters containing such substances without extracting them? Could the lessor demand their extraction? And so forth. If the State complies with both the geothermal energy act and the general state leasing act for oil and gas or other minerals it would be possible to devise and grant a lease which would give to the lessee the right to develop and exploit a given reservoir for whatever substances of value might be found within it. To do so, however would require compliance with the provisions of both Acts. Differences in the limitations upon the terms which must be included in such leases could prove troublesome as will be hereafter noted.

C. Mandatory Terms of a Geopressured Lease

Sections 804, 805, and 806 of the Act provide as follows with reference to the terms of geopressured leases:

30:804 Jurisdiction over State Geothermal Resources and Products

The State Mineral Board is hereby vested with exclusive authority to lease for the exploration, development, production and distribution of geothermal resources and the byproducts thereof any lands belonging to the state, or the title to which is in the public domain, including road beds, water bottoms, and lands adjudicated to the state at tax sale. To the extent applicable, the mineral board is also vested with the same powers of supervision and management of all geothermal leases granted by the state that are vested in the board under R.S. 30:129 with respect to leases granted for minerals, oil and gas.

30:805 Leasing procedures:

Except as otherwise specifically provided herein, applications for state geothermal leases, the inspection of the lands, the quantity of land to be obtained in a single lease, the advertisement for bids, the bidding procedures and the board's authority to accept or reject bids all shall be governed by the provisions of R.S. 30:125 through R.S. 30:129 both inclusive.

30:806 Terms; rentals; royalties:

A. All state geothermal leases shall be granted for a maximum primary term of ten years and so long thereafter as geothermal operations are being conducted or geothermal resources are being produced or utilized in commercial quantities.

B. Where a state geothermal lease provides for delay rentals, the annual rental shall be for not less than one dollar per acre or one-half the cash bonus, whichever is greater.

C. Royalties on production obtained from a state geothermal lease shall be not less than the following:

(1) A royalty of not less than ten percent of the price received for all geothermal resources produced and saved or utilized.

(2) A royalty of not less than five percent of the value of any byproduct produced and saved or utilized.

D. The term rental or royalty obtained by the state from a geothermal lease shall not affect or limit the compensation negotiated by the owners of adjoining or nearby property which may be affected or exploited by the lessee.

It will be observed that Sections 804 and 805 extend to the State Mineral Board the authority to lease the geothermal resources and byproducts thereof under the provisions of R.S. 30:125-129. These sections regulate the procedures by which mineral leases of public lands are to be effected.

II. PROCEDURES FOR LEASING

A. State Mineral Board

The State Mineral Board is the state Agency empowered to grant oil and gas leases on State owned lands. Furthermore, no state agency can grant a mineral lease on its land unless the Mineral Board approves the lease.

Currently, no standard form for a state geothermal lease exists, and there appears to be no move underway to construct such a lease. It is the apparent intention of the Mineral Board to handle any requests for leases which they might receive on a case by case basis, possibly adapting a private geothermal lease form for their needs. To date there have been no such applications.

The State Mineral Board is a seventeen member board, appointed by the Governor, who sits as the ex-officio chairman of the board. The Board has all of the powers normally incident to corporations, such as the capacity to sue and be sued. The powers and duties of the Mineral Board are set forth in R.S. 30:124 as follows:

30:124 Board may lease public lands

The State Mineral Board has authority to lease for the development and production of minerals, oil and gas, any lands belonging to the State, or title to which is in the public, including road beds, water bottoms, and land adjudicated to the State at tax sale.

B. Procedures For Leasing

Sections 125-127 adopted by reference in the Geothermal Energy Resources Act provide:

30:125 Application for lease: Deposit

When a person desires to lease state lands, he shall make application to the Board in writing, giving the description of the land and enclosing a certified check, cashier's check or bank money order for Two Hundred Dollars as evidence of good faith. This sum shall be returned if he should bid for the lease.

30:126 Inspection; quantity of land; advertisements for bids

Upon receipt of an application accompanied by deposit, the State Mineral Board may cause an inspection of the land to be made, including geophysical and geological surveys. After receiving the report of the inspections, the board may offer for lease all or part of the lands described in the application. However, no lease shall contain more than five thousand acres. The board shall publish in the official journal of the state, and in the official journal of the parish where the lands are located, an advertisement, this advertisement must appear three times in these journals not more than sixty days prior to the date for the opening of bids, with an interval of not less than five days, including holidays, between each advertisement. The board may publish other such advertisements in its discretion. This advertisement shall contain a description of the land proposed to be leased, the time when a place where sealed bids shall be received and publicly opened, a statement that the bid may be for the whole or any particularly described portion of the land advertised, and any other information that the board may consider necessary, and the royalty to be demanded should the board deem it to the interest of the state to call for bids on the basis of a royalty fixed by it. If the lands are situated in two or more parishes, the advertisement shall appear in the official journals of all parishes where the lands may be partly located. This advertisement and any other published by the board, shall constitute judicial advertisement and legal notice within the contemplation of Chapter 5 of Title 43 of the Louisiana Revised Statutes of 1950.

The board may also cause notices to be sent to those whom it thinks would be interested in submitting bids. The board may on its own motion and without application advertise for bids for a lease in the same manner as if an application had been made.

30:127 Opening bids; minimum royalties; terms of lease; deposit

A. Bids may be for the whole or any particularly described portion of the land advertised. At the time and place mentioned in the advertisement for the consideration of bids, they shall be publicly

opened at any state owned buildings situated in the city in which the capitol is located. The mineral board has authority to accept the bids most advantageous to the state, and may lease upon whatever terms it considers proper. However, the minimum royalties to be stipulated in any lease shall be:

1. One-eighth of all oil and gas produced and saved.
2. Seventy-five cents per long ton of sulphur produced and saved.
3. Ten cents per ton of potash produced and saved.
4. Five percent of all lignite produced and saved.
5. One-eighth of all other minerals produced and saved.

Each lease shall contain a provision permitting the state, at its option, to take in-kind the portion due it as royalty of any minerals produced and saved from the leased premises.

B. The board may reject any and all bids, or may lease a lesser quantity of property than advertised and withdraw the rest.

C. If all written bids are rejected, the board may immediately offer for competitive bidding a lease upon all or any designated part of the land advertised, upon terms appearing most advantageous to the state. This offering shall be subject to the board's right to reject any and all bids. No lease shall be for more than five thousand acres. Where a lease provides for delay rental, the annual rental shall not be for less than one-half the cash bonus. All lands shall be accurately described in a lease.

D. Deposit that may be required to be submitted with each bid shall be in the form of certified check, cashier's check or bank money order.

It should be noted that R.S. 30:806 sets the minimum royalties for State Geothermal Leases. To the extent covered by Section 806, the royalties set out above should be considered superseded. R.S. 30:801 defines "natural gas dissolved in formation waters or which was dissolved in formation waters and is produced at the . . . well bore" as "geothermal resources", the royalties for which are 10%. It may well be that more natural gas will be produced at the well bore than can physically be dissolved in formation waters. If this occurs and if the lease covers it, the gas could be subject to two minimum royalty figures- 10% on that gas dissolved in formation water and 1/8 on and dissolved or "free" gas. The difficulty in differentiating one from the other is

obvious. Furthermore "oil" is excluded from the definition of geothermal resources if produced with the water, again necessitating some extension of the terms of a geopressured lease if this presents possible problems.

III. AUTHORITY OF MINERAL BOARD IN THE ADMINISTRATION OF STATE LEASES

In addition to its leasing authority the Board has considerable authority over operations on public Lands, as will be seen from the following:

30:128 Transfers, Approval by Board

No transfer or assignment in relation to any lease shall be valid unless approved by the State Mineral Board.

30:129 Powers and duties of board; pooling agreements; operating units

The Board shall have full supervision of all mineral leases granted by the State, in order that it may determine that the terms of these leases are fully complied with, and it has general authority to take any action for the protection of the interests of the State. It may institute actions to annul a lease upon any legal ground. The Board has authority to enter into agreements or to amend a lease. However, the Board shall not extend the primary term of any lease . . . Further, the Board shall not except as to unitization and pooling agreements, amend a lease by reducing the amount of bonus, rental, royalty, or other consideration stipulated in the lease. It may join in pooling and unitization covering a lease, the mineral and royalty rights thereunder and any other lease, mineral or royalty rights in and under any other property, so as to create, by the combination of these leases, or royalty and mineral rights, one or more operating units, as hereinafter defined. The Board may agree in the event of production of minerals from any unit so created, that the lessor shall receive and accept on account of production, whether or not production is from any part of the property covered by the lease, a royalty proportionate to that part of the production or proceeds which the lessor is fairly entitled to receive. In determining this proportionate part the Board may consider the surface acreage, the estimated original reserves in place, the estimated ultimate recovery, sand thickness, porosity, permeability, as determined by approved engineering practices, and any other relevant factors. This portion of the royalty shall be paid in the same manner, and subject to the same conditions, as other royalties agreed to be paid under the lease, but shall be in lieu of all other royalties which would accrue under the lease on account of production from any part of the property covered by the lease included in the unit. "Operating

unit" as herein used means that number of surface acres of land which, under regular or special rules of the Commissioner of Conservation or other authority having control in the premises, or by agreement of the lessors, lessees and mineral and royalty owners, may be pooled and unitized for development and operation as a unit. An agreement creating an operating unit may provide for cycling, recycling or pressure maintenance or repressuring in fields productive of oil, gas, and gas from which condensate, distillate or other products may be separated or extracted. The commencement of operations for the drilling of a well, or production of minerals on any portion of a unit in which all or any part of the property covered by the lease is embraced shall have the same effect, under the terms of the lease as if it had occurred on the lands embraced by the lease.

Other provisions regulating mineral cases granted by the Board which appear to have relevancy to the geopressured resource are the following:

30:134 Roads, etc.; Payment to Parishes; Compromise of Claims

The provision of this Sub-part shall extend to the public roads, canals, and similar properties, the title to which is in either the State or the parishes.

30:136 Funds, Disposition and Appropriation of

A. All bonuses, rentals, royalties, shut-in payments or other sums payable to the state as the lessor under the terms of valid existing mineral leases entered into under this Sub-part or previously granted by the State and under the supervision of the Board or from leases hereafter granted shall be paid to the register of the State Land Office.

30:142 Board as Agency to receive, Administer and Control Royalties in kind; Contract Authority

A. In addition to the powers and duties of the board as specified in R.S. 30:129 and other provisions of this Sub-part, the board is hereby designated as the agency of the State of Louisiana authorized to exercise the option granted to the state by R.S. 30:127 (A) (4) to receive in kind the portion due to the state as royalty of any minerals produced and saved from leased premises and to receive, administer, and control royalties due in kind to the State of Louisiana.

B. The board may contract under terms which it deems to be most advantageous to the state with persons, corporations, municipalities, other political subdivisions, associations, and partnerships engaged in the storage, transportation, refining, processing, distribution, sale and/or use of oil, natural gas, and other materials, for the storage, transportation, refining, processing, distribution, sale and/or use of such royalties.

C. Leases granted by other state agencies. The State Mineral Board grants leases on lands owned by the State of Louisiana. Other public

bodies also have the right to lease mineral rights owned by them for exploration by private operators, subject to the status below.

30:151 "Agency" Defined

In this sub-part the term "agency" means a levee district, drainage district, road district, school board, or other board, commission, parish, municipality, State university, State college, State penal or charitable institution or agency, unit or institution or agency, unit or institution of the State or subdivision thereof.

30:152 An Agency may lease lands; School Board may lease Sixteenth Section lands

Every agency is authorized to lease its land for the development and production of minerals. School boards are authorized to lease sixteenth section and school indemnity lands for the development and production of minerals.

30:153 Agencies may lease through State Mineral Board

Any agency may by resolution direct the State Mineral Board to lease its land in the manner provided in sub-part A of this Part. The bonus money, if any, received for the lease shall be transmitted by the State Mineral Board to the agency. After execution of the original lease, all rights and authority in connection therewith shall be vested in the agency to the same extent as if the agency had itself leased the land.

30:154 Signing of papers and disposition of funds when Agency Leases its own lands

A. When an agency chooses not to avail itself of the provisions of R.S. 30:153 but leases its own lands, the agency shall sign all necessary or customary division orders or other documents incident to the products under the lease.

30:155 Alternative Procedures

If an agency does not avail itself of the provisions of R.S. 30:153, it may lease its lands for mineral purposes on its own motion, or on written application, by advertising and letting in the manner provided by this Sub-part, subject however to approval of the State Mineral Board as provided in R.S. 30:158.

30:156 Procedure when Agency leases its own land

A person desiring to lease from a State agency shall make application with deposit to the agency in the same manner as is set forth in R.S. 30:125 for application with deposit to the Mineral Board. The agency shall itself advertise, receive bids at its domicile, and lease in the same manner and subject to the same restrictions applicable to leases by the State Mineral Board under R.S. 30:126 and 30:127. The agency has the same powers over leases granted by it as are granted the State Mineral Board in R.S. 30:129.

30:158 Approval of Lease by Board

No lease executed under the authority of this Sub-part shall be valid unless the agency obtains its approval by the State Mineral Board. A lease made under the provisions of this Sub-part which is not approved by the State Mineral Board and countersigned by the duly authorized officer of that body is null and void.

The Board is also given authority over the exploration or prospecting for minerals on public lands. The geopressed resource undoubtedly falls within the ambit of these provisions:

30:208 Exploration of Public Lands

The State Mineral Board may explore and develop the mineral resources of lands belonging to the state which might lease under Sub-part A of Part II of Chapter 2 of this Title.

30:209 State Mineral Board, Authority of

In order to carry out the provisions of R.S. 30:208, the State Mineral Board may conduct geological and geophysical surveys, may equip, drill and operate wells or miners for the production of minerals; may construct, operate and maintain necessary or convenient facilities for saving, transporting and marketing mineral production and may do all other things which may appear to be necessary or desirable. The State Mineral Board may contract to have any of these things done.

30:210 Permits to Prospect on Lands Over Which State has Mere Servitude Prohibited

No Board, Commission, or Department of the State shall issue a permit to any person to prospect, by means of torsion balance, seismograph explosions, mechanical device, or otherwise, for minerals, or for any other purpose, on lands which the issuer does not own in fee simple, but over which has a servitude or right of way, without the consent of the owner of the abutting property.

30:211 Geophysical and Geological Survey, and Public Lands Defined

A. "Public lands" means lands belonging to the State or its agencies and which may be leased under Chapter 2 of this Title.

B. "Geophysical and geological survey" means magnetometer surveys, gravity-meter surveys, torsion balance surveys, seismograph surveys, using either the reflection or the refraction method, solid analysis surveys which tend to show the presence or absence of hydrocarbons, electrical surveys, using either the Eltran or some similar method, and any method utilizing short wave radio.

30:212 Permits for Surveys on Public Lands

The State Mineral Board shall have exclusive authority to grant permits to conduct geophysical and geological surveys on State owned lands and waterbottoms. No person shall conduct a geophysical or geological survey on State owned lands and waterbottoms without obtaining a permit. These permits shall be granted to rules promulgated by the State Mineral Board. No permit shall be granted covering lands over which the State has a mere servitude without consent of the owner of the abutting property.

The State Mineral Board has promulgated several regulations under the authority granted by this section. Those pertinent to the matter under discussion follow. Since it is not necessary to indicate in the application for a permit what type of prospecting is to be conducted, these regulations should apply to geopressured prospecting as well as traditional oil and gas prospecting.

II Application for a permit for such exploration must be filed in quadruplicate with the Secretary of the State Mineral Board at least ten (10) days before requested effective date of the permit, except as hereinafter provided, and must be accompanied by the following enumerates supporting documents in quadruplicate:

- (a) A detailed map showing the exact area in which the geophysical operations are to be conducted, such area to be outlined in red, and where possible, by reference to an established landmark. It is suggested that the above map be a copy of a portion of the "Oil and Gas Map of Louisiana" as published by the Department of Conservation.
- (b) A statement of the type work planned (gravity meter, magnetometer, reflection, refraction, etc.). It is required that official permit application forms be used, same being available upon request by the prospective permittee to the State Mineral Board. (See supplemental section following this chapter for form).

All permits shall be deemed not to cover and include any State oil and gas lease either in effect or thereafter to be in effect, so long as such lease or leases remain in effect, covering any portion of the area covered by the permit or permits, but if permittee or permittees shall secure appropriate consent from the lessee or lessees under any such lease or leases to conduct operations thereon of the type permitted by the permit or permits, such permit or permits shall evidence the acquiescence of the State Mineral Board in such consent. Upon the expiration, lapse, or termination of any such State lease or leases, permits shall automatically extend to cover the acreage formerly under lease.

III. Whenever there arises an emergency or other cause which prevents the applicant from filing application as above provided, application for a permit for such exploration may be requested in any manner, and the Secretary of the State Mineral Board is authorized to grant, in any manner, temporary permission to conduct such geophysical operations provided that proper notification be made to the Louisiana Wild Life and Fisheries Commission of the informal application for this temporary permit. Within ten (10) days of the date of granting such temporary permission a written application as above provided for in Paragraph II shall be filed with the State Mineral Board.

Operations under this paragraph shall be confined to the areas affected by the emergency conditions such as are deemed to exist in the discretion of the Secretary of the State Mineral Board.

IV. Permits are limited to a period of six (6) months from date of issuance, unless revoked for cause, but may be renewed at the discretion of the State Mineral Board for two additional periods of three (3) months, provided written application for renewal is made by letter addressed to the Secretary of the State Mineral Board not less than ten (10) days prior to expiration of the original permit. Renewals may be granted in letter form.

V. Permits for reflection and refraction seismograph work for inland areas should cover an area not greater than that equal to two parishes. Permits for reflection and refraction seismograph work in the Gulf of Mexico shall be restricted to the equivalent of any one state lease area. Permits for other types of surveys may cover any reasonable area even if larger than two parishes or one state lease area. No one permit shall cover both inland and offshore areas. There must be separate applications and plats for each. Offshore, for the purpose of Geophysical Permits, shall be that portion of the Gulf of Mexico as delineated by the State's off shore block system and as exemplified by the Oil and Gas Map published by the Louisiana Department of Conservation, immaterial of whether said line of demarcation is or is not the shore line of the State of Louisiana.

VII. The State Mineral Board hereby declares that all information, maps, and other data of every kind whatsoever that are supplied to the Board pursuant to the requirements of R.S. 30:213, shall be kept confidential and shall be available only to the State Mineral Board for its use in the proper administration and development of State-owned lands and water bottoms.

VIII. The provisions of Title 30, Chapter 3, Sections 211-216 and Act 175 do not affect State-owned lands and water bottoms under lease for mineral exploration and development, where geophysical exploration is done by or for the account of the lessee. In the event the permittee conducts operations through an operator, the name and address of such operator shall be furnished. All permittees and their operators shall be authorized to do business in the State of Louisiana.

IX. Geological or geophysical surveys shall not be considered to have been conducted on State-owned lands and water bottoms because of the use of State highways by trucks containing instruments in connection with such surveys, and the provisions of the Act shall not be applicable.

X. The approval of the State Mineral Board, through its duly authorized officer, of any permit, is granted subject to any future rules and regulations which may be, from time to time, adopted to the State Mineral Board. The Board hereby declares that in the event any changes in the rules and regulations are effected, thirty (30) days written notice shall be given to all permittees whose permits are still in effect.

The following statute requires compliance with Department of Wildlife and Fisheries Regulations before a permit will be issued for geophysical exploration on state owned waterbottoms. Those pertinent regulations currently in force follow the statute.

30:214 Permit for Survey Entailing use of Public Waters or Bottoms

Any person who makes or causes to be made a geophysical survey entailing the use of shot points in any lake, river, or stream bed or other bottoms, the title to which is in the public, shall obtain from the State Mineral Board a special permit therefor. This permit shall be granted under the rules and regulations which may from time to time be promulgated by the Department of Wildlife and Fisheries for the protection of oysters, fish, and wildlife.

Regulations:

1. The Director of the Wild Life and Fisheries Commission will designate when, where and how such exploration work shall be conducted under the following rules and regulations. The supervision of this work is under the Division of Oysters and Water Bottoms and Seafoods. No seismic exploration work shall be started without the approval of the Director of the Wild Life and Fisheries Commission and all such work must be carried out in such manner as may be approved by the said Director. Applications for approval may be made by letter giving name of Party Chief and exploration company, and should be accompanied by a detailed map in duplicate showing the exact area in which the geophysical operations are to be conducted.
2. No seismic exploration work shall be conducted in any wild life refuge, water fowl refuge, game preserve, fish preserve or hatchery, or oyster seed ground reservation

without written permission from the agency in charge of such refuge, preserve, hatchery or reservation.

3. Each seismic exploration crew working in the State of Louisiana will always be accompanied by a Seismic Agent, unless written exception has been granted by the Director. When a crew employs more than one shooting component and the crews are at such a distance apart that it is impossible for the Seismic Agent to travel from one to the other in time to observe the shots of such units, it will be required that an agent be assigned to each shooting component of the crew. The Seismic Agent will be constantly present during the shooting operations of the party to which he is assigned.
4. Daily reports on such exploration work shall be filed with the Division of Oysters, Water Bottoms and Seafoods, of the Wild Life and Fisheries Commission at the end of each working period, on forms provided by the Commission. A separate report must be made for each day whether or not shooting is in progress. These reports must furnish complete information as indicated by the report form and must be signed by the Party Chief and by the Seismic Agent. The Party Chief will furnish only such information to the Seismic Agent as is required to fill out the daily reports. Should the Wild Life and Fisheries Commission wish to secure any other information, it will furnish the Parth Chief with a written request.
5. Operators shall notify the Division of Oysters, Water Bottoms and Seafoods of the Wild Life and Fisheries Commission of beginning, of interruption, and of cessation of work in any area, and shall keep the Commission informed of name and address of Party Chief, and location and movements of the crew or quarter boat.
6. Charges in excess of fifty (50) pounds shall not be used except pursuant to express written authorizations from the Chief of the Division of Oysters, Water Bottoms and Seafoods of the Wild Life and Fisheries Commission. Requests for the use of such charges must be made in writing, giving the reasons why such charges are needed, the size of charges to be used, and the depth at which they are to be suspended or buried. Such requests should be addressed to the Division of Oysters, Water Bottoms and Seafoods. Should multiple charges be used, the total amount of explosives should not exceed fifty (50) pounds without special permission from the Chief of the Division of Oysters, Water Bottoms and Seafoods.
7. In the interpretation of these rules and regulations, the dividing line between North and South Louisiana will be latitude 31° North. The area lying South of this latitude is considered South Louisiana.

8. (A) Minimum required depth of charges in South Louisiana and in all water areas shall be as follows for shots detonated in holes:

- 1) 5 lbs. or less 20 feet
- Up to 20 lbs. 40 feet
- Up to 30 lbs. 50 feet
- Up to 40 lbs. 60 feet
- Up to 50 lbs. 70 feet

2) No part of the charge shall be above the minimum required depth.

3) These minimum required depths shall not apply to trial charges and charges for determining condition of the weathering layer, or position and water speed; provided that such charges are not over five (5) pounds, and not fired oftener than absolutely necessary.

(B) Minimum required depths of charges in North Louisiana with the exception of water areas shall be as follows:

- 5 lbs. or less 15 feet
- Up to 20 lbs. 20 feet
- Up to 30 lbs. 25 feet
- Up to 40 lbs. 30 feet
- Up to 50 lbs. 35 feet

(C) The placing of explosive charges on the bottoms of the waters of the Gulf of Mexico, Mississippi Sound, Breton Sound, Chandeleur Sound and Lake Borgne is prohibited. All charges not detonated in holes below the bottom must be suspended and detonated at a point not below the level midway between the surface of the water and the substratum underlying such water; or detonated above the surface of the water. Under no conditions should charges be detonated nearer to the bottom or water bed than five (5) feet.

9. When more than one shot is fired in the same hole and there is any reasonable doubt in the mind of either the Seismic Agent or the Field Manager of the party as to the legal depth of the hole after the shot is fired, the hole will be measured for depth before reloading to ascertain that it is the required depth in accordance with the table of charges and depth.

10. All pipe used in geophysical operations must be removed to at least six feet below the surface of the ground, or six feet below the bottom in water areas, before finally leaving the shotpoint. No pipes should be left in the water during crew off-days.

11. All parties using pipe in water areas must have clearly stamped at each end of each joint the name or abbreviation of the name of the company using the pipe.
12. All 2 x 2S used for survey lines must be clearly stamped with the name of the company using the stakes at approximately three-foot intervals. These stakes must be pulled upon the completion of the prospect.
13. All pipes, buoys and other markers used in connection with seismic work shall be properly flagged in the daytime and lighted at night according to the navigation rules of the U.S. Engineers and the U.S. Coast Guard.
14. All holes drilled in geophysical operations in land areas must be filled, by the persons or agency drilling these holes, before leaving the location.
15. No explosives shall be discharged within 250 feet of any oyster reef or bed, including any State-owned natural reefs, without written permission signed by the owner and/or lessee of the reef or bed, approved by the Director of the Wild Life and Fisheries Commission and the Chief of the Division of Oysters, Water Bottoms and Seafoods.
16. All shotpoints in oyster areas must be approved by the Division of Oysters and Water Bottoms before being fired.
17. No explosives in suspended charges shall be discharged within one thousand (1000) feet of a fishing boat without notice being given to such boat so that it may move from the area.
18. Persistent gas and water spouts caused by drilling or shooting operations of seismic crews in water areas will be stopped as soon as possible after they occur.
19. Boats, marsh buggies or other types of marsh vehicles must be so used as to cause the minimum disturbance of an injury to the lands. Water bottoms, and wild life and fisheries thereon.
20. No shooting will be allowed except in daylight hours so that the Seismic Agent may observe the results of each shot, except pursuant to express written authorization from the Chief of the Division of Oysters, Water Bottoms and Seafoods. Such requests must be made in writing, giving reasons.
21. No shooting will be allowed in heavy fog due to danger to boats in close proximity.
22. Agents assigned to seismic crews are under the supervision of the Chief of the Division of Oysters, Water Bottoms and Seafoods of the Wild Life and Fisheries Commission:
 - (A) The Supervisor, on request, will have access to all records, such as shot point location maps, shooters'

logs and tracings, but only to the extent necessary to determine that all protective requirements have been complied with.

- (B) The interpretation of these rules and regulations by the Supervisor will be accepted by the seismic operator and the Seismic Agent.
 - (C) The Party Chief will instruct the members of his party as to these rules and regulations, and to the duty and authority of the Supervisor of the Division of Oysters, Water Bottoms and Seafoods of the Wild Life and Fisheries Commission and the Seismic Agent.
 - (D) The Party Chief will assist the Seismic Agent to fill out the required form by furnishing all necessary data.
23. A fee of \$1,500.00 per month will be charged geophysical operators to be used to pay salary, retirement participation fees, and the expenses of Seismic Agents assigned to crews working in Louisiana. One-half of this amount, or \$750.00, will be charged for any portion of a month less than fifteen (15) days, and for any portion of a month exceeding fifteen (15) days, the geophysical operators will be billed at the full monthly rate of \$1,500.00. All payments will be made by the geophysical exploration companies directly to the Louisiana Wild Life and Fisheries Commission on or before the 20th of each month; therefore, no payments will be made by the operators to the Seismic Agents.
24. The Seismic Agent has the right to stop any particular shooting, if, in his opinion, it will violate the above rules and regulations, but does not have the authority to shut down the entire exploration work. If, in the opinion of the Seismic Agent, such violations continue, he will immediately contact the Wild Life and Fisheries Commission Supervisor, and the members of the exploration party will assist him to do this with all the facilities at their disposal.
25. The Party Chief will furnish the Wild Life and Fisheries Commission Supervisor with transportation facilities to enable him to visit the working area, if requested.
26. The Party Chief is required to notify the Division of Oysters Water Bottoms and Seafoods of the Wild Life and Fisheries Commission immediately if the Seismic Agent is not on the job, and will notify the Commission Supervisor if it should be necessary to relieve the agent at any time. The Commission Supervisor will arrange relief for the agent.

27. No Seismic Agent shall have the right to release any operator from the obligations imposed by these rules and regulations. Exceptions may be granted by the Director of the Wild Life and Fisheries Commission only, after written application setting forth reasons for exception. The release, signed by the Director, will designate the particular area and rule affected and the procedure to be followed in lieu of the established rule.
28. All operators conducting seismic operations shall use reasonable presentation in accordance with approved and accepted methods to prevent destruction of, or injury to, fish, oysters, shrimp and other aquatic life, wild life or other natural resources of the State of Louisiana.
29. Operators shall furnish to the Wild Life and Fisheries Commission a surety bond with a surety company authorized to do business in the State of Louisiana in the full sum of twenty-five thousand (\$25,000.00) dollars when using more than one seismic crew in the field, or five thousand (\$5,000.00) dollars when operating with only one crew. Bond forms may be obtained from the Division of Oysters, Water Bottoms and Seafoods of the Wild Life and Fisheries Commission. Bond should be filled by the applicant.
30. Any violation of these or any other valid rules promulgated by the Wild Life and Fisheries Commission for the regulation of seismic operations, or the refusal of any operator or its employees to comply fully with all orders and requirements which may be made by the Wild Life and Fisheries Commission at the time the exploration is conducted, or any attempt to unduly influence any Seismic Agent to abstain from the enforcement of these regulations shall constitute peremptory cause for shutting down the entire exploration work and may mean the barring of the Party Chief, Party Manager or Field Manager involved from future operations in this State.
31. These rules and regulations supersede all other rules and regulations issued prior to this date and are subject to change at the discretion of the Director of the Wild Life and Fisheries Commission.

Finally, there are a number of miscellaneous provisions which must be taken into account by the geopressed developer:

30:213 Furnishing State Information Obtained under Permits

The Commissioner of Conservation, the State Mineral Board, or any other agency of the State shall not require the holder of a permit to furnish information secured under his permit prior to

obtaining from the State a mineral lease affecting the property surveyed. If the permittee becomes a mineral lessee of the State (upon request of the Commissioner of Conservation or the State Mineral Board), he shall file maps showing the location of all shot points and detector or geophone set-ups located on the property and the dates on which they were used, together with the subsurface contours obtained as a result of the use of the points. This information shall not extend to lands beyond the boundaries of the public property surveyed. This information shall be furnished the Commissioner of Conservation or the State Mineral Board within ninety days after the survey is made provided that ninety days have elapsed since the completion of the survey.

30:215 Confidential Nature of Surveys and Data

All surveys and data of every kind filed under R.S. 30:213 shall be confidential and available only to the Commissioner of Conservation and State Mineral Board for their use in the proper administration and development of publicly owned land.

30:216 Penalty

Whoever knowingly and willfully violates R.S. 30:211 through 30:215 or any rule or order of the State Mineral Board made thereunder shall be fined not less than one hundred dollars (\$100.00) nor more than one thousand dollars (\$1,000.00) or imprisoned for not more than six months, or both.

30:218 Injunction not to Lie in Suits to Restrain Exploitation for Oil, etc., on State Lands

No injunction shall issue against lessee of the state or state employees to restrain exploration for minerals on state lands. In all cases plaintiff's remedy shall be judicial sequestration of the product of the exploration or its proceeds until the rights of all claimants are determined.

30:219 Release from Sequestration

The defendant may obtain release of the sequestered product or proceeds by giving bond. This bond shall be payable to the clerk of court and in an amount fixed by the judge as being the value of the product at the time of its release, with legal interest from final judgment.

30:171 State Departments and Agencies; Permits to Lessees for Directional Drilling; Permits to erect structures, etc.

Any department or agency of the State may grant on lands of which it has title, custody, or possession:

(1) A permit, lease, or servitude to engage in directional drilling in search of minerals underlying adjacent water bodies.

(2) A permit, lease, or servitude to erect structures and enjoy all privileges of the lands necessary or convenient in the development and transporting of minerals underlying adjacent water bodies.

The five year limitation of R.S. 41:1217 shall not apply to these grants.

No grantee shall exercise any rights without first obtaining a valid mineral lease on the adjacent water bottoms.

FOOTNOTES TO CHAPTER VI

1. The Act was first adopted as Act 784 of 1975. It was incorporated into the Revised Statutes as Sections 800-809 of Title 30. Citations will be to the appropriate sections of the Revised Statutes.
2. Act 134 of 1976.
3. 30 U.S.C. §1001 et seq (1970) The federal act qualifies the "75%" requirement to add that the by product must not be of sufficient value to warrant production by itself for its own value. The state act changes the requirement. The effect is also to raise the question as to whether a true "byproduct" i.e., a substance not valuable in itself is excluded from the definition of the resource, and is thus not covered by a lease.
4. R.S. 30:2.
5. This information was derived by conversations with attorneys representatives of the Mineral Board at the time of preparation of this report.



CHAPTER VII
THE GEOTHERMAL ENERGY RESOURCES ACT OF 1976
AND
UNITIZATION OF GEOPRESSURED RESERVOIRS

I. UNITIZATION AND THE LOUISIANA CONSERVATION ACT

A. Unitization Provisions of the Conservation Act and Geopressured Resources

The preamble to the Geothermal Energy Resources Act of 1976 provides in part that the act is "to provide for regulation of exploration, drilling, production and subsurface disposal; to provide for conservation and environmental protection; . . ." to this end, as mentioned in the preceding chapter, Section 802 provides that full regulatory authority over all geothermal exploration, drilling, development and production is vested in the State Department of Conservation. The section goes on to provide that the provisions of the Louisiana Conservation Act, especially R.S. 30:5 and R.S. 30:9, are extended to all geothermal operations. This chapter will consider the provisions of the Act and the implications which unitization may generally hold for the geopressured developer. The Commissioner has recently issued proposed regulations under the Geothermal Energy Resources Act. These do not regulate the unitization of the resource but are limited primarily to completion and operating matters. It is assumed he will apply his general rules of procedure to applications for the formation of geopressured units and will, initially at least, apply the same criteria for the formation of units as he uses in the case of oil and gas.

R.S. 30:5 and R.S. 30:9 provide the basis for unitization of oil and gas production in Louisiana. An understanding of the significance of this aspect of the Geothermal Energy Resources Act, therefore, requires a consideration of the Louisiana Conservation Act as it has been applied in the oil and gas area.

B. History of The Conservation Act

As early as 1839 oil was sometimes collected from the surface around the Calcasieu River near Lake Charles and used locally. It was not until September, 1901, however, that the first oil production in Louisiana occurred. A "gusher" at 1,800 feet was brought in just six miles north-east of Jennings, Louisiana, and production from the Jennings field began.

In 1905 natural gas was discovered in northwest Louisiana in Caddo Parish. In early May of that year a gas well got out of control and was afire. The fire burned for several weeks. This situation was brought to the attention of the Louisiana Legislature, and in the next regular session of the legislature in 1906, the legislature passed an act making it illegal for persons to permit a gas well to remain out of control or to wastefully burn gas or blow it into the air. If the owner of the well neglected or was unable to bring about control of the well, the governor was authorized to call upon the state board of engineers to take charge of the situation, and control the well. This early act set the stage for the more comprehensive and complicated conservation laws which were to follow.

It was not long after this that the Louisiana courts were called upon to decide the nature of the landowner's rights to the petroleum under

his property. Reference has already been made in Chapter IV to the results of this litigation. Its effect upon the conservation movement is also important. In 1913 the Supreme Court of Louisiana first ruled on the nature of the landowner's right. The question before the court arose in the context of an owner of land who had entered into an act purporting to convey all of the minerals underlying his land to an oil company. More than ten years elapsed before the company made any effort to exploit the minerals. When the company began drilling operations, the landowner objected arguing that he had never been the owner of the petroleum under his land because it was a thing without a master. He then argued that he could therefore only own a right to search for the petroleum and to exploit it if it could be found. Accordingly, he could not convey the minerals to the oil company because he had never owned them. The Supreme Court agreed with the landowner. The case², which is not reported, was of doubtful value as precedent because it was settled pending a rehearing. The basic theory of the case, however, was affirmed in the historic case of Frost-Johnson Lumber Company v. Sallings Heirs³.

The decision in Frost-Johnson which first established the non-ownership theory of oil and gas law in Louisiana, was based on a hazy understanding of the geology involved. The court was impressed with the "fugitive" nature of oil and gas. It apparently believed that these substances were "running at large beneath the surface", and that the only way to appropriate the oil and gas was by drilling wells and capturing it. The court said:

"the right, which is now universally recognized, of every landowner to extract, by boring wells on his own land, and appropriate to his own use, without compensation to his neighbor, the oil or gas in a natural reservoir beneath the surface, extending beyond his property line, is not consonant with the right

of "ownership" (as that right is defined in the Code) of the fugitive minerals, oil and gas, running at large beneath the surface".⁴

It was against this background of partly erroneous geological assumptions, no statutory mineral law, and little guidance from the Civil Code, that the Louisiana courts were forced to improvise an oil and gas law.

The assumed fugacious character of oil and gas originally gave rise to the rule that immediate drilling was necessary to appropriate them before they migrated from under the land or the streams dried up from some unknown cause. The courts, laying stress on this effect of mineral's assumed migratory nature, and seeking to protect the landowner from feared speculation by large oil companies, early ruled that the real consideration for the execution of oil and gas leases was the immediate and complete exploration and development of the land. Since leases were often incomplete, or worse, showed overreaching by the oil companies, the implied covenants were fashioned by the courts from this premise. These have already been mentioned. Their effect was also the ultimate cause for the development of conservation legislation. It will be recalled that these obligations as ultimately developed consisted of: (1) the implied covenant to drill exploratory wells. This covenant was deemed essential because early lease forms provided for very long primary terms, sometimes from 25 to 99 years. Today, the existence of this covenant has become somewhat obscured because most leases provide expressly for the payment of delay rentals which in theory are to defer the drilling of the exploratory well. (2) The implied covenant to fully develop the leased property. After completion of an exploratory well as producer, it was thought necessary that the lessee

immediately embark upon a program to drill such additional wells as were necessary to reasonably develop the deposit of minerals which had been discovered. (3) The implied covenant for diligent and proper operation of the wells and for marketing the production if oil and gas was discovered in paying quantities. Because the main consideration to the lessor was the anticipation of royalty from the sale of the minerals, the lessee was also deemed obligated to diligently and efficiently operate and market the product. (4) The implied covenant to protect the leased premises against drainage by wells on adjoining land.

As more and more fields were discovered, and as production continued to rise, geologists and engineers began to have a better understanding of the nature of oil and gas in the ground. The effect of the implied obligations was also to require that each operator drill as many wells as possible as quickly as possible once oil or gas was discovered. It was at first believed this was necessary because the oil, believed to be running in streams under the land, might be forever gone if it was not rapidly captured. By the time this was discovered to be incorrect the right which had been established of each owner to produce as much as he could from his own land at the expense of causing it to migrate from his neighbor's land meant in turn that the neighbor, to prevent this, would be forced to withdraw it at equally rapid rates from his land. The senselessness and waste caused by this in terms both of uselessness of drilling excessive wells and of the detrimental effect upon the ultimate recovery of a too rapid withdrawal of the oil or gas gradually became realized. By 1930, the Mid-Continent Oil and Gas Association published a "Handbook

on Unitization of Oil Pools". This early work stressed that one of the factors favoring wide spread unitization of oil and gas pools was to stop the "undue dissipation of the gas pressure which is the important or propulsive force to bring the oil product out of the ground..."⁵

The term unitization was defined as the "practice of unifying the ownership and control of an actual or prospective oil or gas pool by the issuance or assignment of units for undivided interest in the entire area with provision for development and operation by an agent, trustee or committee representing all holders of undivided interest therein."⁶ The purpose of unitization was said to be to convert a number of separately owned properties into one large property to be developed and operated as such. It was felt that operating the oil property as a single unit would reduce the drilling of unnecessary wells, which increase the cost of drilling; eliminate waste by reducing the dissipation of reservoir energies, and still guarantee to each landowner his proportionate share of the oil underlying his land. Implicit in the common pool concept was realization that oil and gas while migratory within a reservoir are in fact confined to a limited pool or reservoir only and do not run in large underground rivers which flow over an undetermined area.

While Louisiana courts were developing a regime of property law to apply to oil and gas the Louisiana Legislature, starting with the 1906 act mentioned above, was concerning itself with various conservation measures.

A seven member commission on natural resources was originally created in 1908⁷ and was changed in 1910 to the Conservation Commission. A

Department of Mining and Minerals was also established in 1910.

In 1916 large new discoveries greatly decreased the price of natural gas in the state. Partially as a result of these discoveries, the carbon black industry began to shift from West Virginia and Kentucky to the Louisiana area. It was believed that the manufacture of carbon black from natural gas was a wasteful use, and in 1920 the legislature adopted Act 250 which allowed the Department of Conservation to prescribe rules for carbon black plants. The Act also authorized the Commissioner to fix the potential capacity of any gas well used for the manufacture of carbon black. He was further authorized to reduce the consumption of these plants whenever it became necessary to obtain an adequate supply of natural gas for domestic uses in Louisiana.

Apparently the legislature was dissatisfied with the Act of 1920, and in 1924 enacted what was perhaps Louisiana's first real attempt at a true oil and gas conservation law.

This Act which dealt exclusively with gas production⁸ prohibited wells from being placed within a certain distance from each other, further restricted to carbon black manufacture in Louisiana, and regulated such matters as the protection of gas strata, the keeping of logs, plugging of dry wells, the type of equipment to be used, the casing of wells and the testing and metering of gas production. The most significant feature of the Act, however, was the establishing of gas allowables. These allowables restricted the amount of gas a well could produce and were to be based upon the open flow capacity of the well and the acreage on which the well was located. This resulted in a rough allocation of production by acreage

and discouraged the drilling of an excessive number of wells since each new well reduced the production allowed from others on the tract.

Louisiana appears to have been the first gas producing state to set up such a statutory scheme for gas allowables based upon geographic considerations.

Act 253 of 1924 undertook oil conservation along somewhat similar lines. It was revised in 1926 to prohibit the drilling for or production or handling of oil in such a manner as to cause waste, provide for monthly reports by operators, regulate various operating practices, and authorize inspections by conservation agents. The Act also provided that the Department of Conservation had the right to make rules for the spacing of oil wells in any area of the state, and prohibited the waste or blowing into the air of more than a certain amount of gas. Although the Commissioner of Conservation also had the authority to issue orders on well-spacing, none appear to have been issued.

In 1935 the Legislature acted to prohibit production of crude petroleum in such a manner as to constitute waste or an excess of market demand, to be ascertained by the Commissioner of Conservation.⁹ This provision was similar to the one already in effect for natural gas. It granted the Commissioner the right to allocate production of any oil field among the various producers in the field in a reasonable manner. The Commissioner immediately exercised this power to control the production of crude petroleum in the Caddo field located in extreme northwestern Louisiana.¹⁰ Some of the producers in the Caddo field apparently thought the Act permitted certain operators to receive allowables which were excessive when compared with those on surrounding leases in the same field.

As a result of this, and other pressure, in 1936 the Legislature combined the oil and gas statutes previously passed, into a comprehensive oil, gas and sulphur conservation measure¹¹. This Act prohibited the production of these resources in such a manner as to constitute waste or which was in excess of reasonable market demand. The Commissioner was given the power to determine the market demand, and to promulgate orders on matters concerning waste, production practices, and the like. He was specifically authorized to require that oil wells be operated with efficient gas-oil ratios and to fix the spacing of wells. Incidental to the Commissioner's powers to determine market demand, was the power to restrict production to designated allowables among fields. The requirement that Commissioner mandate efficient gas-oil ratios is apparently the first legislative acknowledgment of the need to conserve reservoir energies.

The Commissioner quickly carried out his mandate at the Cotton Valley field. The wells in this field produced a high gravity liquid plainly different from the ordinary crude petroleum, and commonly designated as "distillate". This distillate was essentially liquid petroleum with very high volumes of natural gas dissolved in it at high pressure. Initially, the oil was separated and the gas was either flared or allowed to escape into the atmosphere. Because of the large amount of natural gas involved this was particularly wasteful. To prevent such waste, the Commissioner set allowables for oil in terms of gas production and permitted the oil to be produced but only if there were markets capable of absorbing the gas which was produced with the oil. The wasteful flaring or venting of gas into the air was also prohibited.

C. The Louisiana Conservation Act

As a result of the experience in Cotton Valley and other fields in 1940 the Legislature adopted Act 157 which, with major amendments in 1960,¹² forms the present conservation act. The Act was revolutionary in that it deprived the landowner of much of his freedom in the production of oil and gas.

While Louisiana courts have continued to speak of petroleum as being insusceptible of private ownership in the ground, and have continued to classify the right to mine it as a servitude or lease, the Conservation Act greatly limits the rule of capture and to a large extent recognizes the surface owner as the owner of the petroleum in place underneath his land.

The Act establishes the State Department of Conservation under the direction of a Commissioner of Conservation. All natural resources of the state not within the jurisdiction of another specific state agency are declared to be within the jurisdiction of the Conservation Department. This includes oil and gas in the state, and after Act 134 of 1976 also includes geothermal-geopressed resources. Therefore, where reference is made to oil or gas in the Conservation Act one must now presume the terms also include the geopressed resource unless they are clearly incompatible to the resource. The Act specifically prohibits the waste of oil and gas as that term is defined in the Act. In addition to its ordinary meaning the term, waste, includes:

the inefficient, excessive, or improper use or dissipation of reservoir energy; and the location, spacing, drilling, equipping, operating, or producing of an oil or gas well in a manner which results, or tends to result in reducing quantity of oil or gas ultimately recoverable from a pool and . . .

the inefficient storing of oil; the producing of oil or gas from a pool with an excess of transportation or marketing facilities or of reasonable market demands; and the locating, spacing, drilling, equipping, operating or producing of an oil or gas well in a manner causing, or tending to cause, unnecessary or excessive surface loss or destruction of oil or gas.¹³

The Commissioner has the authority to make reasonable rules and regulations with the proper administration and enforcement for the prevention of waste.¹⁴ Power is specifically granted to the Commissioner to promulgate rules and regulations for the following purposes:

(1) to require drilling, casing, and the plugging of wells in such a manner as to prevent the escape of oil and gas and to prevent the intrusion of water into oil or gas strata; (2) to prevent the pollution of fresh water supplies by oil, gas or salt water; (3) to prevent the premature and irregular encroachment of water which reduces the total ultimate recovery of oil or gas from a pool; (4) to require the operation of wells with efficient gas-oil ratios, and to fix those ratios; (5) to prevent blowouts, cavings, and seepage; (6) to regulate secondary recovery methods including the introduction of gas, air, water, or other substances into producing formations; (7) to limit and prorate the production of oil or gas or both from any pool or field the prevention of waste; (8) to regulate the spacing of wells into established drilling units as defined; (9) to require interested persons to place uniform meters approved by the Commissioner wherever the Commissioner designates, on pipelines, and all places necessary to prevent waste.

The 1936 experience in Cotton Valley with distillate prompted the Legislature to include subsection B of section 5. This subsection

authorizes the Commissioner to require the recycling of gas in any pool from which distillate may be separated or natural gas extracted. Under the Commissioner's regulation the recycled gas, after it has been separated from the crude oil, is to be reinjected into the formation. The Subsection also authorizes the Commissioner to promulgate rules to "unitize separate ownership" in the distillate field. When enacted, this provision was revolutionary in that it allowed the Commissioner of Conservation to ignore property lines and to require distillate reservoirs be treated as a single unit without regard to them. If property owners could not agree on a unitization agreement, the Commissioner could nonetheless force them to unitize and operate the reservoir as a single unit. It is doubtful, because of its specific nature, and the general provisions of Section 5C discussed below, that Section 5B should be considered applicable to the geopressured resource, notwithstanding the general reference to Section 5 in the Geothermal Energy Resources Act.

In 1960 the Legislature added Subsection C to Section 5. This purports to authorize the Commissioner of Conservation to generally require unit operations of an entire field for any reason. Although some persons felt that Subsection B already granted this power to the Commissioner, this was not the position taken by the Commissioners, although it was readily admitted that in some cases field wide units might increase production and thereby decrease waste. The view apparently was that Subsection B limited his authority to those cases where recycling of gas was necessary.

Sections 9 and 10 are the basic unitization provisions of the act. Section 9 provides that whether or not the total production from a pool is limited or prorated no rule or regulation of the Commissioner shall

make it necessary for an owner, to obtain his tract's just share of the production of the pool, to drill or operate any well, or wells, in addition to the well or wells that can, without waste produce, his share. Nor can any rule or regulation of the Commissioner occasion net drainage from a tract by requiring the drilling and operation on a tract of a well in addition to the wells thereon that can, without waste, produce the tract's just and equitable share of the pool's production. This is to be accomplished by Subsection 9B which requires the Commissioner to establish a drilling unit or units for each pool in order to prevent waste and to avoid the drilling of unnecessary wells. The term "drilling unit" is defined as the maximum area which may be efficiently and economically drained by one well.

Section 9 goes on to require the Commissioner to fix the location of the well to be drilled on such a unit which will efficiently drain the unit. Section 9D defines an owner's just and equitable share as "that part of the authorized production of the pool" which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract bears to the recoverable oil and gas in the total developed area of the pool. The Commissioner is to prevent or minimize net drainage from each developed area and see that each producer is given the opportunity to use his just and equitable share of the reservoir energy to produce the oil in the pool.

Section 10 provides that whenever two or more separately owned tracts of land are embraced within a drilling unit which has been established by the Commissioner, the owners may validly agree to pool their interests and

to develop their lands as a drilling unit. Section 10 goes on, however, to provide that where the owners have not agreed to pool their interests, the Commissioner shall require them to do so and to develop their lands as a unit if he finds it necessary to prevent waste or to avoid drilling unnecessary wells.

Sections 9 and 10 appear then to contemplate a two stage proceeding. The Commissioner is first to establish a drilling unit which restricts the drilling of wells within the unit area to one well located at the place determined by the Commissioner which will efficiently and economically drain the unit area. He will then involuntarily unitize or consolidate the rights of persons within the unit area if they do not agree to the consolidation of their interests. As a practical matter in the vast majority of cases in recent years the Commissioner has not separately established drilling units and then unitized the ownership but has combined in one order the creation of the drilling unit and the pooling or unitization of its ownership. Furthermore, particularly in the South Louisiana fields, he has seldom established the drilling unit until after a well has been completed in the pool.

Section 11 sets the procedure for the allocation of allowables for both wells and pools. This Section provides that allocation among fields shall be made on a reasonable basis, and that production in the field shall be prorated among the producers in the pool so as to prevent or minimize avoidable drainage from each developed area, so that each producer will have the opportunity to receive his "just and equitable share".

Section 9.1, which was added in 1975, establishes the terms under which units are terminated. It provides that any unit established pursuant to the authority of the Commissioner will remain in full force as long as: (1) a well is producing from the pool from which the unit or units were established; (2) a well is completed in the pool for which the unit or units were established and, although not producing, has been proved to be capable of producing; (3) drilling, reworking, recompletion, plugging back or deepening operations are being conducted on a well to secure or restore production from the pool from which the unit or units were established. After a period of one year and ninety days elapses, without the occurrence of any one of the above three conditions, upon application made to the Commissioner, he may by order terminate all units within the pool.

As can be seen from the above brief description, the Conservation Act seeks to minimize waste both above and below ground by setting up a regulatory scheme designed to maximize production, minimize waste, and provide for just and equitable distribution of the state's oil and gas reserves to those landowners whose tract overlies oil and gas pools. The ordinary pattern, under Sections 9 and 10 is to establish single well units and to prorate the production in the state, first among fields and then among the individual units in the field, by means of allowables. He has limited authority which will be discussed later to establish multi-well field or pool-wide units under Section 5B and C. The Conservation Act was one of the few in the country that provides for field

wide unitization. It has been said, quite accurately, that the Conservation Act changed the legal attitude toward mineral law from the "policy of production" to a "policy of conservation."

II. THE UNITIZATION OF GEOPRESSURED RESOURCES

The application of these provisions to the geopressured resource as mandated by the Geothermal Energy Resources Act may give rise to considerable difficulty. If the development of the geopressured resource follows the conventional pattern of leasing the land to undertake the activity then despite uncertainty as to the ownership of such rights under existing contracts, the problems presented do not appear to be much different than those which face the developer of oil and gas deposits or a gravel bed. If the entire area which one proposes to develop is obviously vested in a relatively few owners, even if the division of their ownership is uncertain or in dispute, the matter can probably be satisfactorily resolved or leases taken from all of them. On the other hand, if the developer of the resource contemplates acquiring the rights to extract the geopressured waters from a large reservoir, utilizing the production of several wells, each perhaps draining three to five square miles, the problems of leasing may become insurmountable particularly if the ownership of the land and minerals is highly fragmented. Furthermore, to hold or maintain the leases without drilling a well on each separate tract or lease some form of unitization will be essential. Finally, the ability of owners of tracts in the vicinity to require unitization and obtain a share of the production under the Conservation Act will make it almost a certainty that unitization will occur.

While unitization may be accomplished by order of the Commissioner of Conservation, it may also be effected by agreement of the owners of the rights independently of the actions of the Commissioner. This is done but infrequently in the oil and gas industry in Louisiana. Conventional unitization requires a high degree of assurance as to title. It may be effected either by the agreement of the owners of the mineral rights within the proposed unit or lessees may be permitted to unilaterally form units by provisions in leases permitting them to unitize the leased premises with others in the same area by an ex parte declaration. Clauses permitting the unilateral formation of units by the lessee contain great possibility for abuse and are sometimes inherently in conflict with the basic obligations of the lessee to act prudently with respect to the interests of each of his lessors. On the whole, Louisiana courts have exhibited a highly critical and technical approach to units formed in this manner and they are probably the least desirable method of creating a unit. Furthermore, unless a single operator owns leases covering the entire unit, it will require the agreement of the other owners or operators to arrive at a satisfactory plan or project for its development.

In the oil and gas industry conventional agreements, if limited to a single well unit are generally not difficult to negotiate. Field wide or multi-well units present much greater problems even after the wells have been drilled and the limits of the reservoir have been fairly well defined. Negotiating such agreements even under ideal conditions may

involve a multitude of parties and require extended periods of time. It is not unusual for field wide agreements to require several years to perfect. This is true even though the interest of all of the parties is directed to substantially the same end - the enhancement of production and the reduction of operating costs. A community of interest may not be as present in the case of a geopressured reservoir. If one operator desires to use the resource for its heat and pressure as well as for any methane its waters may contain, and other owners are interested primarily in the methane alone or have a desire to utilize the heat and pressure in a different manner for different purposes arriving at a satisfactory unitization agreement may prove to be extremely difficult and time consuming. Uncertainty as to the size of the unit or the costs of its development will further aggravate the problem if unitization is attempted before wells are drilled.

The presence of brokers or speculators who obtain leases without any intention of directly participating in the development and who intend to sell or convey their interests for a profit or who simply hope for a "free ride" from the efforts of the developer are tolerable to some degree in an oil and gas venture. They may present a much greater impediment to the development of the geopressured reservoir with its lower degree of profitability and higher degree of risk in the operating stage. The support of the Department of Energy in locating and defining geopressured reservoirs, while designed to encourage the investment of private capital in their development by minimizing exploration costs, may

also encourage the taking of leases in those areas by speculators whose presence cannot help but impede the efforts of those actively interested in developing a reservoir.

To negotiate intelligently with other parties and assess the risks which one may be taking as a participant in a unit there must be some assurance as to the validity of one's rights to the reservoir as well as that of those persons with whom one is negotiating to participate in the unit. The danger of title failures or defects is aggravated by the fact that one co-owner of land or a servitude whose interest is unleased, no matter how small it may be can prevent operations by mineral lessees holding from all of the other co-owners. The existence of an unleased interest or defective title in an area where one intends to place pipelines or other facilities may give rise to delay and add inordinately to the expense of the venture, particularly if an injunction is obtained by the adverse claimant preventing construction of those facilities pending resolution of the dispute. Finally, the presence of unleased nonparticipating interests means that the operator who is drilling the well is assuming all of the risks of the venture but will share in none of the returns from the nonconsenting acreage if the well is successful, except perhaps to the extent of recouping his costs.

The cost of determining title to and of negotiating leases on the lands may add expense and delays to the venture which appear to be much more critical in the type of development contemplated for the geopressured resource than is the case with oil and gas operations. Costs

incurred prior to the time the success of the venture is assured have a magnified effect upon the decision as to whether or not the risk should be taken under conventional "risk versus rate of return" analysis.

The royalties which can be reasonably justified by a geopressured well may be much less than those which are customary in the oil and gas industry. It is probably premature to estimate the level to which royalties will ultimately settle, as they undoubtedly will, under a system of negotiated leases. Ten percent appears to be customary in the western geothermal reservoirs but these reservoirs are sufficiently different as to render doubtful their relevancy to the geopressured resource. The exact percentage, however, is not as important as the fact that, if one assumes a geopressured well may draw from an area of several square miles, the royalties on an acreage basis are bound, in any case, to be relatively small. Thus, if one assumes a geopressured well drains an area of five square miles and is producing one million cubic feet of gas per day, a ten percent royalty on gas selling at \$3.00 per thousand cubic feet would result in an annual royalty of something less than \$35.00 per acre. While this is not an inconsequential sum, it may make the incentive to the landowner to lease less strong than is the case in oil and gas prospect, and increase the difficulty of obtaining leases. If the ownership of the land is as highly fragmented as is the case in many areas in South Louisiana, the cost of examining the title, negotiating the leases and paying the royalties may well equal several years royalty.

Involuntary unitization of lands by order of the Commissioner of

Conservation will probably be the order of the day, whether or not power to conventionally unitize a lessor's interest is given the lessee. Such unitization minimizes to some degree the effect of uncertainties of title since the validity of the unit is independent of the ownership of the land but if the unitization provisions of the act are administered and applied in the same manner as is the case with oil and gas they will probably not eliminate the most serious problems.

As mentioned above Sections 9 and 10 of the Conservation Act authorize the Commissioner to form units for drilling and production. Such units are limited to the area which may be efficiently and economically drained by a single well. The Commissioner allocates to each tract within such a unit that portion of the unitized production which constitutes the tract's "just and equitable share of the oil and gas in the pool."¹⁶ Units may be formed upon application of any interested owner after proper notice and hearing.¹⁷ The term "owner" as used in the act refers to one possessing the operating rights to the tract of land.¹⁸ The costs of development and operation chargeable to the other owners of the unit by the operator (who is appointed by the Commissioner) may also be fixed by the Commissioner.

The owner of each tract within a unit is, in substance, considered to be a co-owner of the unitized formation and entitled to fully participate in the operations through the unit operator who acts somewhat as his agent.¹⁹ He is considered to own the share of the production allocated to his tract and may dispose of it as he sees fit.²⁰ The respective rights of persons possessing mineral or royalty interests in a tract within a

unit are determined as though the unit well were located on the tract and was producing the share production allocated to the tract at a cost equal to the tract's part of the unit costs.²¹

It is generally thought that the operator of the unit may not recover for the cost of development and operation chargeable to the other owners of the unit except out of the unitized production in the absence of an agreement with them for the drilling or operation of the unit well. The court in one instance permitted recovery directly from such a nonconsenting owner - but in that case the decision appears to have been based upon the fact that the nonconsenting owner was instrumental in obtaining the order which created the unit.²² There appears to be no basis, statutory or otherwise, for charging the costs of a dry hole or other unsuccessful well to the owners of a unit who do not consent to or participate in its drilling.

The act does not specify how the owners of a unit are to decide whether and under what terms wells are to be drilled or operated. In practical operation as mentioned above, the Commissioner seldom forms a unit until a well has already been drilled and completed in a producing formation.

The fact that the cost of a dry hole must be entirely borne by the parties drilling it, coupled with the probability that the Commissioner will form a unit encompassing the productive area surrounding the well if it is successful, makes it almost imperative for an operator who contemplates drilling a well to control the area around the well which is likely to be placed in a producing unit, or failing that, to secure

participation in the venture of the owners of the operating rights within the area.

This has not presented undue problems to the oil and gas industry. There are a number of factors which tend to encourage agreement among lessees for the joint development of oil and gas ventures. In the first place the relatively short primary term of modern leases and the high cost of delay rentals tend to discourage a lessee from holding a lease for an unduly long period and speculating on the efforts of others. The fact that each owner of a unit may separately dispose of the unit production, the relatively small size of the units, the potential for high profits if the well is successful, the ability to predict the costs of a dry hole and the high costs of drilling in the face of a relatively high risk of failure has generally encouraged operators to negotiate agreements for joint operation with the other parties owning interests in a potential unit. Where some do not desire to directly participate in the drilling those who do may obtain "farm outs" or subleases from the nonparticipating interests by offering overriding royalties, carried interests, net profits interests, or other production sharing arrangements in the event of success. This to some degree permits the risks and rewards of the venture to be indirectly shared by the nonoperating party. Finally, the potential for a high rate of return if the venture is successful has permitted parties to tolerate the presence of a modest amount of acreage which is getting a "free ride".

If the unit which is ultimately formed includes owners who did not participate in the drilling of the well the terms and conditions of their

participation in its operation are also resolved by negotiation. The general acceptance of the basic provisions of industry sponsored operating agreements (such as the AAPL Model Form Operating Agreement), the largely routine nature of oil and gas operations after a well is completed and the relatively low ratio of operating cost to income has tended to reduce conflict and encourage agreement. Highly standardized accounting methods in the industry and the use of "outside" contractors and service companies whose efforts represent most of the costs incurred in the drilling and completion of wells also tend to limit arguments about reasonableness of operating or drilling costs to the amounts chargeable by the operator for "overhead" or similar items. Resort to the Commissioner seldom occurs even for the determination of well costs. Parties who will not agree to a formal arrangement with a unit operator are customarily "carried" by the operator who deducts from their share of the revenues what he believes to be the reasonable costs of drilling and operating the well. If those charges are consistent with what has been paid by other parties who have entered into an operating agreement with the operator there is, in most cases, little that the nonconsenting owner can or will do. The agreement by other parties to the charges will ordinarily constitute substantial evidence of their reasonableness and will tend to place the nonconsenting party in about the same position as if he had signed an agreement. In practical operation the absence of a formal agreement by owners of a unit seldom becomes relevant after the well is drilled unless some exceptional step, such as reworking or deepening is contemplated. In those cases the matter is also left to negotiation

among the parties. If the owners of a unit cannot agree to such action, those who wish to proceed must decide whether the risk of the venture warrants "carrying" the nonconsenting parties. Activities of the type mentioned ordinarily occur after an existing well has ceased to produce and most of the parties face termination of their rights by the lapse of production. Lessees who do not desire to actively participate in such additional efforts to restore or obtain production still have some incentive to assign their rights to those who are willing to take the risk and keep a greatly reduced interest in the production. This also enhances the possibility of agreement.

Mention has been made of the second kind of unitization permitted by the Conservation Act. This is found in Section 5C which authorizes the Commissioner to unitize an entire pool or several pools in the same field.²³ As previously mentioned, Section 5B which authorizes the ex parte field-unitization appears to be limited to those cases requiring recycling of natural gas. It does not appear applicable to the geothermal resource. A pool is defined as an underground reservoir containing a common accumulation of crude petroleum or natural gas.²⁴ Each zone in a separate structure which is completely separated from any other zone in a structure is a "pool".²⁵ A "field" is defined as the general area which is underlaid or appears to be underlaid by at least one pool. It may relate to two or more pools.²⁶ The statute does not specifically define what relationship is required between several pools to constitute a "field" although it does refer, in defining pools, to "zones in a structure". The Commissioner has generally considered a field to be the

area encompassing a number of separate reservoirs or pools if the same geologic structure or trap is the cause of their accumulation. The act permits unitization of separate pools so long as they are in the same field. This should permit the Commissioner, under the Geothermal Resource Act and Section 5C of the Conservation Act to unitize an entire geopressed formation or zone even if it is fragmented into a number of discrete pools or reservoirs as a result of faulting or to unitize any one or more of the individual reservoirs.

One finding which the Commissioner must make before a multi-well unit covering a pool or field can be established under Section 5C is that the owners of at least seventy-five percent of the operating interests and of seventy-five percent of the royalty interests underlying the area to be unitized have approved a written contract for the unit operation.²⁷ Furthermore, the Commissioner has no authority to vary or alter the terms of the agreement nor to impose any terms or conditions upon the nonsigners of such an agreement which are more onerous than those set out in the contract.²⁸ Therefore, while the act appears to authorize the Commissioner to unitize a pool it really permits seventy-five percent of the owners of the interests in a pool to unitize it over the objections of the remaining twenty-five percent if the Commissioner finds the agreement meets the other standards required by the act.²⁹ These are:

1. The unit must be reasonably necessary for the prevention of waste and the drilling of unnecessary wells and appreciably increase the ultimate recovery of oil and gas from the affected pool or area to be unitized.

2. The unit must be economically feasible.

3. The allocation to each separate tract within the unit of a proportionate share of the unit production must be such as to insure recovery by the owners of that tract of their just and equitable share of the oil and gas in the unitized area.

The act also prohibits the Commissioner from requiring a person who has not agreed to the plan to contribute to the costs of development or operation except out of the proceeds of production. This in substance means that those parties who have agreed to the plan must bear most of the risks of its failure.³⁰

In practical operation field wide units are never formed until a reservoir has been substantially developed and it is reasonably certain that unitization may serve to enhance the ultimate recovery from it. In the absence of a reservoir wide unitization the Commissioner allocates the reservoir's entire production among the various single well units by his power to fix the amounts which each well in a reservoir may produce.

In summary, as applied to the geopressed resource the Commissioner appears to have authority under Geothermal Energy Resources Act to form units for individual wells. Pool or field wide units may be formed only if seventy-five percent of the owners of the pool (both operators and royalty owners) have agreed to a plan of unitized operation.

Under both forms of unitization, as they operate in the petroleum industry, much is left to private negotiation. Whether the economic and technological factors which have tended to encourage agreements for joint operation of oil and gas wells will be at work to the same ends in

the case of the geopressured resource is by no means certain. The size of a geopressured unit would appear to be much greater than the average oil and gas unit. The resource itself appears to offer less risk in the exploratory stage but greater risks in the operating stage. Its development may be more capital intensive and afford a lower rate of return than is expected in the oil and gas field. The energy produced, if in the form of heat and pressure, may not be capable of separate utilization but will require all operators to agree to dedicate it to a single use. The extent to which these and the other factors which have been previously mentioned may create problems to the development of the resource will be definitely ascertainable only after more is learned about the resource and the methods of its production and use. At present however, the facts which are known, at least in the authors' opinion, would indicate that cooperative development of a geopressured reservoir, while probably proving to be no less essential to its development than is the case in the oil and gas industry, will present greater obstacles and may be much more difficult to achieve.

III. POSSIBLE SOLUTIONS TO THE PROBLEMS OF LARGE SCALE DEVELOPMENT IN LIGHT OF THE GEOTHERMAL ENERGY RESOURCES ACT.

The most pressing legal problems which face the geopressured developer appear to be inextricably entwined with the necessity of obtaining the rights to a reservoir or a sufficient part of it to justify the kind of operation contemplated in the face of its almost certain unitization. The difficulty a developer may encounter in doing this will depend upon the degree of uncertainty he may experience in determining who owns

the geopressured rights, the expense and delays incurred in making such a determination, and the problems of negotiating acceptable leases on reasonable terms from the owners of the rights. The willingness of owners to lease at a reasonable royalty, the degree to which ownership of the area to be developed is fragmented, whether other operators possess rights to the same reservoir and if so, the extent to which they will cooperate in its development, and whether one well will support the project or whether several wells are required may also contribute to his problems.

If the present pattern which largely contemplates private leasing, negotiation of operating agreements and single well units proves to be unduly difficult or inordinately expensive so as to substantially impede or prevent the development of the resource, what alternatives might be devised to overcome the problems? Any really effective solution would seem to require some procedure by which operating rights to a significant part of a reservoir can be vested in a developer with a minimum of expense and a high degree of certainty, give to him the greatest freedom in conducting his activities and still preserve to the owners of the land a reasonable expectation of realizing on the value of the resource under their land.

The jurisprudence in Louisiana and elsewhere demonstrates that the state, although it does not own the resource or the right to appropriate it, may exercise almost plenary power over its development so long as the value of the landowner's rights are reasonably respected. Brief mention of some of the actions which have been sustained in this area

will indicate both the nature of the state's power and the type of regulation which may be feasible.

Shortly after the adoption of the Louisiana Conservation Act, an attack was made in Hunter Company v. McHugh³¹ upon the power of the state to unitize lands and to deprive the landowners of the right to individually drill wells upon their lands and produce oil and gas from them. The United Supreme Court had previously sustained the constitutionality of the regulation of drilling and producing activities by landowners in two cases: Ohio Oil Company v. Indiana³² and Walls v. Midland Carbon Company³³. These decisions based their holdings upon a recognition that the fugacious character of oil and gas requires that the owner of each tract of land under which a reservoir is located be considered as owning an equal but correlative right with his neighbors to produce from that reservoir. It was then concluded that the state, in recognition of this community of interest and the fugitive nature of the substances could regulate their development to insure that each owner may effectively enjoy his rights without unduly interfering with those of his neighbor. In short, it was assumed that there existed a form of co-ownership in the reservoir among the owners of the property under which it was located which the state could regulate. The court in the McHugh case relied heavily upon these principles and pointed out that in an earlier Louisiana case, Higgins Oil and Fuel Company v. Guaranty Oil Company, Ltd.,³⁴ the owner of an unplugged but abandoned oil well was required to cap it because it was, in some unknown manner, permitting air to enter the reservoir and interfering with the pumping

of oil on neighboring lands. In that case the court made the following comments, which were quoted with approval by the court in the McHugh case, relative to the substantive nature of a landowner's rights in Louisiana with reference to deposits of fugacious minerals:

"The rights of the several owners of the gas field are coequal; one owner cannot exercise his own right so as to preclude his neighbor from exercising his, or so as to interfere with the neighbor."

This principle has been legislatively confirmed in Article 9 of the Mineral Code which declares:

"Landowners and others with rights in a common reservoir or deposit of minerals have correlative rights and duties with respect to one another in the development and production of the common source of minerals."

The courts had also long recognized the state has a basic and legitimate interest in the preservation of its natural resources and may extensively regulate the manner of their development and require them to be cooperatively exploited to prevent their waste and dissipation.³⁵ The court in the McHugh case had no difficulty sustaining the unitization provisions of the Louisiana Act as constituting a reasonable legislative method of accomplishing those ends and preserving the basic rights of a landowner in the reservoir.

A good illustration of the extent to which a state may go in this regard is found in Act 513 adopted by the Louisiana Legislature in 1952. This act in substance provided that where land was owned in indivision by five hundred or more individuals any fifty of them could petition the State Mineral Board to have the property leased. Upon receipt of such a petition, the Board was authorized to lease the lands

by following the procedures by which public lands were leased. The lease was made binding upon all of the co-owners of the land. Shortly after the act was passed owners of such a tract of land petitioned to have their lands leased and the Board, after following the proper procedures, executed a lease.³⁶ One of the co-owners who did not join in the request, Belle Isle Company, had leased its interest to Sun Oil Company. Belle Isle and Sun attacked the constitutionality of the act as constituting a deprivation of their property without due process of law, a denial of equal protection of the laws, the passing of an ex post facto law, and the impairing of the right of contract. The latter two arguments were based upon the fact that the Sun lease was executed prior to the time the act was passed. The court sustained the act. Although it found that under Louisiana law Sun's rights were not vested because all of the co-owners of a tract must grant a lease before a lessee can conduct operations on the land, it also concluded that even if such rights were vested the state had ample authority to enact the law. Its reasons were summarized as follows:

"Finally, even were we to assume the present existence of private, though nebulous, contractual rights between Belle Isle Corporation and Sun Oil Company, it is patent that such rights are subordinate to the valid exercise by the state of its police powers. And it has long since been established that the state's police powers justify measures for the regulation of production of oil and gas and Ohio Oil Co. v. State of Indiana, 177 U.S. 190, 20 S. Ct. 576, 44 L.Ed. 729. It was on this basis that our present conservation statute, Act 157 of 1940 (now R.S. 30:1 et seq.), has been held to be non-violative of any provisions of either the State or Federal Constitution, see Hunter Co. v. McHugh, 202 La. 97, 11 So. 2d 495, appeal dismissed for want of a substantial Federal question, 320 U.S. 222,

64 S. Ct. 19, 88 L. Ed. 5, and Crichton v. Lee, 209 La. 561, 25 So. 2d 229, and it is well settled that, where valid orders of the Commissioner of Conservation are in conflict with private contractual rights, the latter must yield and are superseded by the former. Everett v. Phillips Petroleum Co., 218 La. 835, 51 So. 2d 87 (and cases cited therein) and Smith v. Holt, 223 La. 821, 67 So. 2d 93.

The only function of Act 513 of 1952 is to provide a method for the recovery of minerals in situations where, due to the large number of owners in indivision, exploration and production would otherwise be a practical impossibility. Such a measure, designed to benefit the state and all the co-owners affected, is clearly a valid exercise of the police power, much the same as is an order of the Commissioner of Conservation establishing compulsory drilling units, and private rights succumb thereto."³⁷

If one assumes that the owners of land over a reservoir each possess equal and correlative rights to its development and enjoyment there would appear to be little theoretical difference in a situation where a single tract over a reservoir is owned by so many persons as to render its development by conventional methods impossible and where the ownership of the land over a single reservoir is so fragmented and divided as to render its orderly development equally impracticable. If the state can legislate with reference to one of the situations it could presumably legislate for the other.

Mention might also be made of the Oklahoma Conservation Act³⁸ which although similar in many respect to Louisiana's provides that under certain circumstances the owner of an unleased interest in a unit may be required to participate in the drilling of the drilling of the well on the unit by contributing in advance to its costs or be forced to lease his land to the operator for a bonus and royalty

which is fixed and regulated by law. The constitutionality of this has been upheld on substantially the same grounds as those relied upon by the Louisiana Court in sustaining Act 513 of 1952.³⁹

Based upon these decisions and the many others recognizing the paramount interest of the state in the conservation of its natural resources and the encouragement of their orderly development, it would appear that the state would have authority to unitize a geopressured resource and then to lease or license its development to an operator who would possess full operating rights in it. It could further fix the landowner's interest in the unit on what is essentially a royalty basis. The constitutionality of such a provision would appear to be satisfied by a legislative determination that it was reasonably necessary to ensure the efficient and economic development of the resource in the public interest. The arrangement would have to reasonably protect the landowners and secure for them the value of the rights which they possess but this would not appear to be an insurmountable obstacle.

A lesser approach might be to give the Commissioner authority in those instances where the ownership of the land, reservoir or unit is so fragmented as to make it practically impossible to secure its orderly development or where it appears that the owners of the unit or an area are unable to agree upon a plan of development, to authorize its development in accordance with a plan he believes best suits the public interest of the state, preserves the value of the geopressured resource, and promotes its most efficient and effective utilization.

The Commissioner is presently given power to require unitization of a gas reservoir under Section 5B of the Conservation Act without the concurrence of seventy-five percent by its owners which is required under Section 5C for field wide units generally, if recycling of gas in the reservoir is required to prevent waste and avoid the drilling of unnecessary wells. This provision, because of its explicit nature would not appear to be applicable to the geopressured resource even by reference under the Geothermal Energy Resources Act, but it does establish a precedent which might be used as a model for approaching the problems of developing a geopressured reservoir.

A third and more modest approach might well be a substantial reduction in the percentage of persons required to consent to a field wide unitization and perhaps some modified arrangement for fixing the interest of nonconsenting owners on a royalty basis.

Whether and to what extent a modification of the leasing pattern and the unitization provisions is required or appropriate is difficult to now determine. The dilemma presented, however, is that if a decision on the matter is deferred until the development of the resource is undertaken and one gains a better understanding of the problems, the existence of vested rights or the presence of persons who have made substantial investments in geopressured leases upon the assumption that private development by individual lessees operating independently will be permitted, would render much more difficult any modification of the present pattern.

FOOTNOTES TO CHAPTER VII

1. Act 71 of 1906.
2. *Watkins v. Atlanta and Shreveport Oil and Gas Company* Docket No. 19315 (unreported, 1913)
3. 150 La 756, 91 So. 207 (1922)
4. *Id.*
5. Handbook on Unitization of Oil Pools 10 (1930)
6. *Id.* at 15
7. Act 144 of 1908
8. Act 252 of 1924.
9. Act 13 of 3rd E. S. of 1935.
10. American Bar Association, Legal History of Conservation 61, (1938)
11. Act 225 of 1936.
12. This was incorporated into title 30 of the Revised Statutes of 1950.
13. R.S. 30:2
14. R.S. 30:4B
15. See Willcox v. Shell Oil Co., 226 La. 417, 76 So. 2d 416 (1954); Union Oil Co. v. Touchet, 229 La. 316, 86 So. 2d 50 (1956); Mallet v. Union Oil & Gas Corp of La., 232 La. 157, 94 So. 2d 16 (1957); Humble Oil & Ref. Co. v. Jones 125 So. 2d 640 (La. App. 3d Cir. 1960), *aff'd on rehearing* 157 So. 2d 110 (La. App. 3d Cir. 1963); McDonald v. Grande Corp. 148 So. 2d 441 (La. App. 3d Cir. 1968).
16. R. S. 30:9.
17. R. S. 30:6.
18. R. S. 30:3(8).

19. The act does not directly authorize the appointment of an operator. However, Article 10, which authorizes the involuntary pooling of interests of units where the parties cannot agree to the allocation of production permits him to fix the amounts chargeable "by the operator" to the other parties. It has been the universal custom of the Commissioner to designate the operator of the well in his order. The precise relationship of the operator to the other parties is not entirely clear, but it is obvious he stands in some sort of representative or fiduciary capacity since he is operating property belonging to others.
20. See Desormeaux v. Inexco Oil Co. 277 So. 2d 218 (La. App. 1973) appeal after remand for trial 298 So. 2d 897 (1973); Alexander v. Holt 116 So. 2d 532 (La. App. 1960); Smith v. Holt 223 La. 821, 67 So. 2d 93 (1953).
21. State ex rel. Superior Oil Co. v. Texas Gas Transmission Corp. 242 La. 315, 136 So. 2d 55 (1961). Hardy v. Union Producing Co. 207 La. 137, 20 So. 2d 734 (1945).
22. Superior Oil Co. v. Humble Oil & Refining Co., 165 So. 2d 668 (La. App. 1964) writ refused 246 La. 842, 167 So. 2d 668.
23. R. S. 30:5(C).
24. R. S. 30:3(6).
25. Id.
26. R. S. 30:3(7).
27. R. S. 30:5(C).
28. Id.
29. Id.

30. Id.
31. 202 La. 97, 11 So. 2d 495 (1942).
32. 177 U. S. 190, 20 S. Ct. 576, 44 La. Ed. 729 (1899).
33. 254 U. S. 300, 41 S. Ct. 118, 65 L. Ed. 276 (1920).
34. 145 La. 233, 82 So. 206 (1919).
35. For a discussion of unitization generally and the constitutional questions it raises see Myers, The Law of Pooling and Unitization, 2d ed. 1967.
36. It is generally believed that the act was passed for the purpose of facilitating the leasing of the particular land involved in this transaction. The act was repealed shortly after the lease in question was executed, by Act 358 of 1960.
37. Sun Oil Co. v. State Mineral Board, 231 La. 689, 92 So. 2d 583 (1956).
38. 52 Oklahoma Statutes 87.1 et seq.
39. Anderson v. Corp. Comm. 327 P. 2d 699 (Okla. 1957) appeal dismissed for want of a substantial federal question, 79 S. Ct. 536, 358 U. S. 642, 3 L. Ed. 2d 567 (1959).

CHAPTER VIII

ENVIRONMENTAL CONCERNS AND THE GEOPRESSURED RESOURCE

I. IN GENERAL

The two principal environmental problems which appear to be uniquely presented by the geopressured resource are the effect upon the surface which may result from the withdrawal of massive amounts of water, and the consequent difficulties engendered by the disposal of the water.

A. The Problem of Subsidence

The risk of surface subsidence or the activation of faulting, which will cause the same result, is of major concern. Although the magnitude and risk of such subsidence may be relatively minor, its consequences are apt, in Louisiana at least, to be serious. Many of the reservoirs having potential for geopressured development appear to be located in the coastal marsh areas and even the most inland reservoirs appear to be near or under lands where rice is a major crop. In either case a relatively minor dislocation of surface contours or sinking of the land could result in extremely serious environmental consequences.

Neither the Geothermal Energy Resources Act nor the Louisiana Conservation Act explicitly gives authority to the commissioner to regulate the matter. However, section 803 of the Geothermal Act does mandate that "a lessee of a geothermal lease or an owner shall conduct his . . . operations using all reasonable precautions to protect the environment and prevent . . . other environmental damages . . ." This appears to be broad enough to permit the commissioner to assert regulatory authority over the matter, although the criteria for determining both "reasonable precautions" and "environmental damage" are not specified.

Section XIX of the commissioner's proposed rules disclose his obvious concern for the matter and at least implicitly represents an assertion of authority to regulate it. These provisions state:

Section XIX - Subsidence

A. The operator of a proposed geothermal well is responsible for establishing representative elevations of the land surface in the area of the proposed development. Plans for establishing these reference elevations must accompany the Application for a Permit to Drill the well.

B. Surface elevation of the wellhead will be determined in accordance with U.S.G.S. standards for Fourth Order Leveling and will be filed with the Completion Report and annually thereafter.

C. A gamma ray-neutron log including a collar locator log will run from total depth to the base of the previous casing string and filed with the Completion Report.

D. If in the opinion of the Commissioner there is evidence of subsidence, the Commissioner shall have authority to require a hydrogeologic study or such other actions as he deems necessary.

Subsidence is defined in Section I-S of the proposed regulations

as:

S. Subsidence is the net (lowering) in elevation of the land surface during a specific time interval. Usually calculated as a change in elevation of bench marks between successive surveys. May be the composite change resulting from various natural and man-made causes. (B. E. Lofgren, 1977, Background studies for appraising subsidence in the Texas Gulf Coast Region. U.S. Geological Survey Open-File Report 77-412 in cooperation with ERDA, p.8.).

This definition recognizes one of the problems in determining the environmental consequences of producing the geopressed resource. The process of deposition which created the resource is a continuing one and the entire coastal area of Louisiana appears to be gradually subsiding from the weight of the sedimentation which is being poured into the Gulf. It may be difficult to sort out the effects, if any, of geopressed production from those resulting from natural processes if subsidence is found to be occurring. The apparent purpose of the requirement in

Section XIX of the regulations that a gamma ray neutron log, including a collar locator log, be run on each geopressured well is to assist in this process by providing base data against which subsequent logs may be evaluated. However, it is somewhat doubtful that if one is dealing only with one or two feet of subsidence over a large area, such data would constitute more than corroborative evidence as to the cause of the subsidence. Base line elevations of the area around the well are also required by the regulations. If the area surrounding the geopressured well is the subject of subsidence, such data may permit a determination as to whether the focal point of the subsidence is the well or whether there is a general lowering of all points with no particular or significant concentration near the well. These facts may prove to be highly influential in determining whether subsidence is being caused by the production. Although the proposed regulations require the monitoring of the area of the reservoir to determine if subsidence is occurring over a geopressured area neither the law nor the regulations purport to establish any guidelines as to what action the commissioner may take if it is determined that subsidence is occurring, nor are any criteria established for ascertaining whether such subsidence may or may not be "acceptable" as a matter of environmental concern.

The subsidence problem is further complicated by the fact that the matter must not be considered exclusively a question of regulatory concern or control by the commissioner. Reference has been made in Chapter V to the approach of the Louisiana courts to injuries suffered by property owners from activities conducted upon neighboring lands. Article 667 of the Civil Code provides, as there noted, a rather inflexible and absolute standard for such conduct. Once the court concludes that the damage is being caused and that it exceeds mere inconvenience it will give rise to

either damages or injunctive relief. The geopressure operator would thus appear to be faced with the possibility of private suits for damages or injunctions brought by persons who believe their lands have been injured from supposed subsidence brought on by the geopressed activities. This would appear to be possible even if the commissioner is satisfied that the operator is taking "all reasonable precautions" and that the effect, in the aggregate, of such subsidence does not unduly create environmental consequences which outweigh the benefit derived from the resource. Furthermore, the risk of private action is enhanced by the manner in which Section 803 of the Act is couched. It does not direct the commissioner to regulate geopressed activities in such a manner as to minimize or control adverse environmental affects. Rather it seems to place the duty directly upon the operator to conduct his activities using all reasonable precautions "to prevent environmental damage". This could, and probably will, be construed by the courts as establishing a standard of conduct which may be enforced by private action and may serve as a basis upon which absolute liability could be imposed under the principles discussed in Chapter V.

The experience in Louisiana with actions brought by individuals who suffer damages from causes such as escaping brine or seismic explorations has demonstrated a tendency by the courts to allow the plaintiff to present a rather simple cause-effect relationship by proving the damage occurred contemporaneously with or shortly after the activity complained of, and then to place the burden upon the defendant to prove another or more likely explanation of the cause of the injury. If one assumes that geopressed activity is undertaken for a period of time and subsidence occurs in the area, it is not unlikely that the operator will have the burden of establishing that the exclusive cause of such subsidence was something

other than his own operations. The precise theory upon which such liability is based is somewhat in the state of flux. In one case, Fontenot v. Magnolia Petroleum Company,¹ the court based recovery squarely upon a violation of Article 667 of the Civil Code, and imposed absolute liability. A later case Langlinois v. Geophysical Service, Inc.,² distinguished the earlier case on the grounds of Article 667 applied only to adjoining landowners, the operator in the latter case being merely a contractor. However, even in that case the court found that the doctrine of res ipsa loquitur applied and imposed liability upon the defendant who was unable to demonstrate that the damages complained of could have occurred from any other cause. Furthermore, the case did not preclude the applicability of absolute liability under Article 667 in cases where the person causing the damage is a lessee or owner of other property rights.

The official comments to Article 8 of the Mineral Code perhaps best explain the state of the jurisprudence on this matter:

Regardless of the theory utilized to dispose of cases involving liability for conduct of oil and gas operations, two conclusions emerge. One is that the jurisprudence indicates a strong tendency to impose liability on the operator for damage to persons or to adjacent or neighboring property resulting from the conduct of otherwise lawful operations when they are inherently dangerous. The second is that the conceptual articulation of this result has not been of great importance. The Fontenot decision utilizes the language of Article 667 to impose strict liability for operations entailing blasting. The Watkins case utilizes negligence concepts to impose liability for damage resulting from a blowout and holds that the facts of the case required application of the doctrine of res ipsa loquitur. Because the conceptual approaches of these cases vary while the results are the same, it can be further concluded that the courts are giving great weight, in keeping with the national trend, to the hazardous aspects of oil and gas operations, with the result that a high degree of responsibility is placed upon such enterprises when they involve inherent risks of damage through escape of oil or gas or the use of explosives.

In essence, this is simply a tendency to examine the nature of the enterprise involved rather than property relationships, which is the substance of the principle specified in Article 667 of the Civil Code.

As noted, Article 8 does not attempt, and it is felt that as a rule legislation should not attempt, a full definition of the rules governing the landowner's freedom to operate and his liability for abuse of his property rights. Thus, the general law should be allowed to control such questions. The unsatisfactory condition of present law is more than offset by the extreme dangers involved in attempting to define rules which would be applicable not only to the petroleum industry but to all other mining industries which might be affected. Additionally, it appears unwise in terms of basic policy to remove mining activities from the ambit of the general law except when necessary to accommodate peculiarities warranting a distinction.

One possible bright spot in the picture for the operator is that the Louisiana courts have generally held damages to land which are an ordinary consequence of a lessee's operation, prudently conducted, give rise to no liability on the lessee's part to the lessor.³ This is on the theory that by permitting the activity the lessor must be deemed to have consented to the consequences of that activity. Whether or not this would shield a lessee from delictual or other responsibility to the landowner under whom he holds a lease, if subsidence occurs, is not clear. Under existing principles it should do so and thus relegate the matter again to the regulatory sphere. This also then would imply that field wide unit operations may be the most desirable mode of development since each landowner or lessee in the field is deemed to be conducting the operations upon the lands on which he holds a lease, and the relationships between the lessees and lessors would be regulated as though the activity were being conducted on such lands.

One final observation is in order. The principal difficulty with the subsidence problem may not be its environmental consequences, which may in fact prove to be inconsequential, but the dampening effect upon the prospective investors or developers of a geopressured reservoir

resulting from the uncertainty of whether it will occur and the consequences it may have. The ability to predict with a reasonable degree of certainty whether, and to what extent subsidence may result from production of a geopressured reservoir may become a most important factor in encouraging the development of the resource.

B. Disposal of Waste Waters

The other principal environmental concern which may present special or unique difficulties is associated with the disposal of the large quantities of water which will apparently be produced by geopressured operations. Although it has been postulated that the dissolved solids in a geopressured aquifer may increase with depth in the aquifer and that the upper parts of such a reservoir may contain relatively pure or brackish water, the necessity for producing the entire column of the reservoir in order to procure the high rates of production needed for the venture will probably dictate that most if not all of the water produced will be fairly high in dissolved solids. Surface disposal of such water appears to be impracticable.

Several state laws combine to prohibit the disposition of saline or other water into the rivers and streams of the state. R.S. 56:1451 prohibits the introduction into any natural stream of "any salt water . . . in quantities to destroy the fish therein". R.S. 56:1462 prohibits a person from discharging into a stream any substance which causes "water pollution". This is defined in R.S. 56:1461 as follows:

"Water pollution" includes the introduction into state water bodies of any substance in concentration which results in the killing of fish or other aquatic life in numbers or in a manner materially detrimental to the interests of the state or renders the water unfit for maintenance of the normal fish or aquatic life characteristics of the waters, or in any way adversely affects the interests of the state in respect to its fish or other aquatic life.

The Louisiana Stream Control Commission has basic jurisdiction over the pollution of the rivers and streams of the state.⁵ It has issued rather extensive regulations which are set forth hereafter, for the disposal of what are referred to as "oil field brines".⁶ Although these regulations do not directly control the geopressed resource there is no reason to believe that they would not be extended to them if an operator should attempt to dispose of brines or mineralized waters from a geopressed reservoir in the quantities under consideration into the rivers and streams of the state.

Civil Code Article 660⁷ has already been mentioned in connection with the discussions in Chapter V as to the liability of operators on land. It provides as follows:

It is a servitude due by the estate situated below to receive the waters which run naturally from the estate situated above, provided the industry of man has not been used to create that servitude.

The proprietor below is not at liberty to raise any dam, or to make any other work, to prevent this running of the water.

The proprietor above can do nothing whereby the natural servitude due by the estate below may be rendered more burdensome.

This has been construed to prohibit increasing the burden on other lands not only by increasing the flow in the water which runs through natural drains but by the introduction of foreign substances into the natural drainage system:

The most serious question presented is whether defendants' use of the servitude of drain for disposal of effluent has caused plaintiffs damages which are compensable and whether or not the damages are such that plaintiffs are entitled to an injunction to prevent the continuation thereof. . . .

We are of the opinion that the installation of the sewage disposal plant on defendants' property with the accompanying discharge of the effluent into the system of drainage has created a substantial change in the servitude of drain, rendering it more burdensome on plaintiffs. The evidence convinces us that this is more than just an inconvenience which should be borne by the owner of the servient estate as urged by defendants.⁸

Although an injunction will not necessarily be granted in a case where the court concludes an award of damages may adequately compensate one for the injury or inconvenience resulting from the introduction of foreign substances into the streams running through his land, it must be noted that the presence of this article as well as article 667 in the related sections of the Code are adequate even in the absence of environmental legislation to make the disposal of such waters extremely hazardous and unlikely from the operators point of view.

It would accordingly appear that subsurface disposal, or perhaps the disposal into the deep gulf waters if that can be done without adverse consequences, is the only practical solution to the problem. Regulation of the subsurface disposal of water is granted under the Geothermal Resources Energy Act to the Commissioner of Conservation.⁹ The proposed regulations of the commissioner set forth rather extensive rules as to how this is to be done. Article XIV provides as follows:

A. Disposal of all geothermal/geopressured operation waste material into the surface waters of the State shall be done pursuant to and under the control of regulations and procedures set forth by the Stream Control Commission or other appropriate state or federal agencies having control over such surface disposal.

B. Produced salt water and related waste material may be sorted in pits where such pits have been approved of by the Commissioner of Conservation.

C. Produced salt water shall not be disposed of into a zone producing or productive of hydrocarbons unless such disposal is approved by the Commissioner of Conservation after a public hearing or unless prior approval has been granted to use the proposed zone for salt water disposal.

D. Prior to disposing of salt water by injecting same into any subsurface formation a permit therefor must be obtained from the Commissioner of Conservation. Such permit may be issued by the Commissioner without a public hearing when the applicant has complied with the following requirements:

(a) Application (in the form of a letter) for a permit for underground disposal of salt water produced from wells shall be submitted in duplicate to the appropriate District Manager. Such application shall include or be accompanied by:

1. An electrical log of the well with the proposed zone marked in the case of a well already drilled. A statement of the proposed zone to be used for disposal and the approximate depth of said zone in the case of undrilled wells.
2. A plat showing the location, or proposed location, of the disposal well.
3. A statement of estimated daily volume of salt water to be injected.
4. A statement of other known instances in which the proposed disposal zone has been used for salt water disposal.
5. A statement by the applicant that such disposal well will be completed in a manner to insure that the disposal products are injected into the proposed injection zone and that provision has been made for adequate protection of fresh water sands and other zones of commercial value. A schematic diagram of the disposal well showing the casing and cementing program shall be attached together with an explanation thereof. Where only one string of casing protects fresh water sands, a packer shall be set on tubing at a depth below fresh and brackish water sands, or some other method of completion which would insure adequate protection of fresh water sands. Adequate provision must be made to insure that the casing is set below the base of fresh and brackish water sands.
6. A permit for annular disposal of salt water may be issued for an interim period of one (1) year provided the applicant has complied with the procedure outlined herein.
7. In areas of questionable sand or zone correlations, (typical example being the Wilcox Zone) an operator desiring to dispose of salt water into one such zone, shall first consult with all offset operators in the field in an effort to resolve the correlations. Should these operators agree that the zone sought for injection of salt water is not connected with or a part of a hydrocarbon bearing sand, such operator may obtain authority

from the Commissioner of Conservation through administrative procedure for disposal into such sand provided the application is accompanied with evidence of concurrence by said offset operators. Should these operators fail to agree then the operator seeking such authority may make application for public hearing as provided for in section 3 hereof.

8. The Louisiana Geological Survey shall check each permit application and advise in writing the appropriate District Manager, the Baton Rouge Office and the applicant of approval or denial. If denied, the reason for denial shall be given. The District Manager will issue the Work Permit when approval is granted.

9. The Commissioner of Conservation shall cause an inspection to be made of each completed disposal facility to insure compliance with this Amendment. A copy of the inspection report shall be left with the operator or his field representative.

10. If any request for permit is denied by the Commissioner of Conservation, the applicant shall be granted a reasonable period of time to either construct or make arrangements for other adequate disposal facilities.

11. A reasonable estimate of the amount of salt water injected annually into each disposal well shall be reported to the Louisiana Geological Survey with a copy to the appropriate District Manager, such report to be filed during the first quarter of the next calendar year. This shall not be applicable to secondary recovery projects where the amounts injected are already required to be reported to the Department of Conservation.

12. Exceptions to this Amendment may be granted without a public hearing upon written request by an operator to the Commissioner of Conservation and upon showing that good cause therefor exists. Such exceptions may be granted administratively provided that inspection of the disposal facilities does not disclose any salt water damage or pollution. If pollution or surface damage is detected, production from the well or wells shall cease until compliance with the provisions of this Amendment is accomplished and the Commissioner of Conservation then grants the exception requested.

The definition of pollution is set forth in the rules of the commissioner in subsection I-N:

Pollution shall mean such contamination or other alteration of the physical, chemical, or biological properties of any waters of the State including change in temperature, taste, color, turbidity, or odor of the waters or such discharge of any liquid, gaseous, solid, radioactive, or other substance into

any waters of the State as will or is likely to create a nuisance or render such water harmful, detrimental, or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.

Finally the "waters of the state" as referred to in subsection I-0 are defined in the following subsection, as follows:

Waters of the State shall mean all waters within the jurisdiction of this State including all streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulation of water, surface and underground, natural or artificial public or private, situated wholly or partly within or bordering upon the State, excepting waters and sewage systems; treatment works of disposal systems, water and potable water distribution systems; and water withdrawn for use until such time as all uses and final treatment have been completed.

It should be noted from these provisions that the commissioner's rules reflect three basic concerns which appear to be absolutes in terms of the consequences which must be avoided in the disposal of the water. First, it is obvious that disposition may not be made into fresh or "brackish" water sands. Secondly, such disposition may not impinge upon or adversely effect the production of hydrocarbons from the sands into which the water is being injected. Finally, adequate procedures must be followed in the completion of the facilities to make it reasonably certain that no leakage or other escape of the water will occur in the injection process.

It is beyond the scope of this paper to determine to what extent these may create technological problems to the operator. They will obviously raise formidable economic questions if the operator is to dispose of the water into the subsurface sands lying below fresh water aquifers. Obviously the injection sands must be such as to accept, over the life of the well or project, the large quantities of water which will have to be produced in order to make the geopressured project a success. The inability to dispose of the water by any alternative

method is apt to make it extremely critical that the ability of the injection sands to accept the water be predictable with as much certainty and as with the same degree of assurance as the life of the geopressed reservoir and its potential productivity. Uncertainty as to the continued ability of the injection sands to accept the water may raise the same problems as uncertainty as to the life of the reservoir. Again the degree to which technology may be able to answer this question may be critical to the encouragement of the resources development.

No mention has been made of the possible complications the Safe Drinking Water Act may engender. The requirements of this act are well know and well publicized elsewhere. Insofar as they pertain to the sub urface disposal of water they may be said to be in a state of flux. However, if one assumes that under State regulations the disposal of the water will not be permitted to be made into fresh or even brackish aquifers and will have to be made at depths which will insure the integrity of those aquifers, it is difficult to believe that any prospective Federal rules or regulations will present undue or insurmountable additional difficulties to the operator.

II. THE COASTAL ZONE MANAGEMENT ACT

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Brief mention should be made of the Coastal Zone Management Act. This act establishes the framework for a comprehensive plan regulating the use to which coastal lands may be put. It, in substance contemplates a comprehensive "zoning" system for the coastal zone to regulate the location and requirements for various kinds of development which may in the future occur in this sensitive area. The Act has not yet been implemented and extensive revisions of it will be presented to the

forthcoming legislative session. Until further action is taken it is not possible to predict with any degree of accuracy what effect the act may ultimately have upon the development of the resource. The presence of extensive oil and gas development and the importance of that development to the state should assure that reasonable standards for mineral development will be adopted and implemented. Steps should be taken to assure that the geopressured resource is considered when the regulations are considered under any act which is ultimately adopted.

III. OTHER ENVIRONMENTAL REGULATIONS

In addition to the problems of subsidence and salt water disposal there are other environmental considerations which must be taken into account by the developer. No mention is made of the extensive general federal statutes which may be applicable to the geopressured development. These have been compiled and are adequately discussed elsewhere.¹⁴ On the whole these are not unique or peculiar to the geopressured resource but are common to all types of industrial or mineral development.

Although Federal statutes and regulations are pervasive in the field of environmental law, all states have enacted at least some environmental legislation. Louisiana does not have a coordinated system for environmental protection, relying instead on a number of state and local agencies to carry out specific, somewhat limited functions. Some of these agencies are not fulfilling their statutory mandate, and others are totally inactive. Because of the local character of much of the legislation and the erratic nature of its enforcement the geopressured developer should carefully check with local agencies in his area before proceeding with development.

The following compilation presents the pertinent parts of those acts and regulations which may affect the development of the geopressured resources and which are not directly or specifically applicable to it.

All statutory references are to the Louisiana Revised Statutes of 1950.

Which, if any of these provisions will have to be complied with will obviously depend upon the nature of the activities contemplated for the development and utilization of the geopressed resource and the area in which such activities occur. Except for the problems associated with the disposal of the geopressed water which is discussed above there appear to be few unique or special problems under these acts which would confront the geopressed developer.

IV. STATE AGENCIES

A. Department of Wildlife and Fisheries

This Department was created by the Executive Reorganization Act of 1976 (Act 513) and incorporated several independent boards and commissions into a single Executive Department. The Department is generally empowered to supervise programs for the preservation of wildlife, fish and aquatic life, and to control water pollution as specifically authorized. The Act established within the Department the:

1. Office of Wildlife - Administers programs of research on wild birds, game and aquatic life, and administers certain wildlife refuges.

2. Office of Coastal and Marine Resources - Administers and enforces programs relating to oysters, waterbottomers and other seafoods; has responsibility for performing water pollution control functions as designated by the Secretary of the Department, particularly those laws relating to the control of waste disposal into state waters.

a. Drainage of Noxious or Poisonous Substances into Natural Waterways and Canals, R.S. 56:1451 et seq. (1950).

56:1451 Drainage of oil , salt water , or noxious or poisonous gases or substances into natural streams destroying fish prohibited:

No person shall knowingly and willfully empty or drain or permit to be emptied or drained from any pump, reservoir, well, or oil field into any natural stream of the state any oil, salt water, or noxious or poisonous gases or substances in quantities sufficient to destroy the fish therein.

56:1452 Director of the Louisiana Wildlife and Fisheries Commission to supervise drainage

The director of the Louisiana Wildlife and Fisheries Commission shall supervise all drainage of salt water and other noxious substances into the natural streams of the state. Any owner or operator of oil producing property or oil tanks or reservoirs discharging salt water or any other noxious substances into natural streams of this state in quantities sufficient to kill the fish therein shall, when notified by the director of the Louisiana Wildlife and Fisheries Commission, immediately impound such substances. Substances so impounded may be released by permission of the director.

56:1453 Penalty for violation of Part:

Whoever violates the provisions of this Part, whether acting for himself or for others, shall be fined not less than one hundred dollars nor more than two thousand dollars, or imprisoned for not less than thirty days nor more than three months, for each offense.

Each day that such substances are permitted to flow into the streams constitutes a separate offense.

b. Pollution of State Water Bodies: R.S. 56:1461-63.

56::1461 Definition

"Water pollution" includes the introduction into state water bodies of any substance in concentration which results in the killing of fish or other aquatic life in numbers or in a manner materially detrimental to the interests of the state or renders the water unfit for maintenance of the normal fish or aquatic life characteristics of the waters, or in any way adversely affects the interests of the state in respect to its fish or other aquatic life.

56:1462 Pollution of waters; discharge of injurious substance.

In order to prevent the pollution of any stream or other water body of the state, the killing of fish or other aquatic life, or the modification of natural conditions in any way detrimental to the interests of the state, no person shall

knowingly discharge or knowingly permit to be discharged into any waters of the state, or into drains which discharge into such waters, any substance which causes "Water Pollution" as defined in R.S. 56:1461. Each separate day upon which a violation of this section occurs constitutes a separate offense.

56:1463 Penalty for violation of Part:

Whoever intentionally violates any of the provisions of this Part shall be fined for each offense not less than one hundred dollars nor more than two thousand dollars or imprisonment for not more than one hundred twenty days or both.

c. Discharge of Untreated Wastes into the Mississippi River:
R.S. 56:1464-1464.4.

These provisions generally prohibit the discharge into the Mississippi River of "untreated liquid industrial wastes". Whether this would include the waste from the geopressed resource is uncertain. It appears that R.S. 56:1464.1 would exclude the water, if it is deemed to be a "mineral" under that section. The Geothermal Act, which vests regulatory power with the Conservation Commission should support the argument that for purposes of this Act, the geopressed resource should be classed as an "other mineral".

The Act is reproduced here primarily as a caveat, particularly because it gives a private right of action for enforcement.

56:1464 Definitions:

As used in this Part:

1. "Persons" means any municipality, political subdivision, public or private corporation, individual, partnership, association or other entity.
2. "Treatment works" means any plant or other works which accomplishes the secondary treating, stabilizing or holding of wastes.
3. "Untreated wastes" means wastes which have not been treated in treatment works.
4. "Wastes" means human or animal wastes and liquid industrial wastes.

56:1464.1 Prohibition:

No person in this state shall wilfully and intentionally discharge or cause to be discharged any untreated wastes into any body of public water in this state provided further that at all times all such wastes will receive the best practicable secondary treatment or its equivalent, not later than December 31, 1972.... No portion of Section 1464 through 1464.4 of Title 56 of the Louisiana Revised Statutes of 1950, as amended, shall apply to the discharge of salt water or other wastes produced in the course of operations for the exploration for, or production of, oil gas, or other minerals; but the discharge of such salt water or other wastes shall remain subject to all other applicable Louisiana laws and regulations.

56:1464.2 Enforcement; civil penalty:

Whenever, upon the sworn complaint of any person, it is made to appear to a district court of this state that a violation of this Part has occurred or may be occurring, the district court shall immediately order a hearing on the complaint to be held not less than two nor more than five days from the date of the order. A copy of the order shall be served on the alleged violator. If, at the hearing on the order, it appears to the satisfaction of the court that a violation has occurred, or is occurring, the court may assess a civil penalty not to exceed ten thousand dollars for each day during which the violation has occurred and all costs of the hearing. Where the violation is found to be continuing, the court also may issue a preliminary injunction restraining the violation. The judgment of the court at the hearing, or subsequently on a petition for fixing the penalty if the violation is a continuing one, shall fix the total amount of the penalty due, which shall be collectible under the same procedures as now fixed by law for the collection of money judgments.

56:1464.3 Complainants bond; liability:

A complaint alleging a violation of this Part, filed as provided in R.S. 56:1464.2 hereof, shall have attached the personal bond of the complainant in the sum of one hundred dollars, conditioned upon the payment of costs of the hearing held on the complaint in the event the court determines a violation of this Part has not occurred nor is occurring. No liability whatsoever shall be incurred by the complainant by reason of the filing of a complaint as provided in R.S. 56:1464.2 hereof, other than the payment of costs of the hearing as provided in this section.

56:1464.4 Procedures and remedies as additional:

The enforcement, procedures and remedies herein provided for shall be in addition to any other such procedures and remedies authorized under the laws of this state.

3. Stream Control Commission:

The Stream Control Commission is a seven member group which has charged with controlling the discharge of waste into state waters. It has the authority to (1) investigate and promulgate water pollution standards and the discharge of waste and (2) certify applicants for Federal licenses under the Water Quality Improvement Act (33 USC 1151).

The SCC has a wide range of powers and enforcement capabilities as authorized in the enabling legislation.

The following Act is the general source of their authority.

a. Stream Control Act, R.S. 56:1431-1446:

56:1431 Membership; legal adviser:

There is created a Stream Control Commission of Louisiana. The attorney general is the legal advisor of the commission.

56:1433 Definitions:

As used in this Part, the following terms shall have the meaning ascribed to them in this Section, unless the context clearly indicates otherwise:

(1) "Waters of the state" includes rivers, streams, lakes, and all other water courses and waters within the confines of the state, and all bordering waters, including the Gulf of Mexico.

(3) "Commission" means the Stream Control Commission.

56:1434 Control of waste disposal:

The commission has control of waste disposal, public or private, by any person, into any of the waters of the state or any tributaries or drains flowing into any of such waters, for the prevention of pollution thereof tending to destroy fish life or to be injurious to the public health, the public welfare, or to other aquatic life or wild or domestic animals or fowls.

56:1435 Promulgation of rules and regulations; investigations:

The commission may make and promulgate such rules and regulations and conduct such investigations as it deems necessary to carry out the provisions of this Part. ...

56:1436 Actions by commission:

The commission may in the name of the state bring in court any appropriate action it believes necessary to carry out the provisions of this Part.

56:1437 Administration of part; reservation of powers and duties:

The director of the Louisiana Wildlife and Fisheries Commission shall administer the provisions of this Part and the rules and regulations and orders of the commission. The agents and enforcement officers of the Louisiana Wildlife and Fisheries Commission are ex officio agents and enforcement officers of the commission.

This Part does not deprive the Louisiana Health and Human Resources Administration of any of its duties and powers in regard to matters directly affecting the public health, and said administration shall continue to handle such matters through its officers and agents.

56:1438 Right of entry; assistance:

The commission or its authorized agents may enter at all reasonable times in or upon any private or public property for the purpose of inspecting and investigating conditions relating to the pollution of any waters of the state. The commission may call upon any officer, board, department, school, university, or other state institution, and the officers and employees thereof, and require the furnishing of any assistance deemed necessary to the carrying out of this Part.

56:1439 Establishment of pollution standards; ascertainment of volume of water; regulation or prohibition of discharge of waste:

The commission:

(1) Shall establish such pollution standards for waters of the state in relation to the public use to which they are or may be put as it deems necessary;

(2) May ascertain and determine for record and for use in making its order what volume of water actually flows in any stream, and the high and low water marks of waters of the state affected by the waste disposal or pollution of any person;

(3) May by order or regulation control, regulate, or restrain the discharge of any waste material or polluting substance discharged or sought to be discharged into any water of the state;

(4) May prohibit any discharge resulting in pollution which is unreasonable and against the public interest in view of the existing conditions in the waters of the state.

(5) Is hereby authorized on behalf of the state of Louisiana to make the certifications which applicants for federal licenses or permits are required to provide to the appropriate federal agency under Section 21 of the Federal Water Pollution Control Act, as amended by Section 103 of the Water Quality Improvement Act of 1970, 84 Statutes at Large 107 et seq. and/or Section 401, PL 92-5200-70 Statutes 498; [33 U.S.C.A. §171.] 84 Statutes 91, 33 USC 1151. The commission may delegate its powers and responsibilities under this Paragraph to its executive secretary or some other subordinate official.

56:1440 Illegal discharge of waste:

A. No person shall discharge or permit to be discharged into any of the waters of the state any waste or any pollution of any kind that will tend to destroy fish or other aquatic life or wild or domestic animals or fowls or be injurious to the public health or against the public welfare in violation of any rule, order, or regulation of the commission.

56:1441 Notice to persons violating Part; report to commission; temporary orders stopping waste disposal;

Whenever in the opinion of the commission any person violates or is about to violate the provisions of this Part, or fails to control the polluting content or waste discharged or to be discharged into any waters of the state, the commission or any representative thereof may notify the alleged offender of such determination. Notice may be served by any officer empowered to serve process under existing law or by any officer or agent of the commission. Within ten days from the receipt of notice of the determination, the person shall file with the commission a full report, showing what steps have been taken and are being taken to control the waste or pollution. Thereupon the commission may make such orders as in its opinion are necessary.

In an emergency causing or likely to cause irreparable damage, or if the public interest requires, the commission may issue a temporary order requiring that such waste disposal and such waste discharge or pollution be stopped and terminated pending a hearing. The temporary order shall not be effective for more than five days beyond the date of hearing and in no event for more than twenty days.

56:1442 Petition by person deeming himself aggrieved by commission order; conclusiveness of order on hearing; review:

Any person who feels himself aggrieved by the restrictions of the polluting content or waste, or pollution, or any other order of the commission, may file a sworn petition with the commission, setting forth the grounds and reasons for his complaint and asking for a hearing of the matter involved. The commission shall thereupon fix the time and place for the hearing and shall notify the petitioner thereof. At the hearing the petitioners and any other interested parties may appear, present witnesses, and submit evidence. Following the hearing, the final order of determination of the commission upon

such matter is conclusive. However, the order may be reviewed de novo in the district court in and for the parish of East Baton Rouge, which parish is declared to be the domicile of the commission, upon petition therefor filed within ten days after the final order of determination issued by the commission. On such review the decree of the court takes the place of the order of the commission.

56:1443 Criminal prosecutions; suspension pending hearing:

After service of a written notice of determination, setting forth specifically any violation of this Part, whoever fails to make the report required in R.S. 56:1441 and is thereafter found to be continuing the violation shall be prosecuted under this Part. However, pending the hearing provided for in R.S. 56:1442 no criminal charges shall be files until the termination thereof.

56:1444 Penalty for violation of Part; attorney general to prosecute:

Whoever violates any of the provisions of this Part, or any written order of the commission in pursuance thereof, shall be fined not less than one hundred dollars nor more than two thousand dollars, and costs of prosecution, or imprisoned for not more than one year, or both. Each day upon which a violation of the provisions of this Part occurs is a separate and additional violation. The attorney general shall have charge of and shall prosecute all cases arising out of violation of the provisions of this Part, including the recovery of penalties.

56:1445 Costs; assessment:

The commission shall tax and assess against the parties involved in any hearing or application the costs incurred therein, including the cost of publication and promulgating the orders and regulations of the commission, and shall divide such costs among the parties in such proportion as is just and equitable. However, no more than fifty dollars, in addition to the cost of publication, shall be assessed as costs against any one person.

56:1446 Pollution of waters; recovery of civil damages; attorney general to Institute action; jurisdiction in district courts:

A. Whenever any person without a certificate of approval, permit or other document of approval authorized by law, or in violation of the terms and conditions of such certificate of approval, permit, or other document of approval authorized by law, has negligently, carelessly or wilfully caused pollution of the waters of the state in such concentration or manner that wild birds, wild quadrupeds, fish or other aquatic life are killed as the result thereof, or renders the water unfit for maintenance of the normal fish or aquatic life characteristice of the waters or render the water unfit for the usages which have been established for the stream or other water body by the commission, the commission may recover, in the name of the state, damages from such person.

B. The commission shall notify the person or persons responsible of the amount of damages claimed by the commission and may effect such settlements as it deems reasonable. If no settlement is reached within

sixty days the attorney general shall bring a civil action in the name of the state to recover the damages, in either the district court of the parish in which the damage has occurred or the district court of the parish in which the State Capitol is located. The district courts shall have jurisdiction to hear and determine such actions.

C. The measure of damages shall be the amount determined by the court to be the replacement cost thereof or the cost of restoring the stream or other water body to its former condition plus the cost of all reasonable and necessary investigations made or caused to be made by the state in connection therewith.

D. No civil proceeding brought under this section shall limit or prevent any other actions or proceedings in respect to the pollution of waters which are authorized by this Part or other provisions of law.

E. The provisions of this Part shall not apply to any unintentional pollution or contamination resulting from or in connection with the production of agricultural products.

b. Drainage of oil, salt water, etc. into natural drain prohibited,

The SCC has the specific duty to administer the following Act:

38:216 Drainage of oil, Salt water, etc. into natural drain prohibited

A. Except as hereinafter provided or as authorized by Stream Control Commission permit, no person shall knowingly and willfully empty or drain into or permit to be drained from any pumps, reservoir, wells, or oil fields into any natural stream or drain from which water is taken for irrigation purposes any oil, salt water or other noxious or poisonous substances or gases which would render the water unfit for irrigation purposes or would destroy the fish therein.

B. The prohibitions of this Chapter, however, shall not prevent:

(1) The discharge or drainage of salt water, brine and chemical salts from industrial, oil or mining operations into those portions of natural streams and drains having water which has a normal salt content of more than 110 grains per gallon, to be determined by the daily average for the preceding ten years, measured at any depth not to exceed 12 1/2 feet or into tributaries of such streams which empty into the portions thereof which are excluded from the effect hereof; such water being hereby recognized as unfit for irrigation.

C. Whoever violates this Section shall be fined not less than one hundred dollars nor more than two thousand dollars or be imprisoned for not less than thirty days nor more than three months. Each and every day that oil, salt water or other such substances are permitted to flow into such natural streams or drains in violation of the provisions of this Section shall constitute a separate offense.

c. Regulations:1) Disposal of oil field brine.

In addition to this statute, the SCC adopted, on January 27, 1953, the following regulations governing the disposal of oil field brine which are still in effect.

7. No oil field brine shall be discharged into any stream, lake or other body of water, or into any ditch or surface drainage leading to any stream, lake or other body of water, when it is determined by the Stream Control Commission that such discharge would be deleterious to the public health, or to the prosecution of an industry or lawful occupation for which or in which any such waters may be lawfully used or employed, or whereby the carrying on of any agricultural pursuit may be injuriously affected or whereby the lawful conduct of any livestock industry or the use of any such waters for domestic animals may be prevented, injuriously affected or impaired, or whereby any lawful use of any such waters by the State of Louisiana, or by any political subdivision, or by any corporation, association, partnership, or person, or any other legal entity may be lessened or impaired, or materially interfered with, or whereby any fish life, or any beneficial animal or vegetable life in said waters may be destroyed, or the growth or propagation thereof prevented or injuriously affected; provided that oil-free brine may be discharged under maximum dilution ratios prescribed for any particular stream or field by the Stream Control Commission, or during any particular period in which such discharge is determined by the Commission to be free from pollution hazard, or necessary in the public interest.

8. Wherever possible, disposition of oil field brine shall be accomplished by discharge through disposal wells to underground horizons below the fresh water level, such wells to be so drilled, cased, cemented, equipped, and operated that no fresh water horizon shall be polluted: provided that this rule shall not apply in fields or areas where it is determined by the Stream Control Commission that disposition of the brine is or may be accomplished by discharge into water bodies normally or reasonably sufficiently saline to preclude any actual or potential pollution hazard due to such discharge.

2) Disposal of Industrial Waste and Reporting Requirements:

These regulations which were adopted on August 1, 1951 and are still in effect, require that anyone intending to discharge industrial waste must file a report with the SCC. The requirements for the report are found in the regulations.

REGULATIONS:**I. General**

Under Section 1435 of Chapter 3, Stream Control, Part I, Stream Control Commission of Title 56, Louisiana Revised Statutes of 1950, the Commission is authorized to adopt rules and regulations applicable throughout the State for controlling the pollution of the waters of the State.

II. Definitions**A. Person**

For the purpose of these Regulations, "Person" means any individual, public or private corporation, political subdivision, governmental agency, municipality, industry, co-partnership, association, firm, trust, estate, or any other legal entity whatsoever.

B. Treatment Works

For the purpose of these Regulations, the term "Treatment Works" means any facility primarily designed and installed for the purpose of treating industrial wastes before final discharge or deposit into waters of the State.

C. Public Sewer

For the purpose of these Regulations, the term "Public Sewer" means a sewerage system which is owned and operated by a town, city, parish, or other responsible public body.

D. Waters, Industrial Waste, Other Wastes, Pollution, and Commission

For the purpose of these Regulations, the terms "waters", "industrial waste", "pollution", and "commission" have definitions as given by the Louisiana Stream Control Commission which are as follows:

1. "Waters" shall be construed to mean public waters including lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the ocean within the territorial limits of the State, and all other bodies of surface, natural or artificial, inland or coastal, fresh or salt, within the jurisdiction of the State of Louisiana.

2. "Industrial waste" means any water-borne liquid, gaseous, solid or other waste substance or a combination thereof resulting from any process of industry, manufacturing trade or business, or from the development of any natural resource.

3. "Other wastes" means garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, chemicals, and all discarded substances other than industrial waste as defined in this Section.

4. "Pollution" shall be construed to mean the discharging into any of the waters of the state any waste or any pollution of any kind that will tend to destroy fish or other aquatic life or wild or domestic animals or fowls or be injurious to the public health or against the public welfare.

5. "Commission" means the Stream Control Commission of the State of Louisiana.

III. Requirements for the Submission of Reports

A. To Where and by Whom Reports Shall be Submitted

Any person intending to discharge industrial waste at any location in the State where such person is not now discharging to State waters on the effective date of this Regulation; any person intending to construct a new outlet, or build, add to, or alter any treatment works for the handling of industrial waste, shall, before starting such work, advise the Louisiana Stream Control Commission, Baton Rouge, Louisiana, in writing, concerning his intentions, and shall supply to the Commission a general report describing the sewerage system which is proposed and the steps which will be taken to protect the waters of the State against new pollution or an increase in existing pollution. Said report shall be prepared in accordance with the general rules, which follow, for submission of industrial waste reports, and no construction work shall be started until the report has been approved and a certificate of approval for the work has been received from the Louisiana Stream Control Commission. All conditions under which such certificate of approval is granted, which are considered by the Commission to be reasonable and necessary, shall be included in the certificate of approval. This regulation does not apply in those cases where the industrial waste is discharged into a public sewer or where the projects involved are under actual construction or alteration on the effective date of this order.

B. Professional Engineer Required

The information submitted in compliance with this Regulation, shall be prepared by a person properly qualified to perform engineering work as provided in the Louisiana Professional Engineers and Land Surveyors Registration Act. The report containing the required information shall be submitted to the Louisiana Stream Control Commission, Baton Rouge, Louisiana, and shall be approved by a professional engineer as defined in the above named Act or by a responsible official authorized to act for the person on whose behalf the report is submitted. Said report should be submitted, preferably thirty days, and at least two weeks, before approval is desired.

C. To comply with these regulations, the report concerning the contemplated actions enumerated in these regulations shall include the following:

1. A brief statement describing the action which is proposed.
2. A statement giving the location of the industrial plant or manufacturing establishment, and either an adequate description of the exact location of the point of discharge from the sewerage system, or a map showing such location.

3. A statement giving the volume and concentration of industrial waste, as measured or as estimated by some reliable method, which is being or which will be discharged and the extent to which the volume and concentration will be affected by the proposed action.
4. A description of the treatment works which will be installed, and if no treatment works within the definition of this term is contemplated, the steps which will be taken to prevent the discharge of sufficient quantities of industrial waste to cause pollution of the waters of the State.
5. An estimate of the extent to which the quality (expressed in terms of pounds B.O.D. per 24 hr.) of the industrial waste will be improved by the proposed treatment works or by such other or additional steps as will be taken to control pollution.

The constituents of the industrial waste which may influence its quality may include, but are not necessarily limited to the following:

- a. Oil, floating and settleable solids.
 - b. Acids, alkalies, and dissolved salts.
 - c. Organic matter as measured by the test for biochemical oxygen demand, five-day B.O.D. at 20^o C., as described in "Standard Methods for the Examination of Water and Sewage."
 - d. Toxic materials.
 - e. Compounds producing taste and odor in water or in the flesh of edible fish.
 - f. Colored materials and dyes.
6. An estimate of the rate of low flow of the receiving stream.
 7. An estimate of the extent to which the discharge from the proposed treatment works will alter or affect the quality of the receiving waters.
 8. Such other pertinent data as may be necessary for a good understanding of the proposed which is being made.
 9. Nothing herein contained, however, shall require the owner of any industrial or municipal establishment to disclose any classified data of the Federal Government or any confidential information relating to secret processes or economics of operation.

D. Water Quality Standards

It is the policy of the State of Louisiana that all state waters are to be protected for their recreational value, and all desirable species of aquatic life be preserved. To this end, the following Water Quality Standards have been promulgated by the SCC.

General Criteria

- 1) Aesthetics--The state's waters shall be maintained in an aesthetically attractive condition and shall meet generally accepted aesthetic qualifications.
- 2) Color--True color shall not be increased to the extent that it will interfere with present usage and projected future use of the streams and water bodies.
- 3) Floating, Suspended and Settleable Solids--Waters shall be free from substances that will produce distinctly visible turbidity, solids or scum, nor shall there be any formation of slimes, bottom deposits or sludge banks attributable to waste discharges.
- 4) Taste and Odor--Taste and odor producing substances shall be limited to concentrations that will not interfere with the production of potable water by reasonable water treatment methods, or impart unpalatable flavor to food fish, including shellfish, or result in offensive odors arising from the waters, or otherwise interfere with the reasonable use of the waters.
- 5) Toxic Substances--None shall be present in quantities that alone or in combination will be toxic to animal or plant life. In all cases the level shall not exceed the TLM96/10. In cases where the stream is used as a public water supply the level of toxic substances shall not exceed the levels established by the United States Public Health Service Drinking Water Standards latest edition.
- 6) Oils and Greases--There shall be no free, floating or emulsified oils or greases present in quantities sufficient to interfere with the designated uses of the water.
- 7) Foaming or Frothing Materials--There shall be none of a persistent nature.
- 8) Nutrients--The naturally occurring nitrogen-phosphorous ratio shall be maintained.

- 9) Turbidity--There shall be no substantial increase in turbidity from ambient conditions due to waste discharges.
- 10) Other Materials--Limits on other substances not specified in these revised water quality standards shall be in accordance with recommendations set by the Stream Control Commission and/or the Louisiana State Board of Health for municipal raw water sources.

Numerical Criteria

Numerical criteria for pH, chlorides, sulfates and dissolved solids, dissolved oxygen, temperature, and coliform content have been set for the waters of Louisiana, varying for each water body or stream segment. Criteria apply with respect to substances and conditions attributed to waste discharges or activities of man, as opposed to natural phenomena.

- 1) pH--In all cases the pH shall fall within the range of 6.0 to 9.0 unless otherwise specified for a particular water body or stream segment. No discharge of wastes shall cause the pH of the water body to vary by more than one pH unit for that segment where the discharge occurs.
- 2) Chlorides, Sulfates and Dissolved Solids--Except for tidal waters, maximum chloride content figures have been set which vary from 10 to 1000 milligrams per liter, depending on the particular water body or stream segment. Similar values for sulfates are 5 to 1000 mg/l, and for dissolved solids 100 to 3000 mg/l.
- 3) Dissolved Oxygen--Minimum values for dissolved oxygen shall apply at all times except in naturally dystrophic waters or where natural conditions cause the dissolved oxygen to be depressed. For fresh water, the daily dissolved oxygen concentration shall be above 5 mg/l. In estuaries and tidal tributaries the dissolved the dissolved oxygen concentration shall be not less than 4 mg/l. In surface coastal waters the dissolved oxygen concentration shall be greater than 5 mg/l.
- 4) Temperature--Maximum temperature for fresh water will be 32.2°C except where specified otherwise or due to natural conditions. For estaurine and coastal waters the maximum is 35°C. Temperature differential, representing the maximum permissible rise above ambient conditions, for fresh water shall be no greater than 2.8°C for streams and rivers and 1.7°C for lakes and reservoirs. For estaurine and

coastal waters it shall be no greater than 2.2°C during the period October through May and 0.83°C during the period June through September. Once the ambient temperature reaches the maximum temperature, there shall be no addition of artificial heat.

- 5) Bacteria--Each water body or stream segment is assigned a specified bacterial standard, depending on the water use classification of the water body or stream segment. The most stringent standard requires that the monthly total coliform median MPN (most probable number) shall not exceed 70 per 100 milliliters (ml) and not more than 10 percent of the samples shall ordinarily exceed an MPN of 230 per 100 ml. The lowest standard requires that the monthly arithmetic average of total coliform MPN shall not exceed 10,000 per 100 ml and the monthly arithmetic average of fecal coliforms shall not exceed 2,000 per 100 ml.

4. Wildlife and Fisheries Commission:

a. Natural and Scenic Rivers System Act, R.S. 56:1841-1849.

The Wildlife and Fisheries Commission has the supervision and control of the fish and bivalves in the state, particularly oyster beds and seed grounds. The Commission is also charged with the protection and preservation of designated natural and scenic rivers in the state, a list which can be modified by the Legislature (See R.S. 56:1846 for list). These rivers are basically defined as those which are freeflowing and have not been channelized, cleaned, or altered in the last 25 years (R.S. 56:1841).

56:1844. Planning considerations; degrading uses prohibited; evaluation of projects:

In all planning for the use and development of water and water related land resources, full and equal consideration shall be given by all local, state and federal agencies to the potential natural and scenic river areas; and all river basin reports and project plans should discuss any such potential and all economic evaluations should consider aesthetic values as well as monetary values. No agency of the state government shall authorize or concur in plans of local or federal agencies that would detrimentally affect whether, directly or indirectly, a natural or scenic river or upon which the full and equal consideration of the stream's potential as a natural or scenic area with aesthetic values has not been discussed and evaluated; or except as specifically authorized by the state legislature or by the

system administrator. Evaluation of projects affecting natural or scenic streams shall rest upon an agency other than the construction agency, namely the Louisiana Office of State Planning and the Louisiana Recreation Advisory Council and any of their advisory committees hereinafter appointed for the specific purposes of advising on the quality of the environment.

b. Water Pollution

The Wildlife and Fisheries Commission also has the responsibility for enforcing the following statutes relating to pollution of state waters.

The enforcement procedure is also set out below.

56:362 Pollution of waters; discharge of injurious substance:

In order to prevent the pollution of any of the waters of the state, the killing of fish, or the modification of natural conditions in any way detrimental to the interest of the state, no person shall discharge or permit to be discharged into any waters of the state, or into drains which discharge into such waters, any substance which kills fish, or renders the water unfit for the maintenance of the normal fish life characteristic of the waters, or in any way adversely affects the interest of the state. Each day upon which a violation of this Section occurs constitutes a separate offense.

56:390 Civil action in name of state:

The state has a civil right of action for a penalty of twenty-five dollars, which shall be entered, without suspension, as a civil judgment against any defendant adjudged to have violated the law, after due demand and trial, as hereinafter set out in this Sub-part. For a second offense the civil penalty shall be one hundred dollars; for a third offense two hundred dollars with revocation of license; all without right of suspension.

56:391 Jurisdiction of courts in civil action:

District courts have civil jurisdiction to adjudicate demands under R.S. 56:390. Demands may be brought before the district court, regardless of the residence or domicile of the defendant. When any infraction of the law is sued upon in any parish, the defendant may not except to the territorial jurisdiction of the courts of that parish unless at the same time he declares precisely in what parish the alleged offense was committed. If the defendant professes not to know in what jurisdiction is the place of the alleged offense, it shall be deemed to be within the jurisdiction of the parish where the action is brought. Offenders against the laws protecting this property of the state shall do so at the risk of being sued as here provided. They shall not escape civil liability by placing on the people the burden of proving the precise locality of the offense when the defendant refuses to disclose, or professes ignorance of, the same. The provisions herein respecting jurisdiction apply to the waters and water bottoms over which the sovereignty of the state extends.

56:393 Procedure when arrests are made:

Officers arresting under this Sub-part before making applicable criminal charges, shall bring the alleged defendant before any justice in the parish where the offense was committed without regard to the domicile or residence of the offender, and make oral demand for the amount of penalty allowed to be sued for in the case. The justice shall enter the case on his docket as "Department of Wild Life and Fisheries" for the People of the State of Louisiana versus," entering the name of the alleged offender as defendant and his post office address; setting down the amount of penalty demanded. The justice shall fix the date of trial not less than fifteen nor more than thirty days after demand, after which no further citation is required by law, except notice of postponement, if any, and the date to which postponed, notice of which may be given by mail fifteen days before date thereof to the address given. The case shall be proceeded with thereafter as in any civil case before the court. However, after civil demand for the penalty has been made and docketed by the justice, the defendant may, at his discretion, for purposes of compromise, and without prejudice, propose to pay one-half of the minimum penalty for which judgment could be rendered against him after trial. Such amount may then and there be paid in cash to the justice, plus one dollar and fifty cents as costs to be paid to the justice. The judgment shall be entered accordingly as a compromise and market satisfied on the records of the court when paid. Further, if the offense charged as causing the penalty claimed, in the opinion of the arresting office, is accompanied by acts indicating contempt for the law violated, or other evidence repelling the grant of mercy or consideration, the officer may enter his objection to the compromise and the compromise shall not be entered, and the case shall come to trial as hereinbefore provided for. In any case, regardless of the consent of the arresting officer, a compromise judgment may be entered at any time in an amount not less than double the minimum penalty if judgment and costs are then and there paid.

56:394 Dismissal of civil suit in certain cases:

Where demand is made before the justice for a civil penalty, and a criminal charge for the same offense has been made and fine has been paid or sentence served, the commissioner, on receiving proof thereof, shall order the suit before the justice dismissed on payment of costs by the defendant, except in any case where it appears to his satisfaction that the offense was accompanied by acts indicating contempt for the law violated, or other evidence repelling the grant of mercy or consideration. Wherever a civil judgment has been satisfied, the department shall not prosecute any criminal charge made for the same offense.

56:396 Suit for civil penalty though offender not arrested and taken before justice court.

Suit for civil penalties may be brought against offenders notwithstanding they may not have been arrested and taken before the justice court as above provided. In such cases suit shall be brought before the district court of the parish where the offense is alleged to have been committed and citation shall, if the defendant resides either within or outside of the jurisdiction of the court before which the suit is filed, be issued and the case proceeded with according to law.

56:398 Jurisdiction where offense committed between two parishes
or in Gulf of Mexico:

If any offense is alleged to have been committed in a river dividing two parishes, any court in either parish has territorial jurisdiction if otherwise competent as in this Sub-part provided. If committed in any lake, bay, inlet, or other body of water bound by more than one parish, any court in any parish bordering on such waters has territorial jurisdiction if otherwise competent as provided in this Sub-part.

B. Department of Health and Human Resources

1. Louisiana Air Control Commission, Louisiana Air
Control Act R.S. 40:2201-2216.

The reorganization act transferred the Louisiana Air Control Commission with its powers and functions intact, to the Department of Health and Human Resources. The Commission has nine members, and the authority to adopt and promulgate air quality standards. The Commission is empowered to work with pertinent federal and state agencies toward their goals.

Of special interest is R.S. 40:2216 which provides that the Louisiana Air Control Law is the "exclusive means within the state for the control of 'air contaminants,' 'sources', or 'undesirable levels' as defined herein". In an opinion dated October 23, 1973, the Louisiana Attorney General stated that this law pre-empted the field, and that, therefore, a parish air pollution control ordinance was unenforceable.

40:2202 Definitions:

The following terms as used in this law shall, unless the context otherwise requires, have the following meanings:

(A) "Air contaminant" means particulate matter, dust fumes, gas, mist, smoke, or vapor, or any combination thereof produced by processes other than natural.

(B) "Source" is any and all points of origin of the items defined in Subsection (A), whether privately or publicly owned or operated.

(C) "Undesirable levels" of the terms defined in Subsection (A) hereof is the presence in the atmosphere, as limited by R.S. 40:2204(C), of one or more of such items or combinations thereof in quantities and concentrations and of such characteristics, properties and duration as to materially injure or interfere with the reasonable use of animal or plant life or property.

(D) "Commission" is the Air Control Commission of the State of Louisiana.

(E) "Person" is any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, political subdivision, or any other legal entity or their legal representatives, agents or assigns.

(F) "Technical Secretary" is the Technical Secretary of the Air Control Commission of the State of Louisiana.

40:2204 Powers and duties of commission:

It is the intent and purpose of this law to maintain purity of the air resources of this state consistent with the protection of the health and physical property of the people, maximum employment and the full industrial development of the state. The commission shall seek the accomplishment of this objective through the control of the items defined in R.S. 40:2202(A) by all practical and economically feasible methods consistent with its powers and duties as here and after set forth.

(A) The commission shall have the power:

(1) To prepare and develop a general plan for the proper control of the air resources of Louisiana.

(2) To adopt and promulgate rules and regulations consistent with the general intent and purposes of this law in accordance with the provisions of R.S. 40:2206. Such rules and regulations may not specify any particular method to be used to reduce undesirable levels as defined in R.S. 40:2202(C), nor the type, design, or method of installation of any equipment to be used to reduce undesirable levels as defined in R.S. 40:2202(C), nor the type, design, method of installations of type of construction of any manufacturing processes or other kinds of equipment. However, subject to the provisions of Sub-section (C) hereof, the commission may include in said rules and regulations requirements as to the particular method to be used to reduce undesirable levels as defined in R.S. 40:2202 (C) which arise from the outdoor burning of waste material or refuse.

(3) To develop such facts and make such investigations as are consistent with the purposes of this law, and in connection therewith to enter at all reasonable times in or upon any private or public property except private residences or dwellings for the purpose of inspection and investigation of any condition which the commission shall have reasonable cause to believe to be a source as defined in R.S. 40:2202 (B). The results of any such inspection and investigation shall be reduced to writing and a copy shall be furnished to the owner or operator of the source.

(4) To hold hearings upon complaints or upon petitions for variance and in connection therewith to issue subpoenas requiring the attendance of witnesses and the production of such papers and documents as are related to such hearing.

(5) (i) To issue such orders or determinations as may be necessary to effectuate the purposes of this law including the issuance of cease and desist orders where the nature of a violation justifies such immediate action by the commission. If the commission determines that a condition is defined in R.S. 40:2202 (C) exists, it may recommend such action as is indicated by the circumstances to cause the control of such condition. The commission, except following the issuance of a cease and desist order, shall grant such time for the owner or operator of a source to comply with its recommendations as is provided for in the rules and/or regulations it shall adopt pursuant to the provisions of Subsection (A) (2) hereof which shall make provisions for such time gauged to such general situations as hearing on such proposed rules and regulations may indicate are necessary.

B. The commission shall have the power:

To initiate emission control actions commensurate with the severity of air pollution conditions in an emergency episode situation. The commission shall specify episode criteria ambient pollution concentrations at which control action shall be taken to reduce or prohibit emissions and shall provide for such actions to be taken when the specified concentrations are reached in an air region. The control actions to be taken shall be identified by episode criteria level.

(ii) If such recommendations of the commission are not compiled with in the required time then the commission may order such action as is indicated by the circumstances to cause the control of such condition.

In making its recommendations, order and determinations hereunder, the commission shall take into consideration all the facts and circumstances bearing upon the reasonableness of the emissions involved including, but not limited to:

(a) The character and degree of injury to, or interference with, the health and physical property of the people;

(b) The social and economic value of the source of the undesirable levels as defined in R.S. 40:2202 (C);

(c) The question of priority of location in the area involved, and

(d) The technical practicability and economic reasonableness of reducing or eliminating the emissions resulting from such source.

(6) To cause to be in a court of competent jurisdiction legal proceedings to compel compliance with any order entered by the commission.

(7) To request and be entitled to receive the assistance of any state educational institution, experiment station, board, department or other state agency and the officials and employees thereof when it is deemed necessary or beneficial by the commission to carry out the provisions of this law.

(B) The commission shall have the following duties with respect to the control of the conditions defined in R.S. 40:2202 (C);

- (1) Encourage voluntary cooperation by persons, or affected groups in restoration and preservation of a reasonable degree of purity of air within this state.
- (2) Encourage and conduct studies, investigations and research concerning air control.
- (3) Collect and disseminate information on air control.
- (4) Advise, consult and cooperate with other agencies of the state, industries, other states and federal government, and with interested persons or groups in regard to matters of common interest in air control.
- (5) Represent the State of Louisiana in any and all matters pertaining to plans, procedures, or negotiations for interstate compacts.
- (6) The basic personnel and necessary laboratory and other facilities as may be required to carry out the provisions of this law shall be personnel employed by the Louisiana State Board of Health; provided, however, that the commission, through the Board of Health acting as the agent of the commission, may by agreement secure such services as it may deem necessary from any other departments and agencies of the state government and may arrange for compensation for such services, and may employ and compensate, within appropriations available therefore such consultant and technical assistants on a full or part-time basis as may be necessary to carry out the provisions of this law and to prescribe their powers and duties.
- (7) In the exercise of the powers conferred upon it by Subsection (A) (3) hereof the commission shall act through the engineering division of the State Board of Health.
- (8) Subject to the provisions of R.S. 49:661-668, to accept, receive and administer grants or other funds or gifts through the State Board of Health acting as the agent for the commission for the purpose of carrying out any of the purposes of this law; accept, receive and receipt for federal monies, and for and in behalf of the state, given by the federal government under any federal law to the State of Louisiana for air control activities, surveys or programs.
- (9) Receive and budget through the State Board of Health acting as the agent of the Commission duly appropriated monies for expenditures to carry out the provisions and purposes of this law.
- (c) Nothing contained in this law shall be deemed to grant to the commission any jurisdiction or authority to make any rule, regulation, recommendation or determination or to enter any order with respect to air conditions existing solely within the property boundaries of commercial and industrial plants, works, or shops or to affect relations between employers and employees with respect to or arising out of any air condition. Nevertheless, the commission shall have the authority to enter any such plants, works, or shops to inspect emissions to determine whether they are producing air contaminants in such concentrations that may contribute to the formation of undesirable levels as defined in R.S. 40:2202 (C) beyond the confines of the property inspected.

40:2207 Validity of rules or regulations; declaratory judgment:

The validity of any rule or regulation may be determined upon the petition of any person as defined in R.S. 40:2202 (E) for a declaratory judgment thereon addressed to the District Court of the judicial district in which petitioner has his principal place of business in Louisiana, or where the property affected is located, when the rule or regulation or its threatened application interferes with or impairs, or threatens to interfere with or impair the legal rights or privileges of the petitioner. The commission shall be made a party to the proceedings, and service shall be made upon the Technical Secretary of the commission, whose domicile for the purpose of service under this law shall be deemed to be the office of the commission.

40:2208 Investigations; complaints; hearings; recommendations:

(A) The Technical Secretary must cause investigations to be made upon the request of the commission or upon receipt of information concerning an alleged violation of this law or any rule or regulation promulgated hereunder.

(B) If, in the opinion of the Technical Secretary or of the commission, such investigation discloses that a violation does exist, he or the commission shall by private conference, conciliation and persuasion, endeavor to the fullest extent possible to eliminate such violation.

In case of the failure of such conference, conciliation and persuasion to correct or remedy any claimed violation and the filing by the Technical Secretary of a formal complaint with the commission, the commission may cause to have issued and served upon the person complained against a written notice, together with a copy of the formal complaint, which shall specify the provision of this law or the rule or regulation hereunder which such person is said to be in violation, and a statement of the manner in, and the extent to which, such person is said to violate the law or such rule or regulation and shall require the person so complained against to answer the charges of such formal complaint at a hearing before the commission at a time not less than thirty days after the date of notice.

(C) The respondent to such a formal complaint may file a written answer thereto and may appear at such hearing in person or by representative, with or without counsel, and may make oral argument, offer testimony and cross-examine any witnesses or take any combination of such actions.

The Technical Secretary, on behalf of the commission, at the request of any respondent to a formal complaint made pursuant hereto, shall subpoena and compel the attendance of such witnesses as the respondent may reasonably designate and shall require the production for examination of any book or paper relating to the matter under investigation at any such hearing as the respondent may reasonably designate.

At such hearings the commission shall be controlled by the rules of evidence in effect in the district courts of the State of Louisiana at the time of such hearing.

(D) After due consideration of the written and oral statements, the testimony and arguments that shall be submitted at the hearing upon such complaint or, upon default in appearance of the respondent on the return day which shall be specified in the notice given as provided in Subsection (B) hereof, the commission shall issue and make and enter the recommendations called for by R.S. 40:2204 (A)(5)(i). If such recommendations are not complied with within the time specified in R.S. 40:2204 (A)(5)(i) then the commission shall make such final determination and enter such order as is provided for in R.S. 40:2204 (A)(5)(i) as it shall deem appropriate under the circumstances giving due regard to the matters required to be considered under R.S. 40:2204, and it shall immediately notify the respondent thereof in writing by registered mail.

In all proceedings before the commission with respect to any alleged violation of this law or any rule or regulation of this law or any rule or regulation hereunder, the burden of proof shall be upon the Technical Secretary.

Any determination, recommendation or order by the commission shall be approved in writing by at least four members of the commission.

40:2209 Procedure at hearings:

A. At any public hearing, all testimony taken before the commission shall be under oath, which may be administered by the chairman or vice-chairman of the commission and shall be recorded stenographically. The transcript so recorded shall be made available to any member of the public or to the respondent or party to a hearing on a complaint upon payment of the usual charges therefore.

B. In any such hearings, any member of the commission may examine witnesses.

C. All hearings shall be had before at least five members of the commission.

40:2213 Judicial review:

All orders or determinations of the commission hereunder shall be subject to judicial review by the district court of any judicial district wherein is located, in whole or in part, the property affected by the order or determination, or in the district court of the judicial district in which the commission has its domicile. In any such review, the record made before the commission shall be admissible as evidence, but either the petitioner or the commission may introduce additional evidence. Review of any rule or regulation promulgated by the commission shall not be limited by this section but review may be had as provided in R.S. 40:2207.

40:2214 Injunction; penalties for violation of orders of the commission:

In the event the commission shall determine that any order made by it and not then the subject of judicial review is being violated, the commission may cause to have instituted a civil

action in the district court for any parish in which the violation occurs for injunctive relief to prevent any further violation of such order or, in the case of knowing and intentional violations of an order, for the assessment of a penalty not to exceed two thousand dollars per day for each day such violation continues as the court may deem proper. It shall be the duty of the attorney general to bring such action at the request of the commission in the name of the people in the state of Louisiana.

40:2215 Actions inuring to benefit of state:

The basis for proceedings or other actions that shall result from violations of any rule or regulation which shall be promulgated by the commission shall inure solely to and shall be for the benefit of the people of the state generally and it is not intended to create in any way new rights or to enlarge existing rights or to abrogate existing private rights. A determination by the commission that the conditions defined in R.S. 40:2202 (C) exist or that any rule or regulation has been disregarded or violated, whether or not a proceeding or action may be brought by the state, shall not create by reason thereof any presumption of law or finding of fact which shall inure to or be for the benefit of any person other than the state.

40:2216 Act as exclusive means of control; nuisances:

This law shall be the exclusive means within this state for the control of "air contaminants", "sources", or "undesirable levels" as defined herein. Nothing herein shall be construed to prevent private actions to abate nuisances under existing laws.

If any offense is alleged to have been committed in the Gulf of Mexico within the waters of the state, any court in any parish bordering on the Gulf has territorial jurisdiction if otherwise competent as provided in this Sub-part.

2. Regulations.

Pursuant to the authority granted by Section 2204 of the Act, the Louisiana Air Control Commission has adopted a comprehensive set of regulations, a complete set of which can be obtained from the Commission.

In the Supplements section which immediately follows this compilation can be found Tables 1 and 1a which show the State's current Air Quality Standards, Table 2 which describes the Methods of Contaminant Measurement, and various forms which must be submitted to the Commission before a permit to operate is issued.

Some of the more pertinent regulations are given below.

6.1 Any person planning to initiate, or increase the emission of air contaminants as defined in Section 4.4 of these rules and regulations, which emission was not being conducted on or prior to the effective date of this regulation, shall, before beginning construction or modification or operation of any facility which ultimately may result in such emissions, advise the Louisiana Air Control Commission, New Orleans, Louisiana in writing, concerning his intentions, and shall supply to the Commission a report describing what is proposed and the steps which will be taken to protect the air of the State against new pollution or an increase in existing air pollution, such report to include plans, specification, and any other information the Commission deems necessary to make a determination under 6.1.3. Said report shall be prepared in accordance with the general rules, which follow, for submission of industrial waste reports, and no construction or modification of a faculty which ultimately may result in emission of air contaminants as defined in Section 4.4 shall be started until the report has been approved and a certificate of approval for the work has been received from the Louisiana Air Control Commission. All conditions under which such certificate of approval is granted, which are considered by the Commission to be reasonable and necessary, shall be included in the certificate of approval. This regulation does not apply where the projects involved were under actual construction or alteration as of June 19, 1969. It is the intent of this Regulation that suitable controls be applied to new installations and/or in cases where modifications are to be made or where significant changes in emissions are anticipated. This regulation does not apply to emergency operations, however, the Air Control Commission should be advised of such occurrences without delay.

6.1.1

The Department, using guidelines set forth by the Commission, may exempt certain facilities or types of facilities from the requirements of Section 6 if it is found upon investigation, that such facilities or types of facilities will not make a significant contribution of air contaminants to the atmosphere.

6.1.3

In those cases where the Commission has, after proper investigation, determined that any proposed new emission source will prevent attainment or maintenance of state or national ambient air standards or violate applicable portions of the control strategy, the Commission shall have the power to prevent construction or modification does not relieve the owner or operator of responsibility to comply with regulations which are part of the applicable plan.

6.2

Professional Engineer Required. The information submitted in compliance with this Regulation, shall be prepared by or under the supervision of a person properly qualified to perform engineering work as provided in the Louisiana Professional Engineers and Land Surveyors Registration Act. The report containing the required information shall be submitted to the Louisiana Air Control Commission, New Orleans, Louisiana, and shall be approved by a professional engineer as defined in the above named Act or by a responsible official authorized to act for the person on whose behalf the report is submitted.

Said report should be submitted as far in advance of the date approval is desired, as possible.

6.3

To comply with these regulations, the report concerning the contemplated actions enumerates shall include the following:

6.3.1

A brief statement describing the action which is proposed.

6.3.2

A statement giving the location of the industrial plant or manufacturing establishment, or a map showing such location.

6.3.3

A statement giving the location of sources of emission of air contaminants as defined in Section 4.4, the size of the outlets of such sources, the rate and temperature of the emission from such sources and the composition and description of the air contaminants being emitted from said sources.

6.3.4

A statement giving a description of the air pollution abatement measures which will be utilized, and if no facilities within the definition of this term are contemplated, the steps which will be taken to prevent the emission of sufficient quantities of pollutants to result in undesirable levels.

6.3.5

An estimate of the extent to which the emission from the proposed facilities will alter or affect the quality of the air of Louisiana.

6.3.6

Such other pertinent data as may be necessary for a good understanding of the proposal which is being made.

6.4

Nothing herein contained, however, shall require the owner of any industrial or municipal establishment to disclose any classified data of the Federal Government or any confidential information relating to secret processes or economics of operation; however, emission data is not covered by this exception.

6.5

In any case in which there is to be any reduction in emissions, or any alterations in the proposed facilities or process which will not increase emissions, a letter of notification of such reductions or alterations must be transmitted to the Technical Secretary before the changes are commenced. The notification shall include all information required in Section 6.3.

7.0

Pursuant to the provisions of R.S. 40:2204 (A)(3) the Technical Secretary shall make such investigations as are necessary and proper to carry out the purposes of the Louisiana Air Control Law and in connection therewith:

7.1 In the event that compliance is achieved as a result of private conference, conciliation or persuasion, a notice, in writing, to that effect may be sent by the Technical Secretary to the owner or operator of such claimed violation. In the event that the Technical Secretary determines after said private conference that no violation exists the Technical Secretary may send a notice in writing to that effect to said owner or operator of said claimed violation within thirty (30) days.

7.2 All such complaints and notices called for by R.S. 40:2208 (B) shall be sent by certified or registered mail addressed to the person who represented the alleged violator in said private conference; or, if the alleged violator is a corporation addressed to its registered agent for service of process.

7.3 Any investigations made by the Technical Secretary pursuant to R.S. 40:2208 (A) upon receipt of information concerning an alleged violation shall be made only upon receipt by the Technical Secretary of written complaint of a violation of the Louisiana Air Control Law or any of these rules and regulations.

7.4 In the event that any investigation reveals that no violation of the Louisiana Air Control Law or of these rules and regulations if found to exist, the Technical Secretary may advise the complaining person and the person complained against of this fact.

7.5 Any information relating to secret processes or method of manufacture or production obtained by the Commission or the Technical Secretary shall be kept confidential and this Commission will, in the event any such process or method of manufacture or production is involved in any hearing, close such hearing to the public for the purpose of hearing testimony regarding such process or method of manufacture or production and such information and testimony shall not be made a part of the transcript of said hearing. Emission data shall not be considered secret for the purpose of this regulation.

8.0 Air Contaminants.

8.1 Purpose. It is hereby declared to be the public policy of the State of Louisiana to achieve and maintain such levels of air quality as will protect human health and safety, and to the greatest degree practicable prevent injury to plant and animal life and property, foster the comfort and convenience of the people, promote the economic and social development of this State and facilitate the enjoyment of the natural attractions of the State.

8.2

No person or persons owning, leasing, renting, or controlling the operation of any source of air contaminants shall cause, suffer, allow, or permit (willfully, negligently, or through failure to provide necessary facilities or to take necessary precautions) the emission from this source of air contaminants which will result in "undesirable levels" as defined in Section 4.73 herein in the atmosphere over properties other than that of the person owning leasing, renting, or controlling the operation of such source.

8.3

No person shall dispose of refuse or waste material in such a manner as to cause "undesirable levels" as defined in Section 4.73 herein.

8.4

Ambient Air Quality Standards. The standards of ambient air quality listed in Tables 1 & 1a (See Supplements following this compilation for Tables 1 and 1a) define the limits of air contamination by particulates and gases, above which limits the ambient air is hereby declared to be unacceptable and requires air pollution control measures. Until additional pertinent information becomes available through surveillance and research with respect to the effects of the air contaminants listed in Tables 1 & 1a the air quality limits listed in Tables 1 & 1a shall apply in Louisiana. The limits stated include normal background levels of particulates and gases.

8.5

Responsible Persons to Have Tests Made. The Department may require any person responsible for the emission of air contaminants to make or have made tests to determine the emission of air contaminants from any source whenever the Department has reason to believe that an emission in excess of that allowed by these regulations is occurring. The Department may specify testing methods to be used in accordance with good professional practice. The Department may observe the testing. All tests shall be conducted by reputable, qualified personnel. The Department shall be given a copy of the test results in writing and signed by the person responsible for the tests.

All owners or operators of stationary sources shall maintain records and semiannually report to the State data on emissions and any other information needed to determine compliance with these Regulations.

8.6

The Department May Make Tests. The Department may conduct tests of emissions of air contaminants from any source. Upon request of the Department the person responsible for the source to be tested shall provide necessary sampling ports in stacks or ducts and such other safe and proper sampling and testing facilities, exclusive of instruments and sensing devices as may be necessary for proper determination of the emission of air contaminants.

8.7

New Sources Shall Provide Necessary Sampling Ports in stacks or ducts and such other safe and proper sampling and testing facilities, exclusive of instruments and sensing devices as may be necessary for proper determination of the emission of air contaminants.

8.8

Circumvention. No person shall cause or permit the installation or use of any device of any means which, without resulting in reduction in the total amount of air contaminants emitted, conceals or dilutes an emission of air contaminants which would otherwise violate these regulations.

8.9

To aid in controlling the overall levels of air contaminants into the atmosphere, air pollution control facilities should be installed whenever practically, economically and technologically feasible. When facilities have been installed on a property they shall be used whenever any emissions are being made which can be controlled by the facilities, even though the ambient air quality standards in affected areas are not exceeded.

9.0 Control of Air Pollution From Suspended Particulate Matter.

9.1

Ambient Air Quality Standards for Suspended Particulate Matter.

9.1.1

Purpose. The purpose of this section is to maintain concentrations of particulate matter in the ambient air at levels which will not cause damage or injury to plant or animal life. In addition to health considerations, lower particulate matter concentrations will result in economic and aesthetic benefits such as increased visibility and reduced soiling and corrosion.

9.1.2

Scope. This section is applicable to all sources of particulate matter into the ambient air.

9.1.3

Concentrations of Particulate Matter in Ambient Air Restricted. The standards of ambient air quality listed in Tables 1 & 1a define the limits of air contamination by particulates and gases. No person or group of persons shall allow particulate matter to become airborne in amounts which cause the ambient air quality standards to be exceeded. The limits stated include normal background levels of particulates and gases.

9.1.4

Nothing in any other part or section of these regulations shall in any manner be construed as authorizing or legalizing emissions in such manner as prohibited by these regulations.

9.2

Provisions Governing Specific Activities.

9.2.1

Substances which are by nature toxic to human or animal life or vegetation shall be controlled to more restrictive levels than is required for suspended particulate generally, and shall not be emitted in such quantities or concentrations as to produce undesirable levels.

9.2.2

The emissions which pass onto or across a public road and create a traffic hazard by impairment of visibility or intensifies an existing traffic hazard condition is prohibited.

9.3

Exclusions from Application of this Section.

9.3.1

The following matters are excluded from the application of this Section:

Emissions of suspended particulate matter pursuant to and in compliance with the terms of a variance granted by the Commission.

9.3.2

Any person claiming exclusion from the application of this Section under this provision shall apply to the Commission through the Technical Secretary for exclusion. The applicant shall furnish such information as the Commission may reasonably require to enable it to make a determination. The Commission may make such determination and apply such conditions as may be appropriate to the activity in question. A person granted an exclusion under this provision may be required to furnish the Commission for implementing any reasonable control measures which may be developed or which may be developed or which may otherwise become available.

9.4

Measurement of Concentrations.

9.4.1

Particulate shall be measured by the methods listed in Table 2 (See Supplement following this compilation for Table 2) or by such other equivalent methods approved by the Department. The publications or their replacements listed in Table 2 are incorporated as part of these regulations by reference.

9.4.2

The sampling and analytical procedures employed and their numbers, duration and location of samples to be taken to measure ambient levels of air contaminants shall be consistent with obtaining accurate results which are statistically significant and representative of the conditions being evaluated.

V. LOCAL AGENCIES

Numerous local agencies, such as Environmental Protection Districts, Watershed Districts, or Water Conservation Districts have been formed. The powers that these local boards have are generally broad, after granting the authority to issue rules and regulations, make inspections, and institute court actions seeking injunctive relief. Representative examples of these local bodies are presented below.

A. Environmental Protection Districts, R.S. 33:7551-7560.

33:7551. Environmental protection districts, creation by parishes; domicile:

Upon the approval of the majority of the qualified electors of a parish voting in an election called for such purpose, the governing authority of any parish which is divided by the Mississippi River and has a population in excess of 200,000, but not more than 450,000, is authorized and empowered to form and create an environmental protection district or districts within said parish with such name or names as said governing authority may designate. The district may include parts of incorporated municipalities, towns or villages, provided that before any incorporated municipality, town or village may be included within the territory of the district, the governing authority shall first concur by resolution to be included in the district, the governing authority shall first concur by resolution to be included in the district.

33:7553 Corporate status and domicile; funds:

A. Any environmental protection district created under the provisions of this Chapter shall constitute a body corporate and shall have the power and right to incur debts and enter into contracts and to do and perform any and all acts in its corporate name which are necessary or proper for carrying out the objects and purposes for which the district is created, including but not limiting the expropriation of property, the acquisition of equipment, buildings and physical facilities. It shall have the power to sue and be sued, to buy and sell, to acquire by purchase, gifts, expropriation or otherwise every kind of property and servitude, right-of-way and other right deemed necessary to its purpose, and to lease, build, operate and maintain any works or machinery designed to accomplish the purposes of the district. The district shall constitute an agency of the parish designated to carry out an essential governmental function of the parish, all of the property of which district shall be exempt from taxation. It shall have the authority to cooperate and contract with the government of the United States or any department or agency thereof and to accept gifts, grants, donations of property and money therefrom. It shall have the authority to cooperate with

the State of Louisiana or any political subdivision, department, agency, corporation or other environmental protection district of said state for the construction, operation and maintenance of facilities designed to accomplish the purpose for which the district is created on any basis including the matching of funds and by participating in projects authorized by any federal or state law as it may see fit.

B. The governing authority creating an environmental protection district shall designate the domicile of such corporation which shall be located within the district.

33:7554 General powers; purposes

The board of commissioners of an environmental protection district shall have the power to do all things necessary or convenient to carry out the purposes of the district, which purposes shall be:

(1) To insure the prudent development of the land areas adjacent to and bordering the Mississippi River, from the toe of the levee to the banks of the river, including batture lands, and the preservation of the economic and natural environment values of such areas, adjacent to land zoned as residential by the governing authority of the parish. The purposes of the district shall further include the designating of land uses on such lands, the establishment of zoning districts on the lands, and the establishment and maintenance of a master plan for the subdivision, use and development of said lands; and

(2) To insure the preservation of the natural beauty and scenery of those lands along the banks of the Mississippi River, including batture lands, and to undertake, encourage and promote programs for the beautification of said lands, including the development of recreational facilities and park areas.

33:7555 Enumerated powers

In order to accomplish its purpose the board of commissioners of an environmental protection district is hereby authorized to and shall:

Pursuant to its purpose of ensuring the wise development and the preservation of the economic and natural environment of the land areas adjacent to the Mississippi River and zoned as residential by the appropriate governing authority of the parish:

(1) Establish and maintain a master plan for the subdivision, use and development of those lands;

(2) Preserve the natural environment of the lands along the river through the restriction of land usage;

(3) Have the power to cause to be created and constructed playgrounds, picnic grounds, grounds for recreation parks and any and all other facilities to accommodate the public and to provide adequate access to such areas, as may within the opinion of the board of commissioners become necessary, and the district shall have the right of eminent domain and expropriation in the exercise of such power;

(4) To expropriate property in accordance with R.S. 19:1-14;
and

(5) Make and promulgate such rules and regulations and conduct such investigations as it deems necessary to pursue its powers, to carry out its purposes and to insure the implementation of its master plan.

33:7558 Right of entry; assistance

The board of commissioners or its authorized agents may enter at all reasonable times in or upon any private or public property for the purpose of inspecting and investigating conditions relating to the regulation of the use of lands within the district. The board may call upon any officer, board, department, school, university, or other state institutions, and the officers and employees thereof, and require the furnishing of any assistance deemed necessary to the carrying out of this Chapter.

B. Watershed Districts

1. Enumeration

Several Watershed Districts and Water Conservation Districts have been authorized by State Law. Those presently in existence are:

- a. Bayou D'Arbonne Lake Watershed District (R.S. 38:2551-2572).
- b. Cypress-Black Bayou Recreation and Water Conservation District (R.S. 38:2601-2612).
- c. Recreation and Water Conservation District, St. Helena Parish (R.S. 38:2651-2661).
- d. Black Lake Bayou Recreation and Water Conservation District of Red River Parish (R.S. 38:2701-2712).
- e. Bayou De Siard-Bayou Bartholemew Cut-Off Loop Water Conservation Board (R.S. 38:2751-2757).
- f. Franklin Parish Watershed District (R.S. 38:2801-2816).
- g. Black Bayou Watershed District (R.S. 38:2821-2842).
- h. Claiborne Parish Watershed District (R.S. 38:2861-2878).
- i. Jackson Parish Watershed District (R.S. 38:2900-2915).
- j. Jackson-Bienville Parishes Dugdemona Watershed District (R.S. 38:3000-3015).
- k. Greater Baton Rouge Water Conservation District (R.S. 38:3051-3057).

1. Salt Lake Water Conservation District (R.S. 38:3085.1-3085.8).
- m. Teche-Vermillion Fresh Water District (R.S. 38:3086.1-3086.6).

2. Typical Provisions

The statutes creating these Districts are generally the same, although there may be some variance, depending on the location of the District. Some of the typical provisions of these Districts are set out below.

a. District as political subdivision and budgetary unit; purpose

The Bayou D'Arbonne Lake Watershed District shall be a political subdivision of the state of Louisiana and a budgetary unit of the state of Louisiana, which shall have as its purpose the conservation of soil and water, developing the natural resources and wealth of the district for sanitary, agricultural and recreational purposes, as the same may be conducive to the public health, safety convenience or welfare or of public utility or benefit. The creation of the Bayou D'Arbonne Lake within the said district as hereinafter authorized shall be for the purpose of conserving the soil and water and developing the natural resources and wealth of the district for sanitary, agricultural or recreational purposes, as the same may be conducive to the public health or public utility or benefit.

b. Powers of board

In order to accomplish the purposes for which the district is created, the board of commissioners may:

(1) Purchase, hold, sell and convey land and personal property and execute such contracts as it may deem necessary or convenient to enable it properly to carry out the purposes for which it is created.

(2) Acquire servitudes, rights of way and flowage rights, by purchase or by expropriation.

(3) Assist in conserving soil and water and in developing the water resources of the district; provided, however, nothing shall be done to interfere with districts previously organized under Louisiana law. . . .

(5) Cooperate with the department of public works in its construction of any drainage works or improvements, and the construction of any works or improvements for the control, retention, diversion or utilization of water; retard runoff of water and soil erosion, construct any ditch, channel improvement, dike, dam, or levee, and repair, improve and maintain any of said improvements or structures

. . . .

(8) Cooperate and contract with persons, firms, associations, partnerships and private corporations, and cities of this state, or other public corporations and with any other local, state and governmental agencies for the sale or use of any waters impounded hereby. . . .

(10) Do and perform any and all things necessary or incident to the fulfillment of the purposes for which this district is created, including all acts necessary to construct, lease, acquire in any manner, maintain, and operate dikes, dams, reservoirs, storage basins, locks, levees, flumes, conduits, spillways or other structures necessary, suitable or convenient to the purposes of the district.

(11) The board of commissioners of the Bayou D'Arbonne Lake Watershed District shall have the care, management and control of the said lake or reservoir formed by the damming of Bayou D'Arbonne and its property and finances. They shall have power:

(c) To secure the general health of the district; to prevent, remove and abate nuisances; to prohibit the construction of privy vaults and cesspools, and to regulate or suppress those already constructed; to compel and regulate the connection of all property with the sewers and drains; to establish and regulate health and sanitary regulations with regard to construction within the said district; to compel and regulate the removal of garbage and filth within the said limits of the district.

c. Rules and regulations

In order to accomplish the purposes of the district, to protect the works, improvements and property of the district, both real and personal; to secure the best results from the construction, operation, and maintenance thereof, and to prevent damage to the district by the misuse of any works, improvements or properties or by the pollution or misuse of the waters of the district or any water course therein, the board of commissioners may make and enforce such rules and regulations as it shall deem necessary and advisable.

(1) To protect and preserve the works, improvements and properties owned or controlled by the district, prescribe the manner of their use by public corporations and persons, and preserve order within and adjacent thereto;

(2) To prescribe the manner of building bridges, roads, or fences or other works in, along or across any channel, reservoir or other construction of the district;

(3) To prescribe the manner in which ditches, sewers, pipelines or other works shall be adjusted to or connected with the works of the district or any water course therein and the manner in which the water courses of the district may be used for sewer outlets or for disposal of waste;

(4) To prescribe the permissible uses of the water supply, provided by the impoundment constructed as hereinafter set forth and to collect therefor and the manner of its distribution and to prevent the pollution or unnecessary waste of such water supply;

(5) To prohibit or regulate the discharge into sewers of the district of any liquid or solid waste deemed detrimental to the works and improvements of the district.

d. Constructions which would impede flow of waters in watershed prohibited; pollution defined and prohibited; penalties fixed for violations.

A. No person or public corporation shall erect within the drainage area of the district any dam or reservoir upon any stream or water course therein or any work or obstruction diminishing the cross section of any such stream or water course until a copy of the plans thereof has been filed with the board of commissioners and the state department of public works, for approval or rejection by both.

Whoever violates this Sub-section shall be fined not less than \$500.00 or more than \$1,000.00 or imprisoned for not less than 30 days, nor more than 60 days, or both.

B. No person shall knowingly and willfully empty or drain into, or permit to be drained from any pumps, reservoirs, wells or oil fields into any stream or drain constituting the Bayou D'Arbonne Watershed District or from any stream within said district into the said reservoir any oil, salt water or other noxious or poisonous gases or substances which would render the water unfit for irrigation purposes or would destroy aquatic and fish life in the streams.

Whoever violates this Sub-section shall be fined not less than \$100.00 or more than \$200.00 or imprisoned for not less than 30 days nor more than three months.

Each and every day that oil, salt water, or other substances are permitted to flow into natural streams or drains which constitute the watershed district of Bayou D'Arbonne Lake shall constitute a separate and distinct offense.

c. No person shall:

(6) Drain into channels by natural or artificial inlets except under regulations prescribed by the board of commissioners of the Bayou D'Arbonne Lake Watershed District. . . .

(9) In any manner obstruct drainage channels, natural flow drains or natural flowage or violate any of the rules or regulations adopted and promulgated by the board of commissioners of Bayou D'Arbonne Lake Watershed District for preserving and maintaining the efficiency of the drainage channels in said district.

Whoever violates this Sub-section shall be fined not less than \$250.00 or more than \$500.00 or imprisoned for not less than 30 days nor more than 60 days or both.

C. Lake Pontchartrain Sanitary District

38:3201 Lake Pontchartrain Sanitary District

A. There is hereby created a sanitary district, under the name of Lake Pontchartrain Sanitary District, which shall be comprised of the parishes of St. Charles, Jefferson, Tangipahoa, St. John the Baptist, St. Tammany, and Orleans.

B. In order to prevent the pollution of the waters of Lake Pontchartrain, the sanitary district may adopt rules and regulations governing the discharge of drainage, sewerage, and trade waters into Lake Pontchartrain, and into channels which empty into Lake Pontchartrain, within the limits of the aforesaid parishes.

C. The sanitary district may adopt rules and regulations and enforce the same by injunction or mandamus in any court of competent jurisdiction.

D. Capital Area Groundwater Conservation District, R.S. 38:3071-3084.

Of particular interest is the Capital Area Groundwater Conservation District. The District was created by the legislature, and charged with preventing groundwater waste, preserving fresh water aquifers, and controlling subsidence. To these ends, the District is empowered to require registration of water wells, set allowables for water production, and levy a pumping charge on water produced.

The legislature has exempted geopressured wells from the requirements of the Groundwater Utilization Act (R.S. 38:3091-3097), the provisions of which are very similar to those of the Capital Area District. It seems obvious that the legislature intended to exempt geopressured wells from this type of regulation, but, at least as to the five Baton Rouge area parishes that make up the District, it has not done so.

Pertinent provisions of the Capital Area Groundwater Conservation Act are set out below.

38:3071 Legislative finding; purpose

A. The orderly utilization of groundwater resources is hereby found and declared to be a matter of public interest.

B. It is the purpose of this part to provide for the efficient administration, conservation, orderly development and supplementation of groundwater resources by the establishment of a groundwater conservation district composed of the parishes of East Baton Rouge, East Feliciana, Pointe Coupee.

38:3073 Definitions

. . .

(2) "Groundwater" is water suitable for any beneficial purpose percolating below the earth's surface.

(3) "Well" or "water well" shall mean any well drilled or constructed for the principal purpose of producing groundwater.

(4) "Beneficial purpose" or "beneficial use" means the use of groundwater for domestic, municipal, industrial, agricultural, recreational or therapeutic purposes or any other advantageous use to the user.

(5) "User" means any person making any beneficial use of groundwater produced in the district in excess of fifty thousand gallons for any day during any calendar year from a well or wells owned or operated by such person or from a well or wells owned or operated solely for the production of water used by such person.

38:3076 Powers of the board

A. The board shall have authority to do all things necessary to prevent waste of groundwater resources, and to prevent or alleviate damaging or potentially damaging subsidence of the land surface caused by withdrawal of groundwater within the district. The board shall have authority to do, as required the following:

(1) To hold hearings.

(2) To require permits for the drilling or construction of all wells drilled after July 31, 1974, having a capacity in excess of fifty thousand gallons per day.

(3) To require registration with the board of all wells showing the date drilled, the name of the driller, if available, and the current ownership together with such other information as the board may reasonably require to permit it to accomplish the purposes of this legislation. No charge shall be assessed for such registration.

(4) To require that all users of groundwater within the district register with the board showing the number, location, and

capacity of wells owned or operated by them or solely for their benefit and designating the beneficial use or uses of groundwater by them. The board shall classify each user as a municipal or industrial user of groundwater upon the basis of such information. The board shall have authority in its discretion to require periodic renewals of registrations to determine alterations in uses of water within the district. Such registration may be required on an annual basis or such greater periods of time as the board may deem appropriate.

(5) To establish standards for the construction of wells that would come under the jurisdiction of this part drilled after July 31, 1974.

(6) To specify spacing of wells drilled after the effective date of this part in limited areas upon a showing that the water quality, quantity of withdrawal or subsidence in such area threatens the public interest.

(7) To require well owners who are users, well owners providing water to other users, and users of groundwater who are not well owners to keep and furnish, on request, information necessary to carry out the provisions of this part pertinent to wells, drawdowns, grouting, casing sizes, property descriptions and other pertinent information reasonably required by the board, provided that as to wells in existence on the effective date of this part such information is available.

(8) To collect data; to make investigations and inspections; to examine properties, papers, books, and records relevant to groundwater use or conservation; to examine, survey, check test, and gauge all water wells within the district; to require well owners who are users or well owners providing water to other users, at their own expense, to meter wells to permit accurate determination of rates of use. Metering may be required on a continuous or periodic basis, and the board may require approval by it of metering devices; to provide for the keeping of records and making of reports by owners of water wells providing water to users, and users of groundwater within the district.

(9) To require that authorized representative of the board be able to enter property at reasonable times and under reasonable conditions to inspect wells, perform tests and examine records.

(10) To establish standards for the control of existing and future flowing wells and the sealing of abandoned wells.

(11) To require that all abandoned wells be reported and sealed in accordance with such standards.

(12) To establish groundwater use priorities, under conditions supported by research data, which indicate depletion of water subject to this Part.

(13) To acquire by all legal means property or property rights necessary to achieve the purposes of this part and to enter into all contracts necessary to the achievement of such purposes.

(14) To assess against all users within the district a charge based upon the annual rate of use of each user sufficient to meet costs and expenses of operation. Such charges must be uniform as to all users, being assessed on the basis of units of water used, whether a cubic, acre-foot, or other unit be used, and without distinctions or graduations as to total amounts of water produced by individual users or classes of users, except that no charge shall be made against the quantity of water pumped from the Mississippi River alluvial aquifer. Further, such charges shall be assessed and income therefrom used only to defray the costs and expenses of operation of the district assessing them.

(15) To cooperate with and enter into contracts or cooperative agreements with other governmental units and agencies of this state, with governments and agencies of other states and of the United States, and with private agencies or other groundwater conservation districts for the achievement of the purposes of this Part.

(16) To receive grants and enter into contracts for groundwater resource development.

(17) To conduct studies and investigations of all problems concerning groundwater resources of the district.

(18) To take all necessary steps to prevent intrusion of salt water or any other form of pollutant into any aquifer or aquifers, including the powers to operate injection wells to create freshwater barriers against salt water intrusion or the intrusion of any other pollutant; and to control pumping rates by users in any area threatened by intrusion of salt water or other form of pollutant.

(19) Within affected areas, to limit rates of production of water from any aquifer or aquifers, after detailed research, considering both recharge and withdrawal data, when the quality or quantity of the supply of water afforded by such aquifer or aquifers is in danger for any reason or where the danger of damaging subsidence exists.

(20) To use and permit the use of any of its property or facilities for recreational purposes and to operate thereon such concessions as may be appropriate to such recreational use or uses as long as such activities do not increase the net operating expenses to the district.

(21) To sue and to be sued as a body corporate.

(22) To expand the district to include adjacent parishes, upon approval by the board, and with the consent of the governing body of the parish involved, said parish to have the same representation on the board, and subject to the same conditions, as provided for the original parishes included in this part.

(23) To hire such personnel and retain such consultants as shall be reasonably necessary to the performance of its functions. Personnel from other agencies shall be used wherever practical and possible.

B. No order limiting rates of production as authorized in Subsection A of this section shall have the effect of in any way denying to any owner of the land or any other person holding rights to water derivative from any landowner a reasonable opportunity to produce and beneficially use his just and equitable share of the groundwater supply affected by an order limiting rates of production.

C. Anything herein to the contrary notwithstanding, the board formed hereunder shall have no authority to regulate water produced from formations producing oil or gas or both for commercial purposes or to issue any rule, regulation, or order conflicting with regulation of drilling to and production from or disposition of water from such formations by the commissioner of conservation. Nor shall the board formed hereunder have authority to regulate the production of salt water used for pressure maintenance, secondary recovery operations, or other operations for the production of oil or gas.

D. Anything herein to the contrary notwithstanding the board shall have no authority to regulate nor shall it have any jurisdiction whatsoever with respect to a well or wells, the production from which is used exclusively for bona fide agricultural or horticultural purposes or for such purposes and for domestic use of persons resident upon the same premises and capable of producing not more than fifty thousand gallons per day in the aggregate, such well or wells being specifically excluded from the provisions of this Part.

E. The board shall have authority to make, after notice and hearing and to enforce reasonable rules, regulations, or orders necessary from time to time to achieve the purposes and powers as outlined in this Part, and such rules, regulations and orders shall be effective and enforceable immediately upon promulgation in the official journal of each parish affected.

38:3077 Suits and failure to bring suit

A. Whenever it appears that a person is violating or is threatening to violate any provision of this part of a rule, regulation, or order made hereunder, the board shall bring suit to restrain that person from continuing the violation or from carrying out the threat.

B. Venue shall be in the district court in the parish in which the board is domiciled.

C. In any such suit, the board may obtain injunctions, prohibitory and mandatory, including temporary restraining orders and preliminary injunctions as the facts warrant.

D. If the board fails to bring suit within ten days to restrain a violation of this part or any rule, regulation, or order issued hereunder, any person in interest adversely affected by the violation who has notified the board in writing of the violation or threat thereof and has requested the board to sue, may bring suit to prevent any or further violations, in the district court of the parish in which the board is domiciled. If the court holds that injunctive relief should be granted, the board shall be made a party and shall be substituted for the person who brought suit, and the injunction shall be issued as if the board has at all times been the complaining party.

38:3080 Administrative procedure

A. Except as it may be inconsistent with the express provisions of this part, the board formed hereunder shall be governed by the Administrative Procedure Law.

B. At hearings conducted by the board, it shall be proper for members of the board or members of its staff to testify and present exhibits or other evidence.

C. Notice of hearings by the board must be given by publication in the official journal, or by publication in a journal of general circulation in the parish or parishes to be affected. Notice of hearings by the board must be given by publication in a journal of general circulation in the parishes included in the district. The board may designate one of its members to conduct public hearings in its behalf.

D. The chairman of the board may subpoena witnesses and require their attendance and the giving of testimony before the board. He may require the production of any books, papers, or records material to the questions lawfully before him. Subpoenas shall be served by any agent of the board, by the sheriff, or by any other officer authorized by law to serve process in this state. No person shall be excused from attending and testifying or producing books, papers, or records, or from obeying the subpoena of the board or of a court of record on the ground that the testimony or evidence required by him may tend to incriminate him or subject him to penalty or forfeiture. Nothing in this section shall be construed as requiring any person to produce books, papers, or records, or to testify in response to any inquiry not pertinent to some question lawfully before the board or a court for determination. No natural person shall be subject to criminal prosecution or to any penalty or forfeiture on account of anything concerning which he may be required to testify or produce as evidence before the board or a court. However, no person testifying shall be exempt from prosecution and punishment for perjury.

E. In the case of failure or refusal of a person to comply with a subpoena issued by the chairman of the board, or in the case of the refusal of a witness to testify or answer as to a matter regarding which he may be lawfully interrogated, any district court on the application of the board may, in term time or in vacation,

issue an attachment for the person to compel him to comply with the subpoena and to attend before the board with the desired documents and to give testimony upon whatever matters are lawfully required. The court may punish for contempt those disobeying its orders as in the case of disobedience of a subpoena issued by the court or refusal to testify therein.

F. The board shall make a record of all hearings which shall be available for public inspection at the office of the board during reasonable office hours. In the event of a suit contesting any rule, regulation, or order of the board, as hereinafter provided, the board shall cause a transcript of the record to be made at its cost. In the event the party contesting any rule, regulation, or order in any such suit is ordered to pay costs, he shall be required also to reimburse the board for the cost of making the transcript of the hearing in question.

38:3081 Court review and injunctive relief

A. Any aggrieved person of the district may, within thirty days after the adoption of any rule, regulation, order or taking of other action by the board, file suit in the district court in which the board is domiciled, to contest the said rule, regulation, order or other action taken. The court may affirm the decision of the board or remand the case for further proceedings. The court may reverse or modify the decision if substantial rights of the appellant have been prejudiced because the administrative findings, inferences, conclusions, or decisions are:

- (1) In violation of constitutional or statutory provisions;
- (2) In excess of the statutory authority of the board;
- (3) Made upon lawful procedure;
- (4) Affected by other error of law;
- (5) Arbitrary or capricious or characterized by abuse of discretion or clearly unwarranted exercise of discretion; or
- (6) Manifestly erroneous in view of the reliable, probative, and substantial evidence on the whole record. In the application of the rule, where the board has the opportunity to judge of the credibility of witnesses by firsthand observation of demeanor on the witness stand and the reviewing court does not, due regard shall be given to the board's determination of credibility issues.

On institution of any such suit, the court shall issue an order setting the matter for trial, as by summary process, and such suit shall be tried in term time, or in vacation, with the greatest possible dispatch. Pending a hearing, the court may grant a temporary restraining order suspending the action of the board upon a showing of immediate and irreparable injury in accordance with the provisions of Louisiana Code of Civil Procedure Article 3603.

38:3083 Violations; penalty; jurisdiction; attorney general
to conduct suit; complicity

A. Whoever knowingly and willfully violates a provision of this part or a rule, regulation, or order of the board made hereunder, shall be subject to a civil penalty of not more than one thousand dollars a day for each day of violation and for each act of violation, if a penalty for the violation is not otherwise provided in this part.

(1) The place of suit to recover this penalty shall be selected by the board, as may be appropriate, in the district court of the parish of the residence of any one of the defendants, or in the district court of the parish where the violation took place.

(2) Suit shall be at the direction of the board, and shall be instituted and conducted in its name by the attorney general or by the district attorney of the district under the direction of the attorney general.

FOOTNOTES TO CHAPTER VIII

1. 227 La. 866, 80 So.2d 845 (1955).
2. 237 La. 585, 111 So.2d 781 (1959).
3. Rhoner v. Austrial Oil Exploration Company, 104 So.2d 253 (La. App. 1st Cir. 1958).
4. It might be noted, in connection with the discussion in the preceding section of this chapter that the provisions of law hereafter mentioned regulating the disposal of waste into waters of the state and control thereof by the Stream Control Commission have been interpreted as giving a private right of action to enforce them by persons whose property has been injured or adversely affected by the violation of the Act. See: Montent v. Nicklus Drilling Co. 135 So.2d 805 (La. App. 3rd Cir. 1961); Tuten v. Shell Oil Co., 26 So.2d 757, (La. App. 2d Cir. 1946); Greer v. Pelican Nat. Gas Co. 163 So. 431 (La. App. 2d Cir. 1975), White v. Edgels Pet, Co. 4 La. App. 20 (1925).
5. R.S. 56:1431-1446
6. Infra p. 234.
7. This article was recently revised by the legislature and the substance of its provisions divided. No significant change appears to have been worked by the amendment, however. See Articles 655-657 as revised by Act 514 of 1977.
8. Moreland v. Acadian Mobile Homes Park, Inc. 313 So.2d 877 (La. App. 2d Cir. 1975)
9. R.S. 30:802
10. 42 U.S.C. §300 h, Pub. Law 93-523.
11. See Tarlock, An Environmental Overview of Geothermal Resources Development, (T.I.S. 1977).

12. Act 705 of 1977.
13. Louisiana State University was, at the time of writing, assisting in the preparation of an extensive revision of the act to meet federal objections to it. To what extent the Legislature may accept such provisions and the extent to which other proposals may ultimately be adopted is presently a matter of conjecture.
14. Tarlock op. cit. note 11.



CHAPTER IX

THE GEOPRESSURED LEASE

I. INTRODUCTION

Absent some major revision in the legal system, the geopressured developer will almost certainly procure his rights to exploit the resource by means of a lease from the landowner or the owner of a mineral servitude covering the geopressured rights. There has apparently already been some scattered leasing of the resource in isolated parts of the state. The leasing which has occurred as well as the provisions of the Geopressured Energy Resources Act reflect a tendency to adopt as a model the leasing pattern which has developed in the oil and gas industry. Although there are sufficient similarities in the two resources to permit certain aspects of the oil and gas lease to serve as a useful guide for developing a geopressured lease, there are also sufficient dissimilarities to cast doubt upon the desirability of following too closely the oil and gas model.

This chapter will present a suggested form for a geopressured lease. The purpose of doing so is not so much to offer the form as one which should be adopted in all cases nor to advance it as being superior to other types of leases which might be used. In fact the form suggested may present some problems which in particular cases would make it less desirable than some other approaches. It is hoped rather that its provisions will serve as a practical example of some of the difficulties which may be encountered in the preparation of a geopressured lease and to indicate by such means possible methods of resolving those difficulties.

Before entering upon a detailed discussion of the provisions of a geopressured lease, it might be well to review some features of the model for leasing which has been almost universally adopted by the oil and gas industry and to comment briefly upon some of the implications those features might have if they are applied to the geopressured resource.

II. THE MODERN OIL AND GAS LEASE

The early history of the law of oil and gas and the assumptions upon which it was based have previously been alluded to.¹ These same assumptions so molded the form of the oil and gas lease that its provisions are neither understandable nor perhaps even workable in their absence. Space does not here permit a recounting of the various stages in the development of the modern oil and gas lease which are well chronicled elsewhere.² Suffice it to say that the oil and gas leases which are in current use in the Gulf Coast area almost universally contain the same basic provisions, the most significant of which for present purposes are those relating to the term of the lease and the royalties payable under it.

A. The Term of an Oil and Gas Lease.

The term of the modern oil and gas lease as first crystallized was generally expressed to be a fixed period (customarily referred to as the "primary term") and as long thereafter as oil and gas is produced in paying quantities, (the latter clause being referred to as the "habendum" clause). The lease also customarily provided that the lessee was obligated to commence the drilling of a well or in lieu thereof to pay a rental within a given period (usually a year) from the date of the lease. This rental, called a delay rental, was

originally stipulated for the privilege of delaying the obligation to promptly commence exploration of the premises, which the courts, it will be remembered, had held was implied by the leasing arrangement even in the face of a fixed term and absence of any express obligation to drill. The leases further provided that the failure to commence a well or pay the delay rental within the time fixed would result in a termination of the lease. Payment of the delay rental extended for a fixed period (also usually a year) the time in which the lessee might commence his drilling operations. The lessee was also given the option to defer drilling for similar successive periods during the primary term upon making the rental payments. If at the end of the primary term production was occurring the lease would continue as long as oil or gas in paying quantities was produced. If production was not then occurring the lease was at an end.

This basic pattern contained a number of defects which most current leases attempt to cure. If the initial well was unsuccessful, there was originally no express indication as to what might thereafter occur. It was apparently assumed that the presence of an unsuccessful well would ordinarily cause the lessee to abandon the premises and terminate the lease. This was undoubtedly true in the case of early leases which covered small tracts and when the geology of oil and gas accumulations was little understood. However, as it became customary to lease larger tracts and geological knowledge increased it became apparent a single well, even though nonproductive, might afford no evidence as to the productivity of other portions of the leased premises or even provide valuable evidence as to the location of such deposits. In such a case the lessee might wish to retain his rights notwithstanding

the dry hole. Since the delay rental clause was ordinarily expressed only in terms of deferring the obligation to commence the initial well, once a well was drilled, the implied obligation to explore the premises would seem to dictate that if the lessee wished to preserve his rights he would have to continue to explore the premises by promptly commencing the drilling of additional wells, although a contrary view was also reasonably arguable.³ Consequently, most forms now contain provisions giving the lessee who drills an unsuccessful well during the primary term several options. He may resume payment of the delay rentals for the privilege of maintaining the lease until he again drills; he may be given a brief period, usually sixty to ninety days to commence the drilling of a subsequent well; or he may do nothing and the lease will simply terminate.

A second source of difficulty existed if a well was being drilled at the end of the primary term or had been successfully completed but was not actually producing. Under the literal terms of the habendum clause the lease would terminate. This was particularly aggravated in the case of gas since it is not uncommon for a well to be successfully completed in a gas reservoir under circumstances where the production from a single well was inadequate to justify construction of a pipeline to transport the gas and actual production would have to await completion of additional wells in the reservoir or where the construction of the pipeline might take an extended period and not be completed until after the primary term expired. The problem was not as critical in the case of oil since it can ordinarily be turned into tanks and trucked or somehow transported away from the premises on very short notice. This problem was remedied by the

addition of provisions extending the lease if the lessee is drilling at the end of the primary term and of "shut in royalty" clauses which permit the continuance of the lease after the end of the primary term by the making of payments to the lessor so long as there is a well located upon the premises capable of producing gas in paying quantities but which is shut in for lack of a market or other reasons. Unfortunately, the nature of the payments under the "shut in" clauses is not always clearly characterized. They are sometimes referred to as rentals and sometimes as payments in lieu of production royalties. This raises questions as to who is entitled to receive the payments as between a royalty owner and the mineral owner or landowner.⁴ Also, whether the well is considered to be "producing" within the terms of the lease for other purposes⁵ is sometimes unclear. Finally, if such payments can be continued indefinitely a question may exist as to whether the term of the lease is definite enough to meet the requirements of law.

Finally a problem existed with habendum clause which implies the term of the lease ends when production in paying quantities ceases. If a well ceased to produce for mechanical or other reasons or if the particular formation in which it was completed became exhausted the literal terms of the habendum clause would work a termination of the lease even though the lessee might promptly and diligently restore⁶ production by reworking, deepening or other similar activities. Accordingly, most leases now contain provisions which permit the extension of the term for a period after production ceases during which the lessee may commence operations to restore the production. These periods are customarily quite brief - sixty to ninety days being the norm.

The provisions of the modern oil and gas lease brought about by these problems can be perhaps best illustrated by those contained in one lease from which is widely used in South Louisiana:

4. Prior to the time that oil, gas or some other mineral is being produced from the leased land or land pooled therewith (or with any part thereof), Lessee may maintain the rights granted during and after the primary term by carrying on operations on said lands or land pooled therewith (or with any part thereof) without the lapse of more than ninety (90) days between abandonment of work on one well and the commencement of operations for drilling or reworking another; and during the primary term such operations may be discontinued and the rights granted maintained by commencing or resuming rental payments, by paying within ninety (90) days from the discontinuance of operations (regardless of the fixed rental paying date) the proportion of the fixed yearly rental that the number of days between the end of said ninety (90) days and the next ensuing rental paying date or the expiration of the primary term bears to the twelve months' period; but, if said ninety (90) days should expire prior to the initial rental paying date or during any year for which rental or other payment has been made, no rental shall be due until the next fixed rental paying date, or, as the case may be, for the balance of the last year of the primary term."....

6. After the production of oil, gas or any other mineral in paying quantities, either on the leased premises or on lands pooled therewith (or with any part thereof), the rights granted shall be maintained in effect during and after the primary term and without the payment of the rentals hereinabove provided for so long as oil, gas, or some other mineral is being produced in paying quantities. It is provided, however, that if, after the production of oil, gas or other minerals in paying quantities, the production thereof should cease from any cause, and Lessee is not then engaged in drilling or reworking operations, this lease shall terminate unless Lessee resumes or restores such production, or commences additional drilling, reworking or mining operations within ninety (90) days thereafter and continues such operations without the lapse of more than ninety (90) days between abandonment of work on one well and commencement of reworking operations or operations for the drilling of another, in an effort to restore production of oil, gas or other minerals, or (if during the primary term) commences or resumes the payment of rentals in the manner hereinabove provided for in connection with the abandonment of wells drilled. Lessee shall not be required to produce more than one mineral, the production of any one mineral in paying quantities and with reasonable diligence being sufficient to maintain all of Lessee's rights. In the event that any well on the land or on property pooled therewith (or with any part thereof), is capable of producing gas or gaseous substances in paying quantities but such minerals are not being produced, then Lessee's rights may be maintained, in the absence of production or drilling operations, by commencing or resuming rental payments as hereinabove provided for in

connection with the abandonment of wells drilled. Should such conditions occur or exist at the end of or after the primary term, or within ninety (90) days prior to the expiration thereof, Lessee's rights may be extended beyond and after the primary term by the commencement, resumption or continuance of such payments at the rate and in the manner herein provided for rental payments during the primary term, and for the purpose of computing and making such payments the expiration date of the primary term and each anniversary date thereof shall be considered as a fixed rental paying date; provided, however, that in no event shall Lessee's rights be so extended by rental payments and without drilling operations or production of oil, gas or some other mineral for more than five consecutive years. ⁷

The most significant aspects of these provisions, other than their complexity, is that the time given the lessee to act after a well is drilled or production ceases is quite brief and the failure to act results in the termination of the lessee.

The failure to pay delay rentals or to commence a well has been viewed by the courts as a resolatory condition (or to use common law terminology, a condition subsequent) to the lease. ⁸ The right to pay or drill is at the option of the lessee and his failure to do either has not been viewed as a breach or default of the lease or even a forfeiture but, merely an election not to continue it. ⁹ Consequently, courts have been quite technical in their application of the provisions, in substance holding that a late payment or failure to make a payment or the commencement of a well after the date allowed is totally ineffective without regard to whether the lessee intended to make the payment or drill the well and failed to do so for good reasons practicably beyond his control. ¹⁰ Furthermore, the failure to pay the rentals in the proper amount or to the proper person has also generally been held to be totally ineffective although the more recent cases in Louisiana, at least, have somewhat tempered this in cases where there was a good faith and deliberate attempt by the lessee to do so and the error was minor or inconsequential. However the courts have apparently considered it

essential for some action to have been actually and timely taken which it could find to be a substantial exercise of the election given the lessee before any discretion could be exercised by them in declaring the lease extended.¹¹

A very real, but perhaps not so obvious, consequence of such a lease is that the lessee must establish and maintain quite accurate and detailed records as to the rentals which he must pay and of the time and manner of making such payments if he wishes to preserve his rights. Transfers, assignments, deaths, and other changes in the ownership must be carefully and rapidly scrutinized to determine the effect they might have under the terms of the lease upon the payment of such rentals. Operations on the premises must be carefully monitored and the effect which the commencement or completion of a well or the termination of production may have upon the obligations to make payments or commence additional operations must be regularly and intelligently considered. Unitization and the modification or revision of units frequently complicate the problems.¹² The intricate provisions of such leases in the light of the technical requirements of the law require a company of even modest size to maintain a highly expert and sophisticated lease rental system supervised by knowledgeable and intelligent experts learned in the law of oil and gas. There is admittedly a slight advantage to the oil and gas industry in this system in that the termination of a lease will occur automatically by a failure to act. If rentals are high and a group of leases are dependent upon the success of the drilling of an individual well, the lessee may be certain that he will not incur the obligation to pay rentals on leases which may be worthless to him because he fails to formally release them. On the whole, however, one suspects that if the industry started today to devise a lease the delay rental - "drill or pay" - approach would not be deliberately adopted.

As applied to the geopressured resource the "drill or pay" approach seems even less desirable. If one assumes the geopressured resource may require an extended time for development and the maintenance of leases covering large areas or if there may be considerable periods where production may be interrupted - as where an electric generating plant is shut down for repairs, the operators holding such leases might find it quite difficult to maintain their rights. A much simpler and less expensive approach would appear to be to provide for the continuance of leases for a fixed term and extended periods in the absence of actual production with a right by the geopressured operator to release them at will but obligating him to pay reasonable rentals when no production is occurring. The risk of overlooking the release of a lease and incurring the continuing obligation to make rental payments would probably be more than offset by the added cost and expense of maintaining the kind of surveillance which is required to insure payment is properly and timely of delay rentals to prevent the inadvertent termination of a lease. In any event the relatively brief periods usually given to obtain and restore production may prove to be quite inappropriate for the geopressured resource.

B. Royalty Provisions

The other distinctive feature of the oil and gas lease is found in its royalty provisions. These have two aspects which reflect characteristics of the oil and gas industry which differ greatly from other mining or extractive ventures. The first is the relatively high rate of royalty one encounters and the second is in the very simple provisions for determining the base against which the royalty is to be calculated. The royalty in most instances is stated to be

a fractional part of the product itself or a fractional part of the market value of the product.

1. The Amount of the Royalty

For many years a one-eighth royalty on oil and gas was so customarily stipulated that the industry and even the courts sometime acted as if there were some positive requirement of law that it be that fraction. The "landowner's royalty" was almost unconsciously assumed to be one-eighth. In recent years, and in Louisiana in particular, royalties of one-sixth or even one-fourth have been not uncommon. In fact, in South Louisiana today a one-sixth royalty would probably be considered as the most customary fraction if any particular amount could be so considered at all. On the other hand, it has been the authors' experience that in other extractive industries royalties of one to five percent of the value of the minerals produced are probably the norm and royalties of the magnitude of those customary in the oil and gas industry are seldom encountered.

The most important factor accounting for the high rate of oil and gas royalties is that the greatest risk and expense of a venture ordinarily occurs in the exploratory stage. While the finding of commercial deposits of other kinds of minerals may be no less expensive or time consuming, the risk of success or failure in the oil and gas business is ordinarily assured upon the drilling and completion of a well. Other industries generally experience much greater risk in developing and producing the mineral once a deposit is located. Operating costs tend to be low in relation to income in oil and gas production and it has only been in recent years that one would intentionally seek to develop an oil and gas deposit which was thought to be of marginal profitability. Furthermore, the custom of paying substantial rentals of any consequence during the

primary term of an oil and gas lease is of quite recent vintage. For many years delay rentals were nominal in amount, one dollar per acre per year being quite customary. The idea of paying minimum royalties or rentals during the development of the deposit which is common in other industries, has never been considered necessary since it is assumed that once oil and gas is discovered production will begin almost immediately. It will be recalled that this assumption gave rise to the necessity for shut in payments in the case of gas wells. If one assumes a lease can be taken for a fixed initial cost, that the risk of the venture is in finding the deposit, that until it is found the rights can be held for little or no additional expense and finally that a commercial deposit, if discovered, will be the source of almost immediate revenue entailing relatively minor production costs a high royalty can be justified. In one very real sense of the word the lessor in such a case, by accepting small amounts until production commences and the success of the venture is assured is sharing in the risks of the venture and is entitled to a proportionately higher return. He will receive very little if his property is ultimately proven to be nonproductive and the lessee's capital investment in the venture as a result of the lease will be minimal until its profitability is demonstrated.

One might contrast this with the practice in the "hard" mining industries where leases are seldom taken until the existence of a potentially commercial mineable deposit on the property is known and where, to prove the profitability of such a deposit, extensive capital costs must be incurred and a long period of development may be required even after the initial production begins. Expensive treatment and processing facilities may have to be constructed and

a relatively low return upon the invested capital may be encountered. Furthermore, production of most of these kinds of minerals has been quite susceptible to economic factors such as fluctuations in price and market demand. Profitable operations may become uneconomic for reasons totally beyond the control of the operator and which are unpredictable at the time the operation is commenced.

In summary, the oil and gas industry is ordinarily not particularly capital or labor intensive in the development and production stages of the venture and the risk and expense predominately occurs prior to the date production begins. Other mining ventures tend to have the greatest risk and expense concentrated in their development and production phases and are much more capital and labor intensive during those periods. The royalties which can be justified under such conditions tend to be much smaller. A royalty incurred before the success of a venture is assured, will have a magnified effect upon the economic appraisal of the venture under the traditional cost versus rate of return analysis used in evaluating potential capital investments.

If one analyzes the geopressured resource and the risks it entails it would appear that serious questions can be raised as to the appropriateness of royalties in the range of those customarily provided for in oil and gas ventures, even as to the methane contained in the geopressured waters. Locating a potential geopressured reservoir does not appear to offer the same degree of uncertainty or risk as is the case of oil and gas. The Department of Energy is presently underwriting research designed to locate and define potential geopressured reservoirs which may be capable of profitable development. On the other hand, present state of

knowledge about the resource and the problems of its development tend to indicate that substantially greater risks may be involved in its development and production than is in the case with oil and gas.

Some of these risks are already apparent, although to precisely determine their significance one will have to await further technological assessment of the factors giving rise to them. Among the most important of these are the following: The first is the amount of methane which may be contained in the water. The presence or absence of substantial quantities of methane in a particular reservoir; whether it is disseminated throughout the water or is trapped in particular areas and what effect the lowering of the reservoir pressure may have upon the ability to produce it over the life of the deposit are all matters which may be critical to the economic success of the venture. Secondly, the size of a reservoir and its ability to deliver the large quantities of water which may be required over many years must be assured. Thirdly, whether a well in such a reservoir will be capable of delivering and sustaining over a long period production of water at rates upwards of several thousand barrels per day must be determined. Fourthly, whether available equipment will be satisfactory for the long term handling of large quantities of hot, high pressured and perhaps highly mineralized water may be critical. Fifthly, whether substantial subsidence to the surface will occur as a result of the extraction of the geopressured fluid may be critical to its success but may not be determinable until after production has been underway for a considerable period. Many of the potential reservoirs lie under low coastal areas where even a modest settling of the surface may produce totally unacceptable environmental effects. Finally, a satisfactory method of disposing of the water after

it has been used must be devised. It is doubtful in most cases that any method of surface disposal will prove satisfactory although in some areas injection into deep gulf waters may be feasible. The temperature and amount of solids in the water of course will be critical to such a determination. If subsurface disposal is required formations which will accept large quantities of fluid at high rates of injection without undue pressure requirements over a long period and without adverse consequences to fresh water aquifers or existing pools of hydrocarbons will be required. If only the methane is valuable then perhaps reinjection into the reservoir from which the water was produced may be feasible. The cost of such injection, however, may prove to be prohibitive and this may have to be determined.

Aside from the question of whether methane is present in substantial amounts, it is doubtful that sufficient data can be accumulated to arrive at a reasonably satisfactory determination of these matters without some extended period of preliminary operation or testing of a particular site and even then considerable residual risk of error or uncertainty as to these factors may remain. As the development of the resource progresses generally it is of course probable that the data accumulated from developed reservoirs will permit more intelligent and rapid appraisal of these factors as they may apply to newly discovered reservoirs. It is unlikely, however, that such information will be readily translatable from one reservoir to another without extensive data being gathered from the potential reservoir and it is not unlikely that an extended period of testing or demonstrative operation on a smaller scale than is optimally desired may be required in many instances.

If these assumptions are correct it would also appear that a developer who undertakes such data gathering or testing will in substance be assuming much of the risk of proving the economic potential of the entire reservoir. In deciding whether to take those risks the developer will undoubtedly weigh their cost against the benefits expected to directly accrue from that part of the reservoir he controls. Furthermore, despite the best efforts of engineers or geologists to predict such things as reservoir life; the capability of wells to deliver to depletion without expensive reworking or stimulation procedures; the lack of unacceptable subsidence, and the effectiveness and expense of disposal procedures, it is unlikely the risks inherent in them will be determinable with the same degree of certainty as soon as is the case with an oil and gas reservoir. Accordingly, the rate at which the initial development costs can be recovered and the magnitude of those costs may well be critical to the willingness of the investor to risk his capital. A large royalty payable during production but before these matters are satisfactorily determined will have a direct and detrimental effect upon the economic evaluation of the venture. Such considerations appear more important if the heat and pressure of the waters are to be seriously exploited as a source of energy than will be the case if production of methane is the primary goal. The investment in the latter instance will essentially be limited to production and disposal facilities and will be recoverable out of the production from an individual well. On the other hand, any large scale use of the geopressured heat and pressure if it requires multiple wells and extensive surface facilities may require assurance that several wells will be available to support their cost.

That is to say if one is looking to the methane in the water as a source for the return of his investment, the economic viability of

the prospect will, like an oil or gas well, be essentially limited to the success or failure of an individual well and except for the economies which may be realized by the common operation of several such wells or of the disposal, gathering or separation facilities or the necessity for a minimal amount of production to justify construction of pipeline or distribution facilities, the risks will be largely based upon an appraisal of the success or failure of each individual well. Furthermore, the failure of a particular well or its inability to maintain the degree of production originally contemplated, while affecting the ultimate profitability of the development will not directly affect the profitability of those wells which are proven to be successful or result in the loss of their investment. On the other hand, if one envisions the appropriation of the heat and pressure from geopressured reservoir for the generation of electricity or the large scale conversion of that heat and pressure into another useful form and if the facilities to accomplish this require the input of a number of wells then the inability to obtain the requisite number of wells, or, more importantly, the premature failure of one of them and the inability to restore it or another like it may render the entire project valueless. All of these factors may make the size of the royalty which the lessee pays much more critical to the success of his venture than is the case with oil and gas.

2. The Method of Determining the Royalty.

Determining a reasonable basis upon which to calculate a royalty appears much more difficult in a geopressured lease than is the case with oil and gas. Oil and gas are fungible and except for the extraction of water which may usually be easily separated at the well head they are usually marketable at the well in their produced form. Only rarely does

oil have to be processed and if it does it is usually done on a fieldwide basis. Gas may contain liquids or heavier fractions such as butane, propane or pentane which should be removed from it and which involves a limited form of manufacturing. The process, however, is not complicated and the end products are usually easily divided and sold. Most modern leases provide for a cost sharing arrangement as to such processing, basing the royalties payable upon the gas remaining after the heavier hydrocarbons have been extracted and a percentage of the products extracted. Because of the nature of the products the modern oil and gas lease ordinarily provides that the royalty payable to the lessor is a fractional part of the product or of its gross value. In those cases where the royalty is stated to be a fractional part of the product itself the lessor is entitled to receive the product "in kind", and he is considered to be the actual owner of that part of the oil or gas produced. He may theoretically make his own arrangements for its disposition. The leases also ordinarily provide that if he fails to do so (which is probably the case in the majority of instances) the lessee may dispose of the product on such terms and conditions as he disposes of his own. Under such a lease the royalty is paid when the oil or gas is sold. The "in kind" royalty is probably most customary for oil. Royalties on gas for pragmatic and historic reasons usually do not provide for an "in kind" payment but are cast in terms of a percentage or fraction of the "value" of the product at the well. If the lessee sells the gas to a pipeline the value is usually defined to be the price he receives. If he takes it into his own pipelines then the market value of the gas in the field or vicinity is used as a base. There are usually sufficient sales by other parties in a field to make the determination of such value relatively simple. A few cases involving

isolated or peculiar situations have engendered difficulty and in recent years the regulation of prices by the Federal Power Commission has caused problems in determining how market value should be ascertained. On the whole, however, little difficulty has been experienced by the industry in determining the value of the product upon which royalties are to be calculated.

The methane content of the geopressured waters should be susceptible of fairly easy valuation and a royalty based upon some fractional part of the methane should create no more difficulty than in the case of ordinary gas and oil leases. A variable royalty based upon the methane content of the water starting at modest rates and increasing as the methane content itself increases may have some advantage to the geopressured lessee. Such a royalty could make a considerable difference in the success or failure of the venture given the appropriate circumstances. More will be said about this in connection with the discussion which follows of the royalty provisions of the model lease.

If one assumes that the heat and pressure of the geopressured waters are also going to be utilized by the lessee for some useful purpose, unless the lessee is supplying the heat and pressure to a third person, considerable difficulty may be encountered in satisfactorily determining the basis upon which royalties should be calculated. In any event the determination of the royalty and the definition of the basis upon which it is to be calculated in a geopressured lease appear to present problems not present in the case of oil and gas leases and the matter should be carefully considered in devising a geopressured lease.

III. THE GEOPRESSURED LEASE - A PROPOSED FORM.

With these general comments the following form is set forth as a model for a geopressured lease. It will be noted that it does not adopt

the delay rental, "drill-or-pay" approach in oil and gas leases but instead contemplates a more definite term, much greater freedom by the lessee to retain the lease during periods when no production is occurring and minimum rentals for this privilege. Whether such a lease will be acceptable to lessors who are used to dealing with oil and gas exploration is a matter which cannot presently be determined. One possible difficulty with such a lease is that its form may appear strange to lessors who have had experience with oil and gas matters. This may make a lease more difficult to negotiate and must be considered as a possible negative feature of it. On the other hand, if one assumes that the royalties which are offered by the lessee will be substantially less than those customarily encountered in the oil and gas industry then utilizing a lease form which has the superficial appearance of a customary oil and gas lease may make it much more difficult to convince the lessor that he should lease his lands for what may appear to him to be a small royalty. If the form of the lease is different and creates the appearance that the geopressed resource is in fact not the same as oil and gas and that it entails entirely different considerations, it may enhance the probability that the lessor can be convinced that he should not receive royalties of the same magnitude. Whether either of these factors will be relevant when one actually attempts to negotiate leases in the field cannot now be determined.

GEOTHERMAL LEASE

This agreement entered into and effective on the _____ day
of _____ 19 ____ by and between

hereinafter simply referred to as "Lessor" (whether one or more)
and
hereinafter simply referred to as "Lessee"

W I T N E S S E S T H A T:

Lessor, in consideration of the sum of _____
Dollars (\$ _____), receipt of which is acknowledged, and of
the other benefits hereafter stipulated, leases the lands hereafter
described to Lessee for the purposes and upon the terms and conditions
hereafter set forth.

This clause requires little comment. One caveat should be noted.
The lease contemplates, as do most modern mining leases, that the
lessee may release and abandon the premises at any time. (See Article
8.04 hereafter). Unless some "bonus" or initial cash consideration
is paid to the lessor for the lease such a release clause may well
cause the lease to constitute a "nudum pactum" on the part of the
lessee. This would in turn cast doubt upon whether the lessor is bound
and might permit him to repudiate the lease at least before actual
mining operations were commenced.

Article 1: Purposes of The Lease:

1.01 Lessee shall, with respect to the leased premises, have
the sole and exclusive right to prospect for, develop, produce, and
retain geothermal or geopressed waters or other waters found at
depths of greater than _____ feet below the surface of the earth
and to use and appropriate such waters and the heat and pressures
thereof for any useful purpose, and also to retain and use or
dispose of any substances of any type or nature including petroleum,
natural gas or other hydrocarbons which may be found in solution
in or be produced in association with such waters.

1.02 There is excluded however from the rights leased the right to produce and save oil, gas or other hydrocarbons which are accumulated in reservoirs under the leased premises and which may be economically produced in paying quantities by conventional methods of production at the time of their discovery. All of the substances which may be produced and saved under the terms of this lease are herein referred to as the geopressured products.

This is undoubtedly one of the most difficult and perhaps unsatisfactory clauses to draft in light of the possible existence of methane in the water. Until more is known of the nature and occurrence of methane and the effect of the withdrawal of water in large amounts from the geopressured aquifer one cannot be certain as to whether the hydrocarbons will be in solution or may be found in discrete accumulations. There is a possibility that the methane may run the gamut from that which is entirely in solution to accumulations in pockets or reservoirs with a little or no water. The lessor will probably be unwilling to lease his land for the low royalties which one must assume will be carried by the geopressured lease if he believes the lessee may actually encounter oil or gas in reservoirs capable of being produced in paying quantities by conventional techniques. At the same time, it may develop that the difference between geopressured methane and ordinary gas reservoirs is but one of degree and any attempt to draw the line between the two in such a case is bound to be unsatisfactory. For this reason the geopressured developer may wish to consider adopting a sliding scale royalty on methane based upon the ratio of gas to water. If the location of the prospective geopressured aquifer is known and capable of relatively easy definition a better approach might be to specifically lease the structure or formation in which the geopressured waters are found may be found for whatever values they may contain. An alternative clause using this approach would be as follows;

Article 1.01 (Alternate Provision)

1.01 Lessee shall have the sole and exclusive right to prospect for, develop, produce and retain all geopressured or other waters, oil and gas or other hydrocarbons, salt, sulphur or any other useful substance or mineral of any type or nature of present or future value which may occur naturally in or as a part of the land described hereafter as the leased premises and which may be found or produced from under such lands between the following depths or from the following formations to wit:

Whether such an approach is viable is difficult to tell. It also presupposes that one will know, within reasonable limits, what formations or strata may contain the geopressured waters.

1.03 Lessee is also granted the right to use the leased premises for any purpose incidental to or necessary for the production, utilization or disposition of the geopressured products from the leased premises or from other lands in the same area or field including, specifically, the right from time to time to conduct exploration activities, drill wells, lay pipelines, build roads and canals, locate rigs, tanks, separators, compressors, or other facilities necessary or useful to the development, production, utilization or disposition of the geopressured products produced from the leased premises or such other lands.

This clause is obviously indispensable for joint or multi-lease operations. Several comments are in order:

1. If the lessor is a servitude owner he may not possess the right to use the premises for operations on other lands nor to inject waters produced from other lands. If his servitude does not grant these rights (and most do not) then he could not lease them. Unitization binding upon the landowner as a matter of law such, as the one established by the Commissioner, would seem to be the only practical method of curing the problem.

2. Although the terms of the lease are probably broad enough to permit locating generating facilities or other facilities necessary to utilize the geopressed waters on the premises, it is doubtful a lessee should rely such right to locate permanent facilities upon the premises if they may be required for production from other tracts. The termination of the lease because of the failure to produce from the leased premises would cause termination of the ancillary rights to use the surface under these clauses. A better and more customary method of obtaining the right to construct plants or other permanent facilities which may have a use or value unconnected with the lands being leased is to do so by obtaining a separate "surface" lease of the land rather than relying upon such ancillary use clauses.

1.04 Lessee may utilize the leased premises to dispose of any waste water or other substances produced or obtained in the exercise of the rights granted under the terms of this lease, or derived from other lands in the same area or field by injecting such substances into the ground, or by otherwise disposing of them in any manner permitted by law.

The first clause of this article would undoubtedly be implied as a matter of law from the nature of the lease as would the rights granted by the first clause of the preceding Article 1.03. Because of their importance, however, it was thought best to specifically incorporate them in the lease. The comments to the preceding Article relative to operations on adjacent tract in the case of a mineral servitude and the dangers to other operations from the termination of the lease by cessation of production are equally applicable to these provisions.

1.05 Lessor reserves the right to utilize the leased premises concurrently with lessee for any purpose which does not impede, interfere with or render unduly burdensome the rights of the Lessee.

The provisions of this clause would also be implied by law but as a matter of policy and good draftsmanship it was deemed best to expressly recognize their existence in the lease. If the lessee desires to locate specific facilities or in specific places that right should be expressly added to this clause. If the lessor does not desire facilities to be constructed in certain locations, such as near houses or other structures, this also should be so stated here.

Article 2. Lands Covered:

2.01 The lands leased are as follows:

The lands described (or so much thereof as may from time to time hereafter remain subject to this lease) are referred to as the "Leased Premises."

The description of the lands leased is a matter of prime importance but one which requires little comment.

One common but questionable practice in oil and gas leasing is to always describe the rights leased as being simply the land even in cases where the lessor is the owner of a servitude or the owner of a undivided interest in the land or the owner of land subject to outstanding mineral rights, rather than describing the interest actually owned by the lessor. This lease is written so that either practice may be followed. One reason for the practice has been the almost universal custom of ignoring the warranties implied in the lease where the lessor's title proves to be defective. Courts in the past have been quite reluctant to impose upon lessors the full measure of

responsibility such warranties might technically imply, particularly in light of the almost universal practice in the industry by lessors of carefully examining titles to the land before committing substantial sums to the drilling of a well. The Mineral Code modifies the implied warranties of a lessor and limits the amount recoverable by the lessee on such a case to the royalties and bonuses actually paid. This may have the effect of making claims on warranties much more prevalent and lessors should be much more careful in describing not only the extent of their interest but any burdens or limitations upon their title.

2.02 If Lessee owns less than a full interest in the leased premises or the right to produce geopressured products from them or if such rights are subject to existing servitudes, leases or other burdens which will diminish Lessee's rights to produce and appropriate all of the geopressured products from the leased premises, this lease shall from time to time cover and affect the entire interest in the lands comprising the leased premises as such burdens or encumbrances are extinguished or removed from the land or if they become owned by Lessor, or Lessor's successors and assigns in any manner whether or not such lesser interest or burdens are declared and this lease shall cover and affect all rights now or hereafter owned or possessed by the Lessor or Lessors' successors in title to the lands described as comprising the leased premises.

Although the normal warranty of a lessor who describes his interest as being complete and unencumbered would prevent him from contesting the right of the lessee to enjoy the benefit of any outstanding interests which may terminate or prescribe during the existence of the lease the Code in Article 145 expressly provides that such warranties do not affect successors in title to the lessor. Accordingly if at the time the lease is taken there are outstanding mineral rights which prescribe or terminate after the original lessor

has sold the land, then despite any warranties to the contrary the lessee would only enjoy a lease over the interest owned by the lessor before the sale. However Article 145 provides that a lease may expressly stipulate that it will cover and affect any such rights as may "revert" to the land during the existence of the lease and such a clause is binding upon subsequent transfers of the land. Hence the necessity for this provision.

2.03 If Lessor owns less than the entire interest in all or any portion of the leased premises or the mineral rights relating thereto which are leased hereunder (whether such lesser interest is herein specified or not) which diminish Lessee's rights to produce and save the entire amount of geopressured products produced from the leased premises then the rentals and royalties due with respect that part of the leased premises as to which such an interest is outstanding in others shall from time to time be reduced proportionately to reflect the interest granted Lessee under this lease. If there are any outstanding rights to receive rentals, royalties or other non-operating charges against the property or rights leased hereunder such charges, whether declared or not shall be payable out of and directly reduce the amount of rentals and royalties otherwise payable to Lessor hereunder. The failure to reduce rentals or royalties shall not affect Lessee's rights to thereafter reduce the same nor shall such reduction affect or limit lessor's warranties or the rights of Lessee stipulated under Article 9.

This clause is deemed necessary for obvious reasons. (See the comments to Article 2.01). Most leases actually in current use do not distinguish between the effect of outstanding mineral interests which should reduce the interest of both the lessee and lessor proportionately and royalty or similar non-participating charges which normally should be a charge upon and reduce only the lessor's interest. This clause attempts to remedy the problem and express what is usually intended by the terms of such provisions.

Article 3. Term:

3.01 The term of this lease shall commence on its effective date and, unless sooner terminated under the terms hereof, shall continue until all of the following events have occurred:

- A. Ten years has elapsed from the effective date;*
- B. Three years has elapsed from the day on which any geopressed products are last produced under the terms of the lease or the lessee has last engaged in operations on the leased premises and;*
- C. All wells capable of producing geopressed products under the terms hereof but which are not being so produced for any reason are finally plugged and abandoned.*

3.02 Notwithstanding the provisions of Article 3.01(C) in no event shall the term of this lease continue for a period of more than ten consecutive years without actual operations being conducted or actual production of geopressed resources having occurred under its terms.

As noted in the general discussion of the lease above the form contemplates a longer fixed term and a longer period in which the lessee may resume or restore production or conduct operations after cessation of production than is the case under the normal oil and gas lease. The term is stated negatively. It in substance provides for a primary term of ten years. In no event, however will the lease terminate until three years has elapsed from the last day on which any operations have been conducted or production has occurred. If there are wells capable of producing the geopressed resource, the lease will continue indefinitely so long as rentals are paid, subject only to the overriding provisions of article 3.02. Whether or not ten years is an adequate period within which to obtain leases covering a geopressed reservoir and to develop and obtain production is a

matter which must be carefully considered. Obviously, if the methane content represents the predominant value it would not appear to be inordinately short. However, if one is contemplating the construction of a generating plant to utilize the resource's heat and energy a ten year limitation may present problems. At the present time Article 115 of the mineral code would cause termination of the lease in accordance with the provisions of article 3.02 and it is not possible to contract to the contrary.

The stipulation in Article 5.01 for minimum annual rentals should eliminate necessity for the complex and complicated provisions for the commencement of additional wells or the drilling of wells during the primary term or after completion which are ordinarily found in an oil and gas lease.

3.03 The term "operations" shall mean drilling, reworking or other activities conducted, in good faith under the terms of the lease, which are reasonably designed or intended to obtain or restore production of a geopressured product from the leased premises whether or not such activities are successful.

This definition is perhaps not as specific as those contained in oil and gas leases many of which also define the commencement of operations with some precision. However, in view of the long period given the lessee to commence or resume operations under the provisions of article 3.01 the exact date the operations begin or end are unlikely to be as critical and a more flexible and functional definition appears desirable.

3.04 *If any part of the leased premises is unitized, the effect of the unit wells and any operations on the unit or any production from such unit allocated to the leased premises shall not be considered in determining the term of this lease with respect to that portion of the premises outside the boundaries of the unit and this lease shall separately terminate as to such portion of the leased premises outside of such units when the conditions specified in Article 3.01 have otherwise occurred. If a unit is formed while operations are being conducted, production is occurring or a shut-in-well is located on the leased premises such operations or production shall be deemed to have terminated and the well shall be considered as no longer capable of producing geopressured products with respect to that portion of the leased premises outside the unit boundaries as of the effective date of the unit.*

3.05 *If any part of the leased premises is unitized with other lands, operations on or production from the unit (to the extent that latter is allocated to the leased premises) and the unit wells located on such other lands shall be deemed to be occurring on or from the leased premises and the well shall be deemed to be located upon the leased premises, as the case may be, from and after the effective date of such unitization, but the effect thereof, for purposes of determining the term of the lease only, shall be restricted to the unitized portion of the leased premises as provided by the preceding article 3.04.*

3.06 *The provisions of article 3.04 and 3.05 shall not be deemed to effect a division of the rights and obligations of this lease unless and until such time as the term of the lease may expire as to a portion of the leased premises as a result of such provisions.*

The provisions of article 3.04 through 3.06 stipulate what is in substance a modified form of the "Pugh clause" which has been widely adopted in the oil and gas industry to regulate the implied obligations to explore or develop premises in the context of unitization. In substance these provisions limit, for the purposes of calculating the term of the lease, the effect of unit operations to those portions of

the leased premises which are included within the units. They could present some difficulty if the units are formed before wells are drilled on the leased premises near the end of the primary term. On the whole however the long term contemplated by this lease and the period of time given to maintain the lease after operations have terminated or production has ceased should render them satisfactory. Lessors almost invariably would and should object to any lease which permits the indefinite or perpetual maintenance of portions of a lease which are not proven to be productive.

3.07 Operations on a unit comprising all or any part of the leased premises; production from such a unit to the extent it is allocated to the leased premises by the terms of the order or agreement creating the unit, and all wells located upon such a unit shall be deemed to have occurred on or from the leased premises or be located on the leased premises, as the case may be, for all purposes of the lease except to the extent the effect thereof is expressly limited by Article 3.04.

Although not directly relating to the term of the lease this article provides what the law probably implies; operations on a unit whether or not conducted on the leased premises should be considered as being equivalent to operations on the leased premises and any production from such unit should be considered to be occurring from the leased premises to the extent it is allocated to the leased premises.

Article 4. Production Royalties:

4.01 The following royalties shall be payable to Lessor with respect to geopressured products produced and saved from the leased premises or allocated thereto from units comprised of a part of leased premises:

- A. _____ of the amount actually received by the Lessee from the sale or use of the geopressured water, or the heat, pressure or other sensible energy contained in such water at the point of sale or utilization.
- B. The proportions set forth below of the amount actually received by Lessee from the sale or other disposition of methane, natural gas or other hydrocarbons existing in gaseous form in the reservoir or formation prior to production (all herein called "methane") actually produced and saved from or allocated to the leased premises. When the average methane content of the geopressured waters is:
- a.) less than _____ cubic feet per barrel of water the royalty shall be _____;
 - b.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____;
 - c.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____;
 - d.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____ and;
 - e.) _____ cubic feet or more per barrel of water the royalty shall be _____.
- C. _____ of the amount actually received by lessee from the sale or other disposition of hydrocarbons, except methane, produced and saved from or allocated to the leased premises; and
- D. _____ of the amount actually received by the lessee from the sale or other disposition of all other geopressured products produced and saved from or allocated to the leased premises.

4.02 The "amount actually received" by lessee for any geopressured product for purposes of calculating the royalty due hereunder shall be the actual price paid lessee for the geopressured product in its first marketable form in or near

the field in which it is produced and after deduction of any charges, costs, or other amounts actually deducted from or credited by the purchaser against the stated price whether in the form of transportation, treatment, processing or similar charges and not otherwise accruing to the credit of lessee under the terms of the sale or other arrangements with the purchaser or acquirer for sale or use of the geopressured product.

As mentioned in the general discussion of the lease these royalty provisions are probably the most unsatisfactory of all those contained in the form. The basic concept adopted is to provide for a fixed percentage royalty (based upon gross receipts) of the amount that the lessee may receive from the geopressured aspects of the production and a fluctuating royalty for gaseous hydrocarbons produced from the geopressured waters. The royalty on oil or other liquid hydrocarbons are separately calculated, primarily on the theory that they will be minimal in amount unless the production is occurring from something that would closely resemble a conventional oil deposit.

The exact parameters to be used in calculating the royalties and the amount of such royalties is a matter which will be dependant upon the economic evaluation of the lessee as to what he can reasonably pay and is a matter of bargaining with the lessee. Consequently, the authors have not at this time proposed any definite percentages which might be suggested for calculating the royalties. It must also be admitted that the basic royalty provisions contemplate the producer of the geopressured product will either sell or dispose of it to some third person. The provisions of article 4.04 which follow deal with a situation where such production is taken or utilized by the lessee. If the lessee contemplates utilizing the heat and pressure for his purposes

an alternative approach might be to make the royalty dependant upon either the amount of electricity generated (if such is the case) or the energy content of the heat and water if the utilization is for some other purpose. It must be reiterated that the unique nature of the resource, the tremendous variables which may be encountered in the type and nature of the energy which will be produced and the uses to which it may be put preclude in the judgment of the authors at least, such standardization of form as has occurred in oil and gas leases.

4.03 If lessee does not dispose of the geopressured product or any portion thereof but consumes or uses it either on or off the leased premises for the generation of electricity; for use in its own pipelines; as process heat and energy for power or for any other useful purpose (except such as are excluded from the royalty by Article 4.05) the royalty payable with respect to such geopressured product shall be calculated upon the market value of such geopressured product at its point of use or the taking of it by lessee into lessee's pipelines, trucks or other means for transportation away from the field where it is produced.

This article attempts to deal with the use of the geopressured resource by the lessee. Again it must be recognized that it is likely to be unsatisfactory insofar as the geopressured aspects of the production is concerned and the authors would certainly suggest that in such a case and particularly if the resource is to be used for the generation of electricity, the royalties must be much more carefully specified and the basis upon which they are calculated related in some manner to the energy contained in the water.

4.04 Lessee shall install and maintain measuring devices of a type recognized in the industry as being standard or customary and shall operate and maintain them in accordance with recognized operating procedures to measure the geopressured waters hydrocarbons or other geopressured products produced

under the terms of this lease and determine the royalties payable hereunder. The methods and procedures prescribed from time to time by the Louisiana Commissioner of Conservation or other regulatory agency having jurisdiction over the production of geopressured products from the leased premises for the measuring and reporting of such products shall be deemed to conform to the requirements of this article.

These provisions may prove unsatisfactory in the authors opinion. Reference might be made to the provisions customarily employed in gas purchase contracts for the determination of volume and quantity. Technical specifications as to the exact kind of metering devices that will be used, the period of time over which the royalties will be calculated, whether the methane content is to be averaged over a monthly, quarterly or annual period and so forth are matters which, at the present time though not unimportant probably require considerably more information as to the nature and extent and production methods that will be used for the resource than is presently available. If greater specificity is desired in the method of calculating and determining the royalty based on methane content provisions of the kind referred to could be easily inserted. At present it was thought best to leave these provisions intentionally vague and flexible but to suggest that before a lease is actually taken or utilized considerable thought be given to how the resource will be produced and what kinds of measuring and metering devices will be practical and available.

Our further problem which is not covered by this lease form is the method of allocating back to the individual leases the revenues and production if a field wide unit is formed for losses in the

transportation gathering or processing. For example if the resource is used for the generation of electricity and several wells provide the input for the plant the amount of water ultimately utilized may not for practical reasons be directly traceable to the quantities measured at the individual wells. These matters should be carefully considered and planned for. In all likelihood a satisfactory lease contemplating an extensive, multi-well development would require considerable amplification of these matters.

4.05 Production royalties shall not be payable with respect to any geopressured product which is not actually saved and disposed of or consumed for some useful purpose nor with respect to any geopressured product which is lost, used or consumed by lessee in the production or processing of the geopressured products or the disposition of waste products resulting therefrom.

4.06 All severance, production, sales or other taxes directly assessed against or measurable by the amount or value of the geopressured products produced under the lease (except corporate franchise taxes; federal and state income taxes; utility taxes and property taxes levied upon the value of the lessee's improvements) shall be chargeable against Lessor and Lessee in the proportion of their respective interests in the gross proceeds from the disposition of such products as fixed by the production royalties payable with respect thereto and without regard to the legal incidence of the tax.

This article and the preceding one are designed to resolve questions that occasionally occur with respect to the base against which the royalties are to be calculated. In the case of article 4.06 they are designed to insure that any severance production or similar taxes assessed against the resource is not allocated by the state to either the lessee or the lessor but is treated as a reduction in the value

of the product against which the royalty base is computed. At the present time paragraph 4.06 would have no particular effect since all severance taxes in Louisiana are deemed to be pro-rated between the lessor, the lessee and other persons entitled to receive a share of the production from the leased premises.

Article 5. Minimum Rentals:

5.01 If during any year ending on the anniversary of the effective date the production royalties which have been paid or are payable for production occurring during such year under Article 4 from any part of the leased premises do not equal the sum of _____ dollars per acre for each acre of the leased premises, which amount is referred to as the minimum rental amount, the lessee shall pay as rental to the lessor an amount herein (called the minimum rental) sufficient to cause the total of the royalties and such minimum rentals to equal such minimum rental amount.

5.02 Minimum rental amount shall be pro-rated by area and time with respect to the leased premises or any part thereof as to which the lease has terminated or been cancelled or released during the year for which it is calculated. The minimum rentals, if any, required to be paid under Article 5.01 shall be determined after deduction of all production royalties payable under the lease from the minimum rental amount and shall be due on the last day of period for which they are calculated. They shall be payable at the same time and in the same manner as any royalty which would be due for the calendar month following the month in which the anniversary date of the lease falls; and shall accrue to those persons entitled on the anniversary date to receive such rentals or, with respect to any part of the leased premises as to which this lease has terminated during the calendar year with respect to which the minimum rentals are calculated to those persons entitled to receive the same on the date the lease terminates with respect to the portion of the leased premises as to which the lease has terminated.

This article provides for the payment during any given lease year or portion thereof a minimum annual rental with credit being given for production royalties. It should be noted that such rentals

are not payable in advance but are payable at the end of each annual period. Accordingly the bonus or initial cash consideration which is paid to the lessee should not include the first years rental and would be in addition to it.

It is of course possible to provide for payment of the rentals in advance and that credit may be taken against royalties during such year or during succeeding years for such rentals. It is customary in some extractive industries to permit a period of several years against which production royalties may be credited to prior years rentals. It was felt, taking into account the prevalence of delay rentals in the oil and gas industry and the customs prevailing in the Gulf Coast, that a guaranteed minimum annual rental for each year during which the lessee may hold the premises would be the most acceptable procedure to follow.

Any minimum rental in a lease which is terminable or which may be released as to part of the premises or where it is contemplated that the lessor may convey or sell fractional parts of the minerals or royalties requires additional provisions regulating whether the rentals are to be pro-rated in the event of partial termination as well as fixing a date for determining who is entitled to receive them. The procedure adopted by Article 5.02 is to pro-rate the rental on an annual basis both as to area and time, so that for example, if one-half of the leased premises are released after six months of a year has elapsed the minimum rental amount would be reduced by one-half of the area for one-half of the year for a total deduction of one-fourth. It should be further noted that the lease provides all production occurring from any part of the leased premises will be deducted from the minimum rental amount due for all of the leased premises. This

eliminates any question as to whether production from one tract should be credited against the minimum rental with respect to another tract if the ownership is divided among separate lessors. The lease provides that the persons entitled as a matter of contract to receive the minimum rental are those persons who would be entitled to receive them on the last day of the year in which such rentals become payable. Obviously, upon the sale or other disposition of the minerals or any interest therein the seller and buyer will be free to allocate the economic effect of such provisions but it was deemed essential that some point of time be fixed to determine the identity of the persons entitled to receive the minimum rentals.

Article 6. Payment of Amounts Due the Lessee

6.01 All rentals, royalties or other sums which may be owed to lessor under the terms of this lease may be paid by check or draft of lessee delivered to or properly deposited in the mails addressed to Lessor at the address (or addresses) given in article 6.02 below.

If Lessor is more than one person the payment shall be made to the various parties hereto in the proportions set forth by each Lessor's name, subject however to the provisions of article 6.05.

Lessee may continue to make payment in the manner specified in this article until the same is duly changed in accordance with the provisions of this lease notwithstanding any other actual or constructive notice by Lessee of a change or modification in the rights of any person to receive such payments.

6.02 The place of mailing payments due hereunder and the proportions in which each Lessor is to be paid (if there are more than one) shall be as follows:

NAME	ADDRESS	PROPORTION
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6.03 If any payment made hereunder is not accepted or is returned for any reason when properly mailed or delivered, Lessee shall be deemed to have made the payment at the time and in the manner which would have occurred if the payment had been accepted or delivered. Lessee shall remain obligated to pay or deposit the amounts due to a new address or to the proper persons when it has been supplied with proper evidence of the right to receive such payment or with a new address, as the case may be, in accordance with the terms of the lease.

6.04 Lessor (or any person or persons entitled to receive payment separately) may change the address for mailing or delivery of notices from time to time by delivering to Lessee a properly signed document identifying a new and proper mailing address.

6.05 If Lessor is more than one person and the proportions in which payments are to be made to each is not specified herein, or if payments due Lessor or any of them become payable to more than one person from time to time hereafter and Lessee receives proper evidence thereof as provided herein, Lessee may nonetheless make such payments jointly to all persons entitled to receive them and mail or deliver such payment to any one of them, unless Lessee also receives a division or transfer order in a form customarily employed by Lessee properly executed by all parties in interest specifying how such payments are to be divided. If any such order directs that payments, which were formerly made to one person or several persons jointly, be made to more than six persons separately, Lessee may require the parties to designate one person to receive the payments or to designate that such payments be divided in a manner as to require no more than six separate payments.

6.06 The designation herein of the proportions in which payments are to be divided or the execution of a division order or agreement by or among Lessors and other persons entitled to receive rentals and royalties directing the manner in which payments are to be divided or agreeing to their allocation or apportionment whether or not it is in accordance with the ownership of the premises and whether it is accepted by Lessee shall not be deemed to supersede or affect the provisions of Article 6.07 or 7.01.

6.07 No change in ownership, status or in the person entitled to receive payments hereunder shall affect the right of Lessee to deal with the person previously entitled to receive such payments and the effectiveness of any payment made with respect to this Lease shall be valid unless Lessee shall have been furnished proper and reliable evidence of such change including certified copies of any act, order, judgment or decree evidencing the same. Nor shall any change in the method of payment or in the person entitled to receive a payment be effective as to Lessee (at its option) until 45 days after Lessee has been delivered proper and complete evidence of such transfer or change in the manner required by this Article 6.

6.08 Lessee may give any notices to, and may contract with the Lessor, or Lessor's successor's or assigns or any other persons having an interest in the leased premises, in all respects concerning this lease or the leased premises so long as such persons are authorized to receive payments from Lessee under this Article 6 and the successors or assigns of Lessor shall be deemed to have given plenary power and authority to such Lessee or successor to so act until the provisions of this article have been fully complied with in such a manner as to require lessee to make payments to them. All notices required to be given lessor under this lease may be mailed or delivered in the same manner and with the same effectiveness as is specified herein for the payment of rentals or royalties hereunder.

6.09 Lessee or any purchaser of the geothermal products may also require Lessor, or any of them, or any other person entitled to receive payment of rentals or royalties from time to time to execute division orders in a form customarily employed by the Lessee or purchaser specifying or acknowledging the rentals or production royalties which person may from time to time be entitled to receive from the leased premises. The execution of such a division order shall not be deemed to diminish the warranties contained in this Lease nor to preclude or estop Lessor or any other person signing the division order from thereafter asserting, as against any person other than the purchaser of the geopressured products relying upon such a division order and the lessee that any interest in the leased premises or production therefrom is owned by them contrary to the terms of the division order.

Under the law of Louisiana an instrument affecting immovable property has no effect as to third persons unless it is filed in the proper conveyance records or mortgage records. However, once filed it is effective as to third persons without regard to whether or not they have actual knowledge of it. Obviously, a lessee who is required to make continuing payments to his lessor cannot be expected to daily search the records to determine whether or not some conveyance or encumbrance may have been made of the lessor's interest. Consequently, all modern oil and gas leases authorize the lessee to continue to deal with the lessor until he is actually notified of a transfer assignment or other alienation of the rights.

In view of the large amounts involved and the multitude of payments that may be required from time to time a lease should also contain provisions specifying in considerable detail the place and manner by which such payments are made.

It is customary in the oil and gas industry to request that lessors, royalty owners or others also are entitled to receive payments based upon production to execute division orders which in substance confirm or agree to the division of the amounts which are being paid and which in some cases specify details concerning price of the product and the method by which such payment is to be determined in areas where the lease may permit of some ambiguity. The provisions of this article recognize the right of the lessee and the purchaser of the product to require such division orders before payments are made. They also provide that the execution of such a division order will be effective only as to the lessor and purchaser who procures their execution and would not preclude a lessor from later asserting as to other parts on error or mistake in it.

The provisions of Article 6 also must be read in light of Article 7 which provides that the leased premises shall be dealt with as an entirety and that a transfer or an assignment by the lessor of his interest in a portion of the leased premises does not require the lessee to separately meter, account for, or calculate royalties based upon geographic considerations. It must also be noted that the cumulative effect of Articles 6 and 7 is to make the division of the royalties among the various lessors a matter of agreement among them. The fact that royalties may be divided among the lessors in a particular manner would not necessarily permit the lessee to assume that he may deal exclusively with any particular lessor on the assumption that such lessor's rights to the premises coincide with his interest in the royalties. If the lessor assigns or transfers all of his mineral interest in a segregated part of the leased premises subject to the lease and further agrees that the transferee shall be entitled to receive a certain part of the royalties or rentals, the lessor who assigned the rights for purposes of the lease may still be a lessor of the entire leased premises depending upon his agreement with the transferee and any transaction dealing with one segregated portion of the leased premises might or might not be binding upon him depending upon his underlying rights. For example a sale of all of the mineral rights to the south one half of the premises might also provide that the purchaser would be entitled to one half of the royalties. Whether the agreement of the parties to such a stipulation would be interpreted as conveying all of the royalties from one half of the lands or one half of those from all of the lands may

be doubtful. In short the presence of article 7 stating that the lessee may deal with all the parties indistinguishably and without regard to the underlying ownership of the premises means that if he chooses to deal separately with them he will do so at his peril.

Article 7. Ownership of the Leased Premises and Changes Therein:

7.01 The leased premises shall be operated and dealt with as an entirety whether or not Lessor is more than one person and without regard to the ownership of the premises or whether Lessor shall assign or transfer any interest in the leased premises or whether such premises are now owned or may hereafter become separately owned. Lessee shall not be obligated to separately record or account for production occurring from any part of the premises or to protect any portion of the leased premises from drainage occurring on any other portion. Subject to the provisions of this Article 7.01 and the provisions of Article 6, Lessors may from time to time divide or allocate in such manner as they deem proper, or may have agreed the rentals and royalties payable hereunder, but such agreement by Lessors as to the division or allocation of the rentals or royalties payable hereunder, whether or not accepted or agreed to by Lessee, shall be deemed to modify or affect the provisions of this Article 7.01.

7.02 Subject to the provisions of Article 7.01 the interests of Lessor may be freely assigned or transferred and all provisions hereof shall inure to the benefit of and bind the successors and assigns (in whole or in part) of Lessor (whether such succession or assignment occurs by sale, inheritance, assignment, sub-lease, or otherwise), but regardless of any actual or constructive notice thereof, no change in the ownership of the land or any interest therein or change in the capacity or status of Lessor or any other owner of rights hereunder, whether resulting from sale or other transfer, inheritance, interdiction, emancipation, attainment of majority or otherwise, shall impose any additional burden on Lessee or affect any other the requirement or provisions hereof including particularly those of Article 6 relative to the time and manner by which such changes may be made effective as to Lessee.

As noted in connection with the comments to Article 6 this article provides that the land shall be dealt with indistinguishably without regard to the underlying ownership of the lessors and that the lessee is not required to separately monitor the production or separately deal with the various lessors even though the ownership of the underlying premises may be divided. This of course is necessary to prevent the lessee from having to separately account for production occurring from various parts of the leased premises. As previously mentioned, such a provision is as binding upon the lessee as it is the lessor and the lessee must be extremely cautious in dealing with any person who claims to own the exclusive right to part of the minerals under the leased premises and consider the effect such an agreement may have upon other lessors.

Article 8. Assignments, Subleases and Releases of the Lease:

8.01 The assignment, sublease or other alienation in whole or in part of this lease by Lessee (all referred to as a "transfer") shall not diminish Lessor's rights or remedies to enforce, as against the transferees the obligations of the Lessee arising prior to the date of such transfer, but shall relieve the transferor of any obligations with respect to the portion of the premises or interest therein transferred which may arise after the date of the alienation and Lessor shall thereafter look exclusively to the transferee for performance of such obligations. Any transferee of an interest in this lease, shall, by accepting such a transfer or the benefits of the interest transferred be deemed to have assumed the obligations thereof to the extent provided by this Article 8.01.

Article 129 of the Mineral Code provides that the assignment, or other alienation of an interest in the lease by the lessee does not relieve the lessee of his obligations to the lessor under the terms of the lease unless it is expressly agreed to in writing. This article

provides that the lessee will be relieved of his obligations to the extent of such a transfer. For such a provision to be workable however, it must provide that the transferees will take the lease subject to any obligations which are then unperformed and furthermore some provision must be made for an express assumption by the transferee of the obligations of the lease in favor of the lessor. One further word of caution should be directed to this provision. Even though the obligations of a transferee and transferor are separate (i.e. joint - and not several or solidary) unless the lease is divided as provided in Article 8.03, it may still be argued that the failure to comply with the terms of the lease by one party lessee will give rise to an action to resolve the entire lease.

8.02 All notices required to be given to Lessee by Lessor may be delivered or mailed to Lessor as herein provided to the address given for Lessee herein. No change in Lessees identity or assignment of the lease shall affect or change Lessor's right to deliver or mail such notices to the address given until Lessor shall have been notified in writing by Lessee of a new address.

The provisions of this section correlate generally with those in Article 6 and provide that the lessor is not bound by any transfer or assignment of the premises until and unless he actually is notified of the transfer.

8.03 The assignment from time to time of the entire interest of Lessee in this lease as to a geographically defined area of the leased premises in such a manner that all of the benefits and the rights and obligations of the lease shall be vested as to each such segregated portion entirely in separate persons shall divide the lease and the rights and obligations with respect to each such portion shall thereafter be considered as separate and distinct leases.

Generally speaking the assignment by a lessee of all of the lessee's rights to a specific geographic area is considered in the industry to constitute a division of the lease and the transferor and transferee generally assume that their rights will not be dependent upon proper operation of the premises by the others. This provision expressly reflects such assumptions.

8.04 Lessee may at any time and from time to time during the term of this lease release this lease as to the entire leased premises or any part thereof by mailing to Lessor a properly recordable act of release identifying the lease and describing the premises to be released (if less than all of leased premises are released) or by filing such act with the proper Register of Conveyances and Lessee shall thereupon be completely and absolutely relieved of any responsibility for the obligations of this lease, accruing on or after the time of such release, to the same extent and as if the term thereof had expired as to such premises.

This article provides for the partial release of the premises by the lessee from time to time and is customary and usual in transactions of this type.

8.05 In case of cancellation or termination of this lease for any cause, other than the release by lessee or the expiration of its term, Lessee shall have the right to retain and continue the lease in effect as to that portion of the leased premises on which there are wells producing or capable of producing geopressured products and which is included within the producing acreage allocated to such wells by the Commissioner of Conservation or, if unitized, which are included in any unit for such wells unless the cancellation occurs as a result of the failure of Lessee to comply with the obligations of this lease relative to the operations of the well or wells referred to.

Theoretically the failure to drill exploratory wells or develop the premises or to protect them from drainage - is a breach of the lease. The breach of a contract gives rise to a right to dissolve it.

If the lessee has developed a portion of the premises such a resolution would be of the entire contract and he would lose the benefits of the lease as to those portions of the premises he has developed.

This provision attempts to deal with the problem as do all modern leases. The provision usually encountered simply says that the cancellation of the lease for any cause will permit the lessee to retain those portions of the leased premises on which there are wells producing or capable of producing. The courts have had some difficulty with this approach. The present clause is designed to permit a more realistic interpretation of the problem. It is highly unlikely that any court would hold that a provision that a lease can not be cancelled for breach as to part of the premises is valid if the reason for the cancellation is the failure to comply with the obligations of the lease insofar as they relate to the premises for which the retention is sought. Such a clause may be easily circumvented by holding that the clause itself is only binding if the contract is binding. The exception should, in the opinion of the authors, encourage a more reasonable approach by the court.

8.06 In the event of a partial release of a portion of the leased premises or the cancellation or termination of this lease as to any part thereof, and notwithstanding any other provision hereof to the contrary Lessee shall retain, with respect to the entire leased premises, the rights granted by Articles 1.02 and 1.03 insofar as they may be necessary or useful to the exercise or enjoyment of Lessee's rights as to the portion of the leased premises retained by Lessee. The area over which Lessee enjoys only those rights granted by Articles 1.02 and 1.03 shall not be considered as part of the leased premises for purposes of calculating the minimum rental amount under Article 3.

This provision is self explanatory but is frequently not included in ordinary oil and gas leases. It may be that the area over which

the lessee desired to release or terminate the lease contains facilities necessary to the enjoyment of the balance of the leased premises. In the event of cancellation or release of the lease those accessory rights set forth in Articles 1.02 and 1.03 will continue to be enjoyed as to that part of the premises not released.

Article 9. Other Rights and Obligations of the Parties:

9.01 Lessee shall conduct all operations pursuant to and exercise all rights granted under the terms of this lease as a prudent operator and in compliance with all applicable legal requirements. Lessee shall indemnify and hold Lessor harmless from all liability or expense to others as a result of any action or activity beyond or contrary to the rights granted hereunder which are taken or performed by Lessee or for Lessee by any other person conducting activities on the leased premises as a consequence of Lessee's rights.

Article 9.01 probably expresses no more than is ordinarily implied by law but was deemed desirable as a matter of completely expressing the understanding of the parties.

9.02 The Lessee shall be responsible for all damages to the timber and growing crops of the Lessor caused by Lessee's operations whether prudently conducted or otherwise but shall not otherwise be responsible for any damages or injury to the leased premises or to the property of crops of other persons now or hereafter occupying or possessing the leased premises under rights from Lessor which are caused by the prudent exercise of the rights granted hereunder.

The law ordinarily contemplated the consequential damages to the lessor's property are not compensable. Notwithstanding this the custom has arisen in the oil and gas industry of paying a lessor for specific damages to timber and growing crops which are caused by the lessees

operations. This section reflects that custom but also limits the liability of the lessee to the lessor. In at least one case the court held a clause of this kind permitted a tenant of the lessor who was growing crops on lands under an unrecorded lease to recover for the damage to his crops even though a settlement had previously been made for "crop damages" with the lessor by the mineral lessee. This provision clearly would limit the lessee's liability to the lessor and in substance should be a warranty by the lessor that no other person is entitled to any such compensation.

9.03 The lessor recognizes that the minimum rentals due and payable under the terms of this lease during periods when there is no production are partly in lieu of and as compensation for lessee's obligation to develop the premises and in consideration of the payment of such minimum rentals lessor agrees lessee shall be under no affirmative duty to develop or explore the premises except as is provided for by Article 9.04.

This article recognizes that the minimum rentals payable under the terms of the lease are in substance in lieu of and as compensation for the implied obligations to develop and explore the premises. While it is true that Article 122 of the Mineral Code can be interpreted as prohibiting a lessor from totally contracting away these obligations the fact remains that delay rentals in the ordinary oil and gas lease are in lieu of the obligation to explore or develop and so long as such rentals are paid no exploration is required. There seems to be no reason in the law why the lessor could not agree to accept a certain minimum payment each year from his lands for the rights enjoyed by the lessee without regard to any other obligations. There is an exception to this found in the next Article dealing with drainage.

9.04 Lessee shall protect the premises from drainage subject to the following conditions:

A. Lessee shall be under no obligation to protect the premises from drainage by a well located upon other lands of the lessor or any of them or on units in which such lessors participate.

B. Lessee shall be under no obligation to protect the premises from drainage by wells located more than 1,000 feet from the leased premises.

C. If a well is located less than 1,000 feet from the leased premises, lessee will drill such wells as would be reasonably prudent to counteract the drainage occurring or in lieu of drilling such a well may pay as a rental monthly so long as such drainage continues an amount of money which would equal the production royalties which would be payable with respect to the production which would be obtained from the leased premises if the well which is draining the premises were located upon such leased premises and was producing the same substances and amounts as are from time to time actually being produced by it while draining such premises. The rentals so payable shall be considered production royalties for purposes of determining the minimum rentals due under article 5.01. No such rentals shall be payable under this Article unless it reasonably appears that a well drilled on the leased premises would be both productive and profitable nor shall they be payable if a well which reasonably offsets the well draining the premises and counteracts the drainage is actually drilled on the leased premises if any portion thereof is unitized with the lands upon which the well draining the premises is located.

D. Lessee shall be under no obligation to seek unitization of the leased premises with any other premises in the vicinity.

These provisions are perhaps not entirely satisfactory. In substance however they limit the obligation to protect from drainage to those circumstances where it is clear that drainage is occurring from the premises and the lessor is not otherwise enjoying the benefits of the production which is causing the drainage. Furthermore, they permit cash payments in lieu of royalties as an alternative to the drilling of a well. This may have two disadvantages. First, it will probably be quite difficult to determine the amount of such payments. Secondly, the presence in the lease of an option to pay

such amounts may make a court more willing to find that drainage is actually occurring. Paragraph D is intended to negate dictum in a few cases which indicate that under some circumstances a prudent operator might be obliged to seek unitization of the leased premises. Again such unitization may be totally incompatible with the plans that the lessee has for the development of the premises and it should be assumed that the Commissioner of Conservation will unitize the premises any time anyone (including the lessor) can demonstrate they should be so unitized. Accordingly, the lessee should not be under an affirmative duty to seek such unitization.

9.05 All minimum rentals and production royalties due lessor from time to time shall be the obligation of the Lessee. The failure to pay the proper amount of rentals or royalties or a delay in paying them or the erroneous determination as to the person or persons entitled to receive them, or other errors in such payments resulting from a good faith or honest error or oversight or an erroneous interpretation of this lease or other contract relating to it and not caused by the fraudulent or intentional effort of Lessee to defeat the payee's ultimate rights thereto shall not give rise to any action to resolve or cancel this lease but Lessee shall remain liable for any sums properly due hereunder together with interest thereon at the legal rate from the date such sums were payable until they are paid.

This article attempts to deal with the problem of mistakes or failures to pay delay rentals or production royalties and in substance holds that a good faith error or mistake in paying them gives rise to no cause to cancel the lease but also makes it clear that the lessee remains obligated to make the payment. Whether such an absolute prohibition against cancellation would be palatable to lessors is a matter of some doubt. If strenuous objection is asserted against this clause an alternative might be to provide that the right of cancellation would not arise a final determination has been made

that lessee owes the money and it remains unpaid. Such clauses however have not been generally looked upon with favor by the courts.

9.06 If at any time Lessor believes any obligation of the lease has not been or is not being complied with by Lessee, Lessor shall notify Lessee in writing specifying the default claimed and corrections necessary to remedy the obligation being breached, with such particularity to fairly apprise Lessee of the manner and extent of the default claimed by Lessor. Lessee, if then legally required to perform such obligation shall have sixty (60) days after receipt of such notice to commence compliance therewith. Completion of such compliance need not be effected within the sixty day period provided it is prosecuted with reasonable diligence to completion in a manner consistent with the prudent operation of the lease and the obligations of Lessee.

This article is more or less standard in all exploratory contracts of the kind being dealt with and simply provides that the lessor must put the lessee upon notice as to any supposed breach of the lease and give him an opportunity to remedy or commence remedying it before a suit is filed.

9.07 Lessor hereby warrants and agrees to defend the title to the leased premises except as to those matters expressly disclosed herein. Lessee may discharge any tax, mortgage or other encumbrance upon the land whether declared herein or not and shall be deemed subrogated thereto. Lessee may apply any rentals or royalties accruing hereunder to the payment or repayment of such amounts.

9.08 Lessee shall have the right to take a lease or leases from others claiming to have or appearing to have rights adverse to those leased hereunder whether such claims are well founded or not.

9.09 If Lessor's title or any interest therein which would be adverse to this lease is claimed by others, Lessee may withhold payment of any rentals or royalties until Lessor has established his right to such sums. Lessee may also institute actions for the declaration of its rights or that of lessors and deposit such rentals or royalties into the registry of the Court until the final determination of such rights, or may otherwise take such steps as may be reasonably necessary to assure Lessee of its rights hereunder or to protect it from having to seek refund or recovery of any amount payable to Lessor or any other person as a result of such claims whether or not such claims prove to be well founded.

Articles 9.07 - 9.09 grant to the lessee the right to protect himself in the event of an encumbrance upon the property or a supposed right or adverse claim being made to the premises and should be noncontroversial.

9.10 Lessee shall pay all ad valorem or other property taxes levied upon or assessed against lessee's equipment or facilities or the leased premises as a result of Lessee's operations thereon.

Although ad valorem taxes are not a major item in most instances and although it is probably that the lessee would have to pay such taxes as may be levied as a result of its operations nonetheless it was deemed desirable to expressly provide that such taxes will be the lessee's obligation.

9.11 Upon termination or release of this lease, entirely or as to a part of the leased premises, Lessee shall restore the premises or that part released or terminated and not being used as permitted by Article 8.05 for the exercise and enjoyment of the rights leased as to portions of the leased premises retained by Lessee, to substantially the same condition as when they were leased by removing all equipment, plugging and abandoning all wells in the manner required by governmental authority, filling all pits or excavations and generally restoring the surface to its original condition. Lessee shall not, however,

be responsible to remedy or correct such things as the loss of productivity or condition of the ground (other than to smooth or level its surface) the removal of trees or damage to shrubs or soil or other consequential injuries which are the ordinary and usual consequences of the operations or activities authorized to be conducted hereunder.

A recent case indicates that the obligation to restore the premises to the condition in which it was found before the use may give rise to some sort of obligation to restore it to its pristine condition - even though it is practically impossible to do so.

This article expressly recognizes that the term "restoration" means restoring the premises in a reasonable manner and does not require the lessee to replace those things rendered or restore the soil to a condition in which it was before the use if that is not reasonably possible.

Article 10. Force Majeure:

10.01 The obligations of this Lease shall be subject to all lawful State or Federal law or order regulating operations on the land. If Lessee is prevented from complying with any express or implied covenants of this Lease from conducting drilling or reworking operations thereon, or from producing therefrom by reason of scarcity or inability, after effort made in good faith, to obtain equipment or material or authority to use same, or by failure of carriers to transport or furnish facilities for transportation, as a result of force majeure, any Federal or State law, or any order, rule or regulation of governmental authority, or other cause beyond Lessee's control, then while so prevented, Lessee's obligation to comply with such covenant shall be suspended and Lessee shall not be liable for damages for failure to comply therewith; and the term of this Lease shall be extended while and so long as Lessee is prevented by any such cause from conducting drilling or reworking operations on or from producing from the leased premises and the time during which Lessee is so prevented shall not be counted against Lessee.

The relatively long periods permitted for the interruption of production and the presence of minimum rentals should obviate much of the necessity for a force majeure clause. However, the risks and uncertainties of the mining business generally would perhaps dictate the inclusion of some provision permitting a cessation of operations from causes beyond the control of the operator. The above provision is typical of the kind ordinarily utilized in the industry and is probably about as effective as any other one might prepare.

Article. 11. Execution in Counterpart and Effect:

11.01 This Lease may be executed in separate multiple counterparts or by separate acts of ratification or joinder by the various persons who are identified as parties hereto and if so executed all such counterparts or acts shall be construed together as constituting one agreement and contract. The failure of any person identified as a Lessor herein shall not affect the validity of the lease as to those persons who do execute the same and it shall be fully effective as to them, but they shall be deemed to have warranted title only to the interest in the premises which they are respectively identified herein as owning, or in the absence of such identification, to the extent of the interest owned or claimed by them.

The frequency with which multiple or fractional interests are encountered and leased makes a provision such as the above desirable.

In witness whereof the parties have to have caused this act to be executed as of the effective date first set forth above in the presence of the witnesses whose names are affixed by them respective signatures.

Witnesses:

Lessor

Lessee

(Those should then follow or be attached to an appropriate acknowledgement form).

IV. CONCLUSION

From the above comments it will be seen that there are three areas in which the proposed lease may be deficient, assuming the basic approach is thought to be acceptable. These deficiencies result not from an inability to express a satisfactory rule which might be just and equitable in a given case but because the present state of knowledge of the resource makes it impossible to adequately predict, as a general proposition, what form the development may take and thus what factors should be taken into account in preparing a lease form.

The areas referred to are found in Article 1 dealing with the description of the resource covered by the lease; in Article 4 describing how the royalties are to be calculated, and finally in the absence of any provision permitting unitization of the leased premises by the lessee. The comments concerning the first two adequately describe the difficulties which are presented by these provisions and suggest the types of changes or additions which might be made to the document to adapt it to a particular purpose or usage. Some additional comment may be in order as to the omission of unitization provisions.

Most oil and gas leases contain clauses permitting the lessee to unitize the leased lands with others in the vicinity by the ex parte action of the lessee. One form widely used in the Louisiana gulf coast area provides as follows:

Lessee, at its option, is hereby given the right and power without any further approval from Lessor, at any time and from time to time, to pool or combine the land or mineral interest covered by this lease, or any portion thereof, with other land, lease or leases and mineral interests in the immediate vicinity thereof, when, in Lessee's judgment, it is necessary or advisable to do so in order to properly explore or develop or operate said premises so as to promote the conservation of oil, gas or other minerals in and under and that may be produced from said premises or to prevent waste or to avoid the drilling of unnecessary wells or to comply with the spacing or unitization order of any Regulatory Body of the State of Louisiana or the United States having jurisdiction. The term "Regulatory Body" shall include any governmental officer, tribunal or group (civil or military) issuing orders governing the drilling of wells or

the production of minerals. Such pooling shall be of adjacent tracts which will form a reasonably compact (but not necessarily contiguous) body of land for each unit, and the unit or units so created shall not exceed substantially forty (40) acres each for each well for oil exploration or production and substantially one hundred sixty (160) acres each for each well for gas and gas-condensate exploration or production unless a larger spacing pattern or larger drilling or production units (including a field or pool unit) shall have been fixed and established by an order of a Regulatory Body of the State of Louisiana or of the United States, in which event the unit or units shall be the same as fixed by said order. Lessee shall execute and file for record in the Conveyance Records of the Parish in which the land herein leased is situated a declaration describing the pooled acreage; and upon such filing, the unit or units shall thereby become effective, except that when a unit is created by order of a Regulatory Body the pooling shall be effective as of the effective date of such order, and no declaration shall be required in connection therewith. The royalties herein elsewhere specified, and subject to the provisions of Paragraph 10 hereof, shall be computed only on the proportionate part of the production from any pooled unit that is allocated to the land herein described; and unless otherwise allocated by order of a Regulatory Body, the amount of production to be so allocated from each pooled unit shall be that production of such total production that the surface area of the land affected hereby and included in the unit bears to the total surface area of all the lands included in such pooled unit. Drilling or reworking operations on or production of oil, gas or other minerals from land included in such pooled unit shall have the effect of continuing this lease in force and effect during or after the primary term as to all of the land covered hereby (including any portion of said land not included in said unit) and as to all strata underlying said land, whether or not such operations be on or such production be from land covered hereby. Any unit formed by Lessee hereunder may be created either prior to or during or after the drilling of the well which is then or thereafter becomes the unit well. Separate units may be created for oil and for gas, or for separate stratum or strata of oil or gas, even though the areas thereof overlap, and the creation of a unit as to one mineral or strata or stratum shall not exhaust the right of Lessee (even as to the same well) to create different or additional units for other minerals or for other strata or stratum of the same or other minerals. The failure of the leasehold title (in whole or in part) to any tract or interest therein included in a pooled unit shall not affect the validity of said unit as to the tracts or interests not subject to such failure, but the unit may thereafter be revised as hereinafter provided. Lessee shall have the right and power to reduce and diminish the extent of any unit created under the terms of this paragraph so as to eliminate from said unit any interest or lease to which title has failed or upon which there is or may be an adverse claim. Such revision of the unit shall be evidenced by an instrument included in the unit as revised and shall be filed for record in the Conveyance Records of the Parish where the lands herein leased are situated. The revised declaration shall not be retroactive but shall be effective as of the date that it

is filed for record. Any unit created by Lessee hereunder shall also be revised so as to conform with an order of a Regulatory Body issued after said unit was originally established; such revision shall be effective as of the effective date of such order without further declaration by Lessee, but such revision shall be limited to the stratum or strata covered by said order and shall not otherwise affect the unit originally created.¹⁴

No such provision has been recommended for the geopressured lease.

The problem with units formed in this manner generally has been previously alluded to.¹⁵ As applied to the geopressured lease, the uncertainty as to the size of the units which may be appropriate as well as whether or not the characteristics of the reservoir may make some basis other than acreage a fair method of allocating production, render such provisions of doubtful value. Furthermore a unit is seldom formed by declaration of the lessee in Louisiana except as a "stopgap" measure pending unitization by the Commissioner or as a device to defer the necessity of paying delay rentals under a number of leases. The latter is sometimes advantageous because the drilling of a single well on a unit comprised of several separately leased tracts will, under the terms of most leases satisfy the drilling obligations necessary to defer or delay payment of delay rentals as to each.

However, if one forms such a unit and the well is successful, any owner whose lands lie outside the unit or a royalty owner who is unhappy with the configuration of the unit and his participation in it, may petition the Commissioner to establish units under the Conservation Act and these units will under most lease forms supersede those formed by the lessee. This is almost universally what happens in Louisiana. Commissioner-formed units are almost always established for producing fields.

The relatively long primary term recommended for the geopressured lease as well as the provision for a minimum annual rental, which are believed to be advantageous for other reasons, should also make the last minute formation of units generally unnecessary and give no financial advantage to unitization of the leases during drilling. On the other hand,

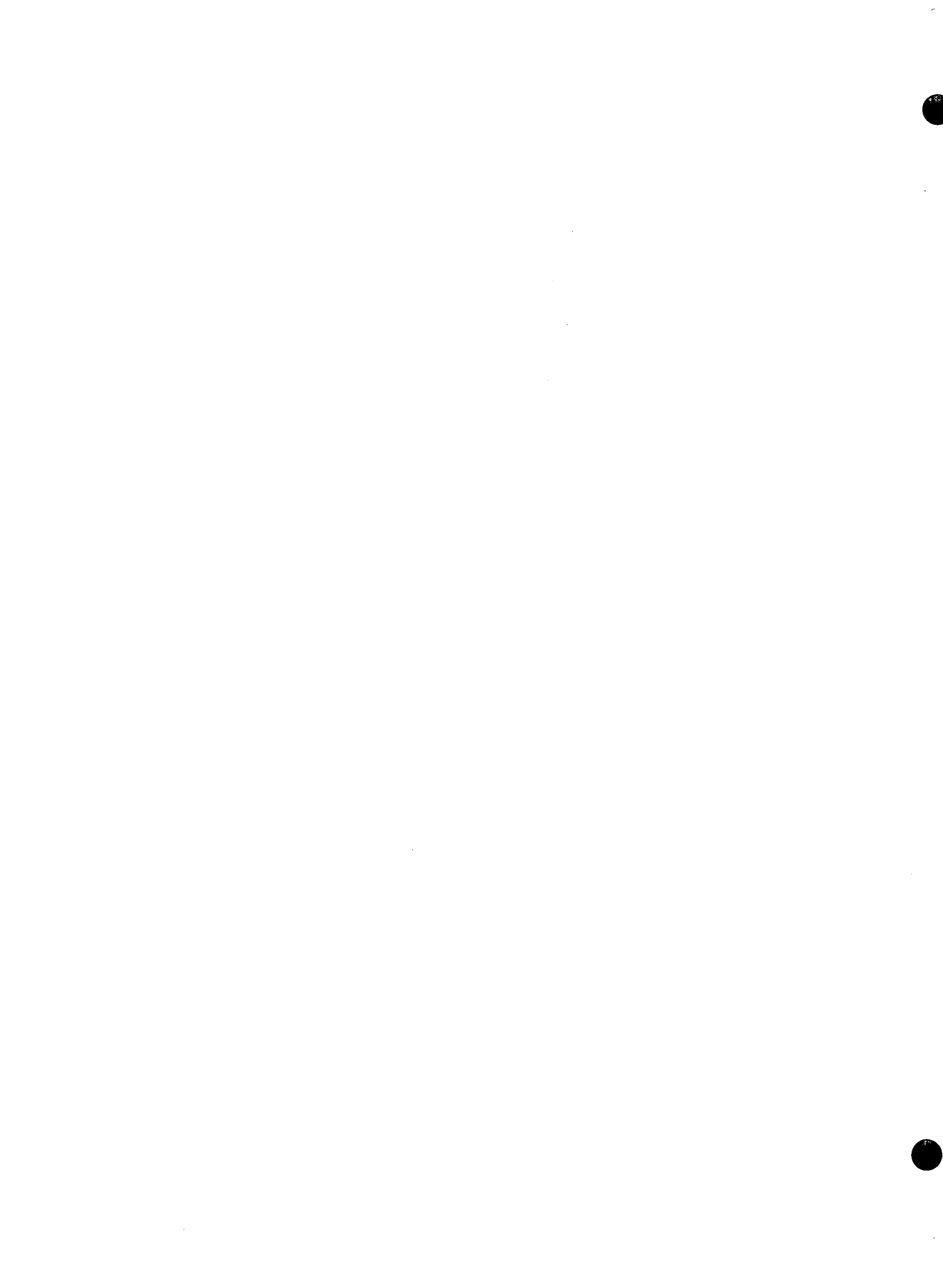
if one assumes the size of a geopressured unit will ultimately encompass several square miles, a lease stipulating what may appear to be a relatively low royalty (in oil and gas terms) and giving the lessee authority to form units comprising several square miles may diminish a prospective lessor's enthusiasm to lease his lands and thus be tactically unwise. After more information is derived from the drilling and operation of geopressured reservoirs some pattern may develop as to the ordinary size and configuration of such units and the method by which the production should be allocated among the various tracts. It may then be possible to draft a satisfactory clause for unitization if circumstances dictate the advisability of such units. On the whole, however, for the reasons mentioned, the authors do not believe a provision for unitization by declaration would serve any really useful purpose under the arrangement suggested and could to create difficulties in negotiating the leases. For this reason no such provision is recommended or has been suggested.

FOOTNOTES TO CHAPTER IX

1. Supra, pages 41 and 175.
2. Moses, The Evolution and Development of the Oil and Gas Lease, Southwestern Legal Foundation, 2d Annual Institute on Oil and Gas Law and Taxation, 1 (1951).
3. See; Williams and Meyers, 3 Oil and Gas Law 201 (1977).
4. See the discussion of this problem in the Comment to Article 213 of the Mineral Code.
5. Id.
6. Landry v. Flaitz, 245 La. 223, 157 So.2d 892 (1963); Smith v. Sun Oil Co. 172 La. 655, 135 So. 15, (1931).
7. Bath's Form; 42 C.P.M., New South Louisiana, Revised 6., Pooling Published by the M.L. Bath and Company.
8. An excellent discussion of this is found in the Comment to Article 123 of the Mineral Code.
9. Id.
10. Rushing v. Griffin 240 La. 31, 121 So.2d 229, (1960). Johnson v. Smallenberger 237 La. 11, 110 So.2d 119 (1959). Atlantic Refining Co. v. Shell Oil Co., 217 La. 576, 46 So.2d 907 (1950). Miller v. Kellermen, 228 F.Supp. 446 (U.S.D.C.W.D. La. 1964). aff'd 354 F.2d 46 (U.S.C.A. 5th 1966); Broussard v. Phillips Petroleum Co., 160 F.Supp. 905 (U.S.D.C.W.D. La. 1958). aff'd 265 F.2d 221 (U.S.C.A. 5th 1959).
11. Calhoun v. Gulf Refining Co. 235 La. 494, 104 So.2d 547 (1928). Jones v. Southern National Gas Co., 213 La. 1051, 36 So.2d 34 (1948). Baker v. Potter, 223 La. 274, 65 So.2d 598 (1953).
12. Many leases contain what is colloqually called a "Pugh clause" which provides that upon unitization the area covered by the lease lying outside a unit will not be maintained by unit production but that the

lessee, upon payment of delay rentals based upon the acreage in the lease and outside the unit may have an extended term in which to develop the external acreage. The formation or modification of a unit may require a determination of the acreage upon which the rentals are to be based and the ownership of the portion of the land outside the unit, sometimes before the boundaries of the unit have actually been surveyed or definitely established.

13. "The term 'royalty' has been given a definition by the courts; that is, it has been construed as meaning 1/8 interest in the oil and gas produced". MacDonald v. Sanders, 207 So.2d 155 (Texas Civ. App. 1955).
14. Form "42 CPM - New South Louisiana Revised Six (6) - Pooling"
Published by M.L. Bath Companies.
15. *Supra*, p. 189.



APPENDICES

1. GEOHERMAL ENERGY RESOURCES ACT
2. SELECTED PORTIONS OF THE LOUISIANA CONSERVATION ACT
3. LOUISIANA DEPARTMENT OF CONSERVATION PROPOSED

REGULATIONS

4. GEOHERMAL LEASE



APPENDIX 1GEOTHERMAL ENERGY RESOURCES ACT

(RS 30:801 et seq.)

(as amended through 1977)

30:801

Definitions

(1) "Geothermal resources" means:

(a) All products of geothermal processes, embracing indigenous steam, hot water, hot brines and geopressed waters excepting, however, waters produced incidental to oil or gas exploration or production.

(b) Steam and other gases, hot water and hot brines resulting from water, gas or other fluids artificially introduced into geothermal and/or geopressed water formations.

(c) Heat, natural gas dissolved in formation water or which was dissolved in formation water and is produced at the geothermal and/or geopressed well bore, or other associated energy found in geothermal and/or geopressed water formations.

(d) Any byproduct derived therefrom.

(2) "Byproduct" means any mineral or minerals, excluding oil and natural gas, which are found in solution or in association with a geothermal resource and which have a value less than seventy-five percent of the value of the total geothermal resource if utilized or not, because of quantity, quality, or technical difficulties in extraction and production of sufficient value to warrant extraction and production by themselves of which production would waste or not fully utilize the geothermal resource.

(3) "Geothermal lease" is a contract by which the lessee is granted the right for exploration, drilling, development, production and distribution of geothermal resources and byproducts.

(4) "Geothermal operation" includes the exploration for, drilling for, development of, production of and distribution of geothermal resources as defined in this Chapter.

30:802 Regulation of exploration, drilling, production and subsurface disposal

Full regulatory authority over all geothermal exploration, drilling, development, and production as well as subsurface disposal of geothermal waters and/or waste is hereby vested in the state Department of Conservation. The provisions of the Louisiana Conservation Act R.S. 30:1, et seq., including particularly, but without limitation, R.S. 30:5 and R.S. 30:9 thereof, are hereby extended to all geothermal operations. The commissioner of conservation is further authorized to promulgate such additional rules and regulations relating specifically to geothermal operations that are deemed by him to be needed in the interest of conservation if they are not inconsistent with the provisions of this Chapter. All geothermal operations shall be exempt from the provisions of R.S. 30:3091 et seq.

Any disposal of any kind or nature made pursuant to this Chapter into any navigable or nonnavigable streams or waters shall be done under the supervision of the Stream Control Commission of the state.

30:803 Conservation and environmental protection

In all cases, a lessee under a geothermal lease or an owner shall conduct his exploration, drilling, development, production operations and disposal methods using all reasonable precautions to protect the environment and to prevent pollution of state waters, other environmental damages, or waste of geothermal resources.

30: 804 Jurisdiction over state geothermal resources and products

The State Mineral Board is hereby vested with exclusive authority to lease for the exploration, development, production and distribution of geothermal resources and the byproducts thereof any lands belonging to the state, or the title to which is in the public domain, including road beds, water bottoms, and lands adjudicated to the state at tax sale. To the extent applicable, the mineral board is also vested with the same powers of supervision and management of all geothermal leases granted by the state that are vested in the board under R.S. 30:129 with respect to leases granted for minerals, oil and gas.

30:805 Leasing procedures

Except as otherwise specifically provided herein, applications for state geothermal leases, the inspection of the lands, the quantity of land to be obtained in a single lease, the advertisement for bids, the bidding procedures and the board's authority to accept or reject bids all shall be governed by the provisions of R.S. 30:125 through R.S. 30:129 both inclusive.

30:806 Terms; rentals; royalties

A. All state geothermal leases shall be granted for a maximum primary term of ten years and so long thereafter as geothermal operations are being conducted or geothermal resources are being produced or utilized in commercial quantities.

B. Where a state geothermal lease provides for delay rentals, the annual rental shall be for not less than one dollar per acre or one-half the cash bonus, whichever is greater.

C. Royalties on production obtained from a state geothermal lease shall be not less than the following:

(1) A royalty of not less than ten percent of the price received for all geothermal resources produced and saved or utilized.

(2) A royalty of not less than five percent of the value of any byproduct produced and saved or utilized.

D. The term rental or royalty obtained by the state from a geothermal lease shall not affect or limit the compensation negotiated by the owners of adjoining or nearby property which may be affected or exploited by the lessee.

30:807 Regulations of board

The mineral board is hereby authorized to incorporate such assitional customary provisions in a state geothermal lease and to adopt such additional regulations governing the administration and management of such leases that are not inconsistent with the provisions of this Chapter.

30:809 Preservation of rights

"The respective rights of the lessees under oil, gas, and mineral leases and of the lessees under geothermal leases are intended to be compatible and to be exercised reasonably by one with due regard to the other. However, in the event of conflict, the rights of the lessee under any oil, gas, or mineral lease heretofore issued on lands as set forth in Section 804 hereof and in effect on the effective date of this Chapter, shall not be diminished or limited by virtue of this Chapter or any provisions hereof."

The provisions of this Chapter are not intended and should not be construed to deny the legal right or remedy of any owner for the protection of his property interests that is otherwise available to such owner under the law.



APPENDIX 2SELECTED PORTIONS OF THE LOUISIANA CONSERVATION ACT

(RS 30:1 et seq. as amended through 1977)

30:1 Department established; appointment of commissioners; term; vacancies; jurisdiction; salary

A. There is established the state Department of Conservation, hereinafter referred to as the department. The department shall be directed and controlled by a commissioner of conservation, who shall be appointed by the governor, with the consent of the Senate, for a term of four years. In case of vacancy for any cause the governor shall, with consent of the Senate, fill the office by appointment for the unexpired term.

30:2 Waste of oil or gas prohibited

Waste of oil for gas as defined in this chapter is prohibited.

30:3 Definitions

Unless the context otherwise requires, the words defined in this Section have the following meaning when found in this Chapter:

(1) "Waste," in addition to its ordinary meaning, means "physical waste" as that term is generally understood in the oil and gas industry. It includes:

(a) the inefficient, excessive, or improper use or dissipation of reservoir energy; and the location, spacing, drilling, equipping, operating, or producing of an oil or gas well in a manner which results, or tends to result, in reducing the quantity of oil or gas ultimately recoverable from a pool; and

(b) the inefficient storing of oil; the producing of oil or gas from a pool in excess of transportation or marketing facilities or of reasonable market demand; and the locating, spacing, drilling, equipping, operating, or producing of an oil or gas well in a manner causing, or tending to cause, unnecessary or excessive surface loss or destruction of oil or gas.

(c) The disposal, storage or injection of any waste product in the subsurface by means of a disposal well.

(2) "Commissioner" means the Commissioner of Conservation of the State of Louisiana.

(3) "Person" means any natural person, corporation, association, partnership, receiver, tutor, curator, executor, administrator, fiduciary, or representative of any kind.

(4) "Oil" means crude petroleum oil, and other hydrocarbons, regardless of gravity, which are produced at the well head in liquid form by ordinary production methods.

(5) "Gas" means all natural gas, including casinghead gas, and all other hydrocarbons not defined as oil in Paragraph (4) above.

(6) "Pool" means an underground reservoir containing a common accumulation of crude petroleum oil or natural gas or both. Each zone of a general structure which is completely separated from any other zone in the structure is covered by the term "pool" as used in this Chapter.

(7) "Field" means the general area which is underlaid or appears to be underlaid by at least one pool. It includes the underground reservoir or reservoirs containing crude petroleum oil or natural gas or both. The words "field" and "pool" mean the same thing when only one underground reservoir is involved; however, "field" unlike "pool", may relate to two or more pools.

(8) "Owner" means the person who has the right to drill into and to produce from a pool and to appropriate the production either for himself or for others.

(9) "Producer" means the owner of a well capable of producing oil or gas or both.

(10) "Product" means any commodity made from oil or gas. It includes refined crude oil, crude tops, topped crude, processed crude petroleum, residue from crude petroleum, cracking stock, uncracked fuel oil, fuel oil, treated crude oil, residuum, gas oil, casinghead gasoline, natural gas gasoline, naphtha, distillate, gasoline, kerosene, benzine, wash oil, waste oil, blended gasoline, lubricating oil, blends or mixtures of oil with one or more liquid products or by-products derived from oil or gas, and blends or mixtures of two or more liquid products or by-products derived from oil or gas, whether hereinabove enumerated or not.

(11) "Illegal oil" means oil which has been produced within the state from any well in excess of the amount allowed by any rule, regulation, or order of the commissioner, as distinguished from oil produced within the state not in excess of the amount so allowed by any rule, regulation, or order, which is "legal oil."

(12) "Illegal gas" means gas which has been produced within the state from any well in excess of the amount allowed by any rule, regulation, or order of the commissioner, as distinguished from gas produced within the state not in excess of the amount so allowed by any rule, regulation, or order, which is "legal gas."

(13) "Illegal product" means any product of oil or gas, any part of which was processed or derived, in whole or in part, from illegal oil or illegal gas or from any product thereof, as distinguished from "legal product," which is a product processed or derived to no extent from illegal oil or illegal gas.

(14) "Tender" means a permit or certificate of clearance for the transportation of oil, gas, or products, approved and issued or registered under the authority of the commissioner.

(15) "Waste product" means any liquid, sludge, effluent, semi-liquid or other substance resulting from any process, whether manufacturing or otherwise.

30:4

Jurisdiction and powers of commissioner; rules and regulations

A. The commissioner has jurisdiction and authority over all persons and property necessary to enforce effectively the provisions of this Chapter and all other laws relating to the conservation of oil or gas.

B. The commissioner shall make such inquiries as he thinks proper to determine whether or not waste, over which he has jurisdiction, exists or is imminent. In the exercise of this power the commissioner has the authority: to collect data; to make investigations and inspections; to examine properties, leases, papers, books, and records; to examine, survey, check, test, and gauge oil and gas wells, tanks, refineries, and modes of transportation; to hold hearings; to provide for the keeping of records and the making of reports; and to take any action as reasonably appears to him to be necessary to enforce this Chapter.

C. The commissioner has authority to make after notice and hearing as provided in this Chapter, any reasonable rules, regulations, and orders that are necessary from time to time in the proper administration and enforcement of this Chapter, including rules, regulations, or orders for the following purposes:

- (1) To require the drilling, casing, and plugging of wells to be done in such a manner as to prevent the escape of oil or gas out of one stratum to another; to prevent the intrusion of water into oil or strata; to prevent the pollution of fresh water supplies by oil, gas, or salt water; and to require reasonable bond with security for the performance of the duty to plug each dry or abandoned well.
- (2) To require the making of reports showing the location of all oil and gas wells, and the filing of logs, electrical surveys, and other drilling records.
- (3) To prevent wells from being drilled, operated, and produced in a manner to cause injury to neighboring leases or property.
- (4) To prevent the drowning by water of any stratum or part thereof capable of producing oil or gas in paying quantities, and to prevent the premature and irregular encroachment of water which reduces, or tends to reduce, the total ultimate recovery of oil or gas from any pool.
- (5) To require the operation of wells with efficient gas-oil ratios, and fix these ratios.
- (6) To prevent blow outs, caving and seepage in the sense that conditions indicated by these terms are generally understood in the oil and gas business.
- (7) To prevent fires.
- (8) To identify the ownership of all oil or gas wells, producing leases, refineries, tanks, plants, structures, and all storage and transportation equipment and facilities.
- (9) To regulate the shooting and chemical treatment of wells.
- (10) To regulate secondary recovery methods, including the introduction of gas, air, water, or other substance into producing formations.
- (11) To limit and prorate the production of oil or gas or both from any pool or field for the prevention of waste.
- (12) To require, either generally or in or from particular areas, certificates of clearance or tenders in connection with the transportation of oil, gas, or any product.

(13) To regulate the spacing of wells and to establish drilling units, including temporary or tentative spacing rules and drilling units in new fields.

(14) To require interested persons to place uniform meters of a type approved by the commissioner wherever the commissioner designates on all pipelines, gathering systems, barge terminals, loading racks, refineries, or other places necessary or proper to prevent waste and the transportation of illegally produced oil or gas. These meters shall be under the supervision and control of the department of conservation. It shall be a violation of this Chapter, subject to the penalties provided in R.S. 30:18, for any person to refuse to attach or install a meter when ordered to do so by the commissioner, or in any way to tamper with the meters so as to produce a false or inaccurate reading, or to have any device through which the oil or gas can be passed around the meter, unless expressly authorized by written permit of the commissioner.

(15) To require that the product of all wells shall be separated into so many million cubic feet of gaseous hydrocarbons and barrels of liquid hydrocarbons, either or both, and accurately measured wherever separation takes place. Gaseous hydrocarbon measurement shall be corrected to ten ounces above atmospheric pressure. Liquid hydrocarbons shall be measured into barrels of forty-two gallons each. Both measurements shall be corrected to sixty degrees fahrenheit.

(16) To regulate by rules, the drilling, casing, cementing, disposal interval, monitoring, plugging and permitting of disposal wells, including all surface and storage facilities incidental thereto, which are used to inject waste products in the subsurface, in such a manner as to prevent the escape of such waste product into a fresh ground water aquifer or into oil or gas strata; and may require reasonable bond with security for the performance of the duty to plug each abandoned well or each well which is of no further use.

30:5 Permission to convert gas into carbon black; re-cycling gas; unit operations

A. In order to prevent waste of natural gas, the commissioner may grant to bona fide applicants permits for the building and operation of plants and to burn natural gas into carbon black for the period of time fixed by the commissioner in the permit, not to exceed twenty-five years and subject to the provisions of the laws of the state and the rules and regulations of the department. It shall be a violation of this Chapter for any person to build or operate a new plant, for these purposes without the permit required by this Section.

B. In order to prevent waste and to avoid the drilling of unnecessary wells, the commissioner shall, after notice and upon hearing, and his determination of feasibility, require the re-cycling of gas in any pool or portion of a pool productive of gas from which condensate or distillate may be separated or natural gasoline extracted, and promulgate rules to unitize separate ownership and to regulate production of the gas and reintroduction of the gas into productive formations after separation of condensate or distillate, or extraction of natural gasoline, from the gas.

C. Without in any way modifying the authority granted to the commissioner of Subsection B of Section 9 of this Title to establish a drilling unit or units for a pool and in addition to the authority conferred in Subsection B of this Section, the commissioner of conservation, upon the application of any interested party, also is authorized and empowered to enter an order requiring the unit operation of any pool or a combination of two pools in the same field, productive of oil or gas, or both, in connection with the institution and operation of systems of pressure maintenance by the injection of gas, water or any other extraneous substance, or in connection with any program of secondary recovery; and the commissioner is further authorized and empowered to require the unit operation of a single pool in any situation where the ultimate recovery can be increased and waste and the drilling of unnecessary wells can be prevented by such a unit operation. In connection with such an order of unit operation, the commissioner shall have the right to unitize, pool and consolidate all separately owned tracts and other property ownerships. Any order for such a unit operation shall be issued only after notice and hearing and shall be based on findings that (1) the order is reasonably necessary for the prevention of waste and the drilling of unnecessary wells, and will appreciably increase the ultimate recover of oil or gas from the affected pool or combination of two pools, (2) the proposed unit operation is economically feasible, (3) the order will provide for the allocation to each separate tract within the unit of a proportionate share of the unit production which shall insure the recovery by the owners of that tract of their just and equitable share of the recoverable oil or gas in the unitized pool or combination of two pools. and (4) at least three-fourths of the owners and three-fourths of the royalty owners, such three-fourths to be in interest as determined under (3) hereof, shall have approved the plan and terms of unit operation, such approval to be evidenced by a written contract or contracts covering the terms and operation of said unitization signed and executed by said three-fourths in interest of said owners and three-fourths in interest of the said royalty owners and filed with the commissioner on or before the day set for said hearing. The order requiring the unit operation shall designate a unit operator and shall also make provision for the proportionate allocation to the owners (lessees or owners of unleased interests) of the costs and expenses of the unit operation, which allocation shall be in the same proportion that the separately owned tracts share in unit production. The cost of capital investment in wells and physical equipment and intangible drilling costs, in the absence of voluntary agreement among the owners to the contrary, shall be shared in

like proportion; provided that no such owner who has not consented to the unitization shall be required to contribute to the costs or expenses of the unit operation, or to the cost of capital investment in wells and physical equipment and intangible drilling costs, except out of the proceeds of production accruing to the interest of such owner out of production from such unit operation. However, no well costs credit allowable shall be adjusted on the basis of less than the average well costs within the unitized area. It is provided, however, that the order requiring unit operation shall not vary nor alter any of the terms of the above required written contract or contracts evidencing approval nor impose any terms or operations upon the non-signers of said contract or contracts more onerous than the terms and operations set out in said contract or contracts.

No order of the commissioner entered pursuant hereto shall have the effect of enlarging, displacing, varying, altering or in anywise whatsoever modifying or changing contracts in existence on the effective date of this Act concerning the unitization of any pool (reservoir) or pools (reservoirs) or field (as defined in said contract) for the production of oil or gas, or both.

30:6 Hearings, notice; rules of procedure; emergencies; service of process; recordation and inspection; request for hearings

A. The commissioner shall prescribe the rules of order or procedure in hearings or other proceedings before him under this Chapter.

B. No rules, regulation, order or change, renewal, or extension thereof, shall, in the absence of an emergency, be made by the commissioner under the provisions of this Chapter except after a public hearing upon at least ten days' notice given in the manner and form prescribed by the commissioner. This hearing shall be held at a time and place and in the manner prescribed by the commissioner. The commissioner, in his discretion, may designate a member of his staff, either an attorney, engineer or geologist, to conduct public hearings on his behalf. Any person having an interest in the subject matter of the hearing shall be entitled to be heard. Provided, however, that whenever any application shall be made to the commissioner of conservation for creation, revision or modification of any unit or units for production of oil or gas, or for adoption of any plan for spacing of wells or for cycling of gas, pressure maintenance or restoration, or other plan of secondary recovery, the applicant shall be required to file with the application two copies of a map of such unit or units or well spacing pattern or two explanations of such plan of cycling, pressure maintenance or restoration, or

other plan of secondary recovery, the applicant shall be required to file with the application two copies of a map of such unit or units or well spacing pattern or two explanations of such plan of cycling, pressure maintenance or restoration, or other secondary recovery program and at least thirty (30) days notice shall be given of the hearing to be held thereon, in the manner prescribed by the commissioner of conservation, and a copy of such plat or explanation of program shall remain on file in the office of the commissioner in Baton Rouge and in the office of the district manager of the conservation district in which the property is located, and be open for public inspection, at least thirty (30) days prior to such hearing.

C. If the commissioner finds an existing emergency which in his judgment requires the making, changing, renewal, or extension of a rule, regulation, or order without first having a hearing, the emergency rule, regulation, or order shall have the same validity as if a hearing had been held after due notice. The emergency rule, regulation, or order shall remain in force no longer than fifteen days from its effective date. In any event, it shall expire when the rule, regulation, or order made after notice and hearing with respect to the same subject matter becomes effective.

D. Should the commissioner elect to give notice by personal service it may be made by any officer authorized to serve process or any agent of the commissioner in the same manner as is provided by law for the service of citation in civil actions in the district courts. Proof of the service by an agent shall be by the affidavit of the person making it.

E. All rules, regulations, and orders made by the commissioner shall be in writing and shall be entered in full by him in a book kept for that purpose. This book shall be a public record and shall be open for inspection at all times during reasonable office hours. A copy of a rule, regulation or order, certified by the commissioner, shall be received in evidence in all courts of this state with the same effect as the original.

F. Any interested person has the right to have the commissioner call a hearing for the purpose of taking action in respect to a matter within the jurisdiction of the commissioner by making a request therefor in writing. Upon receiving the request the commissioner shall promptly call a hearing. After the hearing, and with all convenient speed and in any event within thirty days after the conclusion of the hearing the commissioner shall take whatever action he deems appropriate with regard to the subject matter. In the event of failure or refusal of the commissioner to issue an order within the period of thirty days, he may be compelled to do so by mandamus at the suit of any interested person.

30:7 Orders fixing allowable productions; hearing to determine initial schedules; old fields, hearing unnecessary, summary hearing

A. An order fixing allowable production of oil or gas or making changes therein for any month or other period shall be issued by the commissioner on or before the twenty-third day of the month preceding the month for which the order is to be effective and it shall be promulgated by immediate publication in the official journal of the state.

B. (1) In the case of old fields or pools for which schedules of allowables had been previously issued, it shall not be necessary for the commissioner to have a hearing prior to the issuance of any subsequent order fixing or changing the schedule of allowables unless there is a written request for a hearing by an interested person. This provision permitting the issuance of a schedule of allowables for old fields without a hearing is an exception to the general rule requiring notice and hearing prior to the issuance of an order by the commissioner.

(2) In the event a schedule of allowables is promulgated without previous notice and hearing, an aggrieved producer of oil or gas may file with the commissioner at his office within seventy-two hours from the publication of the order, a sworn written statement, giving in detail the grounds of his complaint. Thereupon, the commissioner shall hold a hearing within forty-eight hours. At this hearing, oral or documentary evidence may be received by the commissioner in favor of and against the complaint. After the hearing, the commissioner shall summarily render a decision. If his decision is not made on or before the effective date of the order complained of, that order shall be suspended until a decision is rendered. During this period, the former order shall remain in force. This provision permitting a summary hearing shall be restricted to cases involving a complaint made against a schedule of allowables under the circumstances set forth in this Subsection B(2).

30:9 Production from pool; drilling units; equitable share; rules and regulations

A. Whether or not the total production from a pool be limited or prorated, no rule, regulation, or order of the commissioner shall in terms or effect:

(1) Make it necessary for the producer from, or the owner of, a tract of land in the pool, in order that he may obtain the tract's just and equitable share of the production of the pool, as that share is set forth in this Section, to drill and operate any well or wells on the tract in addition to the well or wells that can without waste produce this share, or

(2) Occasion net drainage from a tract unless there be drilled and operated upon the tract a well or wells in addition to the well or wells thereon that can without waste produce the tract's just and equitable share of the production of the pool.

B. For the prevention of waste and to avoid the frilling of unnecessary wells, the commissioner shall establish a drilling unit or units for each pool, except for those pools which, prior to July 31, 1940, had been developed to an extent and where conditions exist making it impracticable or unreasonable to use a drilling unit at the present stage of development. A drilling unit, as contemplated herein, means the maximum area which may be efficiently and economically drained by one well. This unit shall constitute a developed area as long as a well is located thereon which is capable of producing oil or gas in paying quantities.

C. Each well permitted to be drilled upon a drilling unit hereafter established shall be drilled at the location designated by the commissioner of conservation, after public hearing, in the order creating the unit. The commissioner of conservation shall consider all available geological and engineering evidence and shall provide for the unit well to be located at the optimum position in the drilling unit for the most efficient and economic drainage of such unit with such exceptions as may be reasonably necessary where topographical conditions exist that would make such a location of the unit well unduly burdensome or where the designated unit well was drilled or commenced prior to the creation of the drilling unit; provided, however, the commissioner of conservation shall fix the well location for each drilling unit so that the producer thereof shall be allowed to produce no more than his just and equitable share of the oil and gas in the pool, as this share is set forth in this Section.

D. Subject to the reasonable necessities for the prevention of waste, and to reasonable adjustment because of structural position, a producer's just and equitable share of the oil and gas in the pool, also referred to as a tract's just and equitable share, is that part of the authorized production of the pool, whether it be the total which could be produced without any restriction on the amount of production, or whether it be an amount less than that which the pool could produce if no restriction on amount were imposed, which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract or tracts in the pool bears to the recoverable oil and gas in the total developed area of the pool, in so far as these amounts can be practically ascertained. To that end, the rules, regulations, and orders of the commissioner shall be such as will prevent or minimize reasonably avoidable net drainage from each developed area, that is, drainage not equalized by counter drainage, and will give to each producer the opportunity to use his just and

equitable share of the reservoir energy. In determining each producer's just and equitable share of the production authorized for the pool, the commissioner is authorized to give due consideration to the productivity of the well or wells located thereon, as determined by flow tests, bottom hole pressure tests, or any other practical method of testing wells and producing structures, and to consider other factors and geological and engineering tests and data as may be determined by the commissioner to be pertinent or relevant to ascertaining each producer's just and equitable share of the production and reservoir energy of the field or pool.

30:9.1 Termination of units; conditions; procedure; issuance of orders

A. Any unit or units established pursuant to the authority contained in this Chapter, shall unless sooner terminated, extended or otherwise modified by order of the commissioner, remain in full force and effect so long as:

(1) a well is producing from the pool for which the unit or units were established;

(2) a well is completed in the pool for which the unit or units were established and, although not producing, has been proved to be capable of producing;

(3) drilling, reworking, recompletion, plugging back or deepening operations are being conducted on a well to secure or restore production from the pool for which the unit or units were established; or

B. If a period of one year and ninety days elapses without the occurrence of any of the conditions specified in Paragraphs (1), (2), or (3), of Subsection A of this Section, upon application being made therefor, the commissioner may, by order issued after ten days legal notice, and without the necessity of a public hearing in the absence of objection, terminate all units within the pool.

C. The commissioner shall prescribe, issue, amend, and rescind such orders, rules and regulations as he may find necessary or appropriate to carry out the provisions of this Section. Among other things, such orders, rules, and regulations shall prescribe the form and substance of the application for unit termination, and all statements, declarations, and supporting evidence to be filed therewith.

D. The provisions of this Section are intended to and shall affect presently existing units; however, in those instances where more than one year and ninety days have elapsed prior to the effective date of this Section without any of the conditions specified in Paragraphs (1), (2), or (3) of Subsection A of this Section having

occurred, such unit or units shall not be subject to termination hereunder until an additional period of ninety days has elapsed after the effective date of this Section without any of the said conditions having occurred.

E. Any order issued pursuant to this Section shall be filed for record as provided in Section 11.1 of this Title.

F. Any future wells completed within the boundaries of any unit or units terminated pursuant to this Section shall, upon a new unit application being made to the commissioner, be entitled to a unit hearing as otherwise provided for by law as fully as though the original unit or units had never been created, and any such new unit or units shall not be limited in any way by the prior hearing or pre-existing unit or units.

G. No provision of this Section shall be construed so as to in any way limit the authority otherwise granted to the commissioner to terminate, extend, or otherwise granted to the commissioner to terminate, extend, or otherwise modify any unit or units.

30:10 Agreements for drilling units; pooling interests; terms and conditions; expenses

A. When two or more separately owned tracts of land are embraced within a drilling unit which has been established by the commissioner as provided in R.S. 30:9B, the owners may validly agree to pool their interests and to develop their lands as a drilling unit.

(1) Where the owners have not agreed to pool their interests, the commissioner shall require them to do so and to develop their lands as a drilling unit, if he finds it to be necessary to prevent waste or to avoid drilling unnecessary wells.

(a) All orders requiring pooling shall be made after notice and hearing. They shall be upon terms and conditions that are just and reasonable and that will afford the owner of each tract the opportunity to recover or receive his just and equitable share of the oil and gas in the pool without unnecessary expense. They shall prevent or minimize reasonable avoidable drainage from each developed tract which is not equalized by counter drainage.

(b) The portion of the production allocated to the owner of each tract included in a drilling unit formed by a pooling order shall, when produced be considered as if it had been produced from his tract by a well drilled thereon.

(c) In the event pooling is required, the cost of development and operation of the pooled unit chargeable by the operator to the other interested owners shall be limited to the actual reasonable expenditures required for that purpose, including a charge for supervision. In the event of a dispute relative to these costs, the commissioner shall determine the proper costs, after notice to all interested persons and a hearing.

B. Should the owners of separate tracts embraced within a drilling unit fail to agree upon the pooling of the tracts and the drilling of a well on the unit, and should it be established by final and unappealable judgment of court that the commissioner is without authority to require pooling as provided for in Subsection A, then, subject to all other applicable provisions of this Chapter, the owner of each tract embraced within the drilling unit may drill thereon. The allowable production therefrom shall be such proportion of the allowable for the full unit as the area of the separately owned tract bears to the full drilling unit.

30:11

Allocation of allowable production

A. Whenever the commissioner limits the total amount of oil or gas which may be produced, he shall allocate the allowable production among the fields. This allocation shall be made on a reasonable basis, giving, to each field with small wells of settled production, an amount which will prevent a general premature abandonment of the wells in the field.

B. The commissioner may limit the production of a pool to an amount less than that which the pool could produce if no restriction were imposed. This limitation may be imposed either as an incident to or without a limitation of the total amount of oil or gas which may be produced in this state. The commissioner shall prorate the allowable production among the producers in the pool on a reasonable basis so as to prevent or minimize avoidable drainage from each developed area which is not equalized by counter drainage, and so that each producer will have the opportunity to produce or receive his just and equitable share, subject to the reasonable necessities for the prevention of waste.

C. After the effective date of a rule, regulation, or order of the commissioner fixing the allowable production of oil or gas, or both, for a pool, no person shall produce from a well, lease, or property more than the allowable production which is applicable, nor shall the amount be produced in a different manner than that authorized.

30:11.1 Filing and recording of orders creating drilling or production units

Within thirty days after the issuance thereof the commissioner of conservation of the state of Louisiana shall cause to be filed and recorded in the conveyance records of the parish or parishes in which the immovable property affected thereby is situated all orders and amendments thereof creating drilling or production units.

30:12 Court review and injunction; venue; procedure; burden of proof

An interested person adversely affected by any law of this state with respect to conservation of oil or gas, or both, or by a provision of this Chapter, or by a rule, regulation, or order made by the commissioner hereunder, or by an act done or threatened thereunder, and who has exhausted his administrative remedy, may obtain court review and seek relief by a suit for an injunction against the commissioner as defendant. Suit shall be instituted in the district court of the parish in which the principal office of the commissioner is located and shall be tried summarily. The attorney representing the commissioner may have a case set for trial at any time after ten days' notice to the plaintiff or his attorney of record. The burden of proof shall be upon the plaintiff and all pertinent evidence with respect to the validity and reasonableness of the order of the commissioner complained of shall be admissible. The law, the provision of this Chapter, or the rule, regulation, or order complained of, shall be taken as prima facie valid. This presumption shall not be overcome in connection with any application for injunctive relief, including a temporary restraining order, by verified petition or affidavit of or in behalf of the applicant. The right of review accorded by this Section shall be inclusive of all other remedies, but the right of appeal shall lie as hereinafter set forth in this Chapter.

APPENDIX 3LOUISIANA DEPARTMENT OF CONSERVATIONPROPOSED REGULATIONSORDER GR-1STATE WIDE ORDER GOVERNING THE DRILLING
FOR AND PRODUCING OF GEOTHERMAL RESOURCESSECTION I - DEFINITIONS

- A. Unless the context otherwise requires, the words defined in this section shall have the following meanings when found in this order:
- B. The DEPARTMENT shall mean the DEPARTMENT OF CONSERVATION of the State of Louisiana.
- C. COMMISSIONER means the Commissioner of Conservation of the State of Louisiana.
- D. The DISTRICT MANAGER shall mean the head of any one of the DISTRICTS of the STATE under the DIVISION OF MINERALS, and as used, refers specifically to the Manager within whose district the well or wells are located.
- E. The AGENT shall mean the DIRECTOR of the DIVISION OF MINERALS, the CHIEF ENGINEER thereof, or any of the District Managers of their Aides.
- F. GEOTHERMAL RESOURCES shall mean:
- (a) All products of geothermal processes, embracing indigenous steam, hot water, hot brines and geopressured waters excepting, however, waters produced incidental to oil or gas exploration or production;
 - (b) Steam and other gases, hot water and hot brines resulting from water, gas or other fluids artificially introduced into geothermal and/or geopressured water formations;
 - (c) Heat, natural gas dissolved in formation water or which was dissolved in formation water and is produced at the geothermal and/or geopressured well bore, and other associated energy found in geothermal and/or geopressured water formations;
 - (d) Any byproduct derived therefrom.

- G. GEOTHERMAL BYPRODUCT means any mineral or minerals, excluding oil and natural gas, which are found in solution or in association with a geothermal resource and which have a value less than seventy-five percent of the value of the total geothermal resource if utilized or not because of quantity, quality, or technical difficulties in extraction and production by themselves or which production would waste or not fully utilize the geothermal resource.
- H. GEOTHERMAL LEASE is a contract by which the lessee is granted the right for exploration, drilling, development, production and distribution of geothermal resources and byproducts.
- I. GEOTHERMAL OPERATION includes the exploration for, drilling for, development of, production of, and distribution of, geothermal resources.
- J. GEOTHERMAL WELL shall mean a well whose principal production is geothermal resources.
- K. WELL, when used alone in these Rules and Regulations, shall mean any bore well used for study of or development of geothermal resources.
- L. COMPLETION. A geothermal well shall be considered completed when geothermal resources are produced or capable of being produced through the wellhead.
- M. WASTE shall mean the development of a geothermal resource in a manner that causes an appreciable reduction in the total energy ultimately recoverable under prudent and proper operation.
- N. POLLUTION shall mean such contamination or other alteration of the physical, chemical, or biological properties of any waters of the State including change in temperature, taste, color, turbidity, or odor of the waters or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will or is likely to create a nuisance or render such water harmful, detrimental, or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other beneficial uses, or to livestock, wild animals, birds, fish, or other aquatic life.
- O. WATERS OF THE STATE shall mean all waters within the jurisdiction of this State including all streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulation of water, surface and underground, natural or artificial public or private, situated wholly or partly within

- or bordering upon the State, excepting waters and sewage systems; treatment works of disposal systems, water and potable water distribution systems; and water withdrawn for use until such time as all uses and final treatment have been completed.
- P. RESERVOIR shall mean a system of hydraulically interconnected aquifers containing the geothermal resource.
- Q. FIELD shall mean the general geothermal resource area which is underlain or appears to be underlain by at least one geothermal reservoir.
- R. OWNER means the person who has the right to drill into and to produce from a reservoir and to appropriate the production either for himself or others.
- S. SUBSIDENCE is the net (lowering) in elevation of the land surface during a specified time interval. Usually calculated as a change in elevation of bench marks between successive surveys. May be the composite change resulting from various natural and man-made causes. (B. E. Lofgren, 1977, Background studies for appraising subsidence in the Texas Gulf Coast Region. U.S. Geological Survey Open-File Report 77-412 in cooperation with ERDA, p. 8:).
- T. ALL OTHER WORDS used herein shall be given their usual customary and accepted meaning, and all words of a technical nature, or peculiar to the geothermal industry, shall be given that meaning which is generally accepted in said geothermal industry or in the alternative the oil and gas industry.

SECTION II - APPLICATION TO DRILL

- A. All applications for permits to drill wells for geothermal resources or conversions of existing wells for geothermal development below the fresh water sands shall be made on Form GR-10 or revisions thereof, and mailed or delivered to the District Office. These applications, in duplicate, shall be accompanied by three copies of the location plat, preferably drawn to a scale of five hundred feet (500') to the inch. The plats shall be constructed from data compiled by a registered civil engineer or surveyor and shall definitely show the amount and location of the acreage with reference to quarter-section corners, or other established survey points. There shall also be shown all pertinent lease and property lines, leases and offset wells, including oil and gas wells. When the tract to be drilled is composed of separately owned interests which have been pooled or unitized, the boundaries to and the acreage in each separately owned interest must be indicated. Plats must have well locations certifications either written on or attached to the well location plats and this certification must be signed by a

registered civil engineer, qualified surveyor or a qualified engineer regularly employed by the applicant. If possible, the application card shall give the name and address of the drilling Contractor, otherwise the information as soon as determined, shall be supplied by letter to the District Manager.

- B. Dual completion applications will be granted only after proper notice and hearing.
- C. No well shall be drilled, nor shall the drilling be commenced, before a permit for such well has been issued by the Department of Conservation; furthermore, any work, such as digging pits, erecting buildings, derricks, etc., which the operator may do or have done, will be done at his own risk and with the full understanding that the Department of Conservation may find it necessary to change the location or deny the permit because of the rules and regulations applying in that instance.
- D. No well shall commence drilling below the surface casing until a sign has been posted on the derrick and subsequently on the well if it is a producer, showing the ownership and designation of the well, name of lease, section, township, range, and the serial number under which the permit was issued. The obligation to maintain a legible sign remains until abandonment. In order to make the designation of the well, as referred to above, more uniform through the State, and thus to facilitate the handling of all matters relative to any particular well, the following system of rules has been developed for use in the naming of wells in the future in Louisiana;

(a) In no case shall any operator name or well name exceed thirty (30) characters. (A space is equivalent to one (1) character.)

1. Abbreviations shall be used whenever possible to comply with the above. It is recommended that "S" be used for sand and "U" for unit.

2. The official well name appearing on Form GR-10 (Application to Drill) shall be used when reporting on all Department of Conservation forms and also in any correspondence.

(b) Lease Wells. All wells drilled on a lease basis shall bear the Lessor's surname and initials or given name.

Example:

<u>LEASE NAME</u>	<u>WELL NO.</u>
J. R. Smith	#2

(c) The Commissioner shall prescribe or cause to have prescribed the procedure for assigning well and/or unit nomenclature and shall issue a memorandum concerning same from time to time as the need arises.

1. Developmental Units proposed at a hearing shall be named in accordance with the latest memorandum, and the well number shall depend on whether or not there are any other wells in existence on the lease.

2. Any unit maps filed with an application for hearing must reflect proposed unit names in accordance with the latest memorandum.

(d) Units with Alternate Unit Wells. For those cases where more than one (1) well serves the same proration unit, the wells shall be named in accordance with the latest memorandum, and the well number shall be followed by the letters "ALT" in the case of each alternate well.

Example:

	<u>LEASE NAME</u>	<u>WELL NO.</u>
	Hayes SUE: J.R. Smith	#1
	Hayes SUE: Dave Luke	#1 ALT
	Hayes SUE: St. Mary	#22 ALT

SECTION III - ALL OTHER APPLICATIONS

- A. All applications for permits to repair (except ordinary maintenance operations) or workovers involving, but not limited to abandonment (plug and abandon), acidizing, deepening, perforating, perforating and squeezing, plugging (plug back), plugging and perforating, plugging back and side-tracking, plugging and squeezing, pulling casing, side-tracking, squeezing, squeezing and perforating, sand control, cementing casing or liner as workover feature, or when a well is to be killed or directionally drilled, shall be made to the District Office on Form GR-4 and a proper permit shall be received from the District Manager before work is started. A description of the work done under the above recited Work Permits shall be furnished on the reverse side of the Well History and Work Resume Report (FORM WH-GR), which form shall be filed with the District Office of the Department of Conservation in which the well is located within twenty (20) days after the completion or recompletion of the well. At least 12 hours prior notice of the proposed operations shall be given the District Manager and/or an offset operator in order that one of them may witness the work. If the District Manager fails to appear within 12 hours the work may be witnessed by the offset operator, but failing in this, the work need not be held up longer than 12 hours. This rule shall not deter an operator from taking immediate action in an emergency to prevent damage.

SECTION IV - RECORDS

The District Office shall be supplied with available field maps showing lease lines and well locations for all producing areas within the District, such maps to be provided by persons or companies operating in the field, on request of the Commissioner or his agent. Electrical and other logs, when run, of all test wells, or wells drilled in search of geothermal resources, shall be mailed in duplicate to the District Office of the Department of Conservation in which the well is located, such copies to be mailed within ten (10) days after completion of the well. These logs shall be filed on the following scales:

(a) All North Louisiana Districts --

Normal Log - Two inches (2") to one hundred feet (100').

(b) All South Louisiana Districts --

Normal Log - One inch (1") to one hundred feet (100').
Detailed Log - Five inches (5") to one hundred feet (100').

The service company running the electric log on the well shall include as a part of the information on the log the Permit Serial No. of the well.

A form entitled "Well History and Work Resume Report" (Form WH-GR) shall be filed with the District Office in which the well is located within twenty (20) days after completion of the well. This report shall be filed on forms furnished by the Department of Conservation or on like forms as reproduced by the operator.

SECTION V - CASING PROGRAM

A. CONDUCTOR PIPE

Conductor pipe is that Pipe ordinarily used for the purpose of supporting unconsolidated surface deposits. The use and removal of conductor pipe during the drilling of any geothermal resource shall be at the option of the operator.

B. SURFACE CASING

(1) Casing to be set shall be determined from TABLE NUMBER ONE Hereof:

TABLE NUMBER ONE

Total Depth of Contact	Casing Required	Number of Sacks Cement	Surface Casing Test Pressure Lbs. Per. So.
0-2500	100	200 or circulate to surf.*	300
2500-3000	150	500 "	600
3000-4000	300	500 "	600
4000-5000	400	500 "	600
5000-6000	500	500 "	750
6000-7000	800	500 "	1000
7000-8000	1000	500 "	1000
8000-9000	1400	500 "	1000
9000-Deeper	1800	500 "	1000

*Circulate to the Surface shall mean the calculated amount of cement necessary to fill the theoretical annular space plus ten per cent.

In known low-pressure areas, exceptions to the above may be granted by the Commissioner or his agent. If, however, in the opinion of the Commissioner or his agent, the above regulation shall be found inadequate, and additional or lesser amount of surface casing and/or cement or test pressure shall be required for the purpose of safety and the protection of fresh water sands.

(2) Surface casing shall be tested before drilling the plug by applying a minimum pump pressure as set forth in TABLE ONE. If at the end of 30 minutes the pressure gauge shows a drop of ten per cent of test pressure as outlined in TABLE ONE the Operator shall be required to take such corrective measures as will insure that such surface casing will hold said pressure for thirty minutes without a drop of more than ten per cent of the test pressure. The provisions of D-7 of this Section, for the producing casing, shall also apply to the surface casing.

(3) Cement shall be allowed to stand a minimum of twelve (12) hours under pressure before initiating test or drilling plug. "Under Pressure" is complied with if one float valve is used or if pressure is held otherwise.

C. INTERMEDIATE CASING

(1) Intermediate Casing is that casing used as protection against caving of heaving formations or when other means are not adequate for the purpose of segregating upper strata.

(2) If an intermediate casing string is deemed necessary by the District Manager for the prevention of underground waste, such regulations pertaining to a minimum setting depth, quality of casing, and cementing and testing of sand, shall be determined by the Department after due hearing. The provisions of D-7 of this section, for the producing casing, shall also apply to the intermediate casing

D. PRODUCING CASING

(1) Producing casing is that casing used for the purpose of segregating the horizon from which production is obtained and affording a means of communication between such horizons and the surface.

(2) The producing casing shall consist of new or reconditioned casing, tested at mill test pressure or as otherwise designated by the Department and set at a sufficient depth to seal off all formations above the horizon in which the well is to be completed. The position of the horizon shall be determined by coring, testing or electrical logging, or other satisfactory method, and the producing casing shall be bottomed and cemented at a point below or above the geothermal geopressured reservoir, if determinable and practicable.

(3) Cement shall be by the pump-and-plug method, or another method approved by the Department. Sufficient cement shall be used to fill the calculated annular space behind the casing to such a point as in the opinion of the District Manager local formations occurring above, but in every case, no less cement shall be used than the calculated amount necessary to fill the annular space to a point at least, but not more than 200' above the bottom of the intermediate string of casing.

(4) The amount of cement to be left remaining in the casing, until the requirements of Paragraph 5 of this Section have been met, shall not be less than 20 feet. This shall be accomplished through the use of a float-collar, or other approved or practicable means, unless the full-hole cementer, or its equivalent, is used.

(5) Cement shall be allowed to stand a minimum of twelve (12) hours under pressure and a minimum total of twenty-four (24) hours before initiating test or drill plug in the producing casing. "Under Pressure" is complied with if one or more float valves are employed and are shown to be holding the cement in place, or when other means of holding pressure is used. When an operator elects to perforate and squeeze or to cement around the shoe, he may proceed with such work after twelve hours have elapsed after placing the first cement.

(6) Before drilling the plug in the producing casing, the casing shall be tested by pump pressure, as determined from TABLE TWO.

TABLE NUMBER TWO

(Intermediate and Producing Casing)

Depth Set	No. of Sacks of Cement	Producing String Test Procedure (Lbs. Per Sq. in.)
2000-3000	200)	800
3000-6000	300)	1000
6000-9000	500)	1200
9000-deeper	500)	1500

If at the end of thirty minutes, the pressure guage shows a drop of ten per cent of the test pressure or more, the operator shall be required to take such corrective measures as will insure that the producing casing is so set and cemented that it will hold said pressure for thirty minutes without a drop of more than ten per cent of the test pressure on the guage.

(7) If the Commissioner's agent is not present at the time designated by the operator for inspection of the casing tests of the producing casing, the operator shall have such tests witnessed. An affidavit of test, on the form prescribed by the Department of Conservation, signed by the operator and witness, shall be furnished to the District Office of the Department of Conservation showing that the test conformed satisfactorily to the above mentioned regulations before proceeding with the completing. If test is satisfactory normal operations may be resumed immediately.

(8) If the test is unsatisfactory, the operator shall not proceed with the completion of the well until a satisfactory test has been obtained.

E. TUBING AND COMPLETION

(1) All flowing wells shall be produced through tubing set on a packer.

(2) A valve, or its equivalent, tested to a pressure of not less than the calculated bottomhole pressure of the well, shall be installed below any and all tubing outlet connections.

(3) When a well develops a casing pressure, upon completion, equivalent to more than three-quarters of the internal pressure that will develop the minimum yield point of the casing, such well shall be required by the District Manager to be killed, and the leak repaired so as to keep such excessive pressure off of the casing.

F. WELL-HEAD CONNECTIONS

(1) Well-head connections shall be tested at a pressure indicated by the District Manager in conformance with conditions existing in areas in which they are used.

SECTION VI - BLOWOUT PREVENTERS

- A. All wells drilling or running casing or tubing are to be equipped with a master gate and a blowout preventer having the correct size rams or plugs installed and in first class condition, together with a flowing valve of the recommended size and working pressure. If a "fill-up" line is connected to the blowout preventer, the line shall be equipped with such valves and fittings of at least the same working pressure as the blowout preventer. If the preventer is hydraulically operated, adequate pressure shall at all times be available for efficient operations.
- B. The entire control equipment shall be in good working order and condition at all times and shall meet with the test or inspection requirement of the Department.
- C. If at any time, evidence indicates that the preventer is not efficient, the casing shall be blocked off below the preventer by some effective method and such repairs to the preventer shall be made as to allow it to hold the originally designated pressure test.
- D. Drill strings shall be equipped with a stop-cock or some other type of drill-stem back-pressure valve for the purpose of controlling back-flow.
- E. No casing shall be perforated until adequate control equipment has been installed and in good working order. Such control equipment shall consist of Master Valve and Lubricator, or their equivalent.

SECTION VIII - CASING - HEADS

- A. All wells shall be equipped with casing - heads with a test pressure in conformance with conditions existing in areas in which they are used. Casing-head body, as soon as installed shall be equipped with proper connections and valves accessible to the surface. Reconditioning shall be required on any well showing pressure on the casing-head, or leaking between production string and next larger size casing, when in the opinion of the District Managers, such pressure or leakage assume hazardous proportions or indicate the existence of underground waste. Mud-laden fluid may be pumped between any two strings of casing at the top of the hole, but no cement shall be used except by special permission of the Commissioner or his agent.

SECTION VIII - HAZARDS

- A. (1) All wells shall be cleaned into a pit, barge, or tank, located at a distance of at least 100 feet from any fire hazard.
- (2) Before any well shall be perforated, the drilling fluid in the well shall be conditioned and brought to a weight necessary to hold the formation fluid pressure at the point to be perforated with a reasonable margin of safety provided, however, in cases where the tubing and Christmas Tree are set for production, the weight of the drilling fluid may be reduced below the weight necessary to hold the formation fluid pressure at the point to be perforated. Before perforating, proper connections for lubricating the gun in and out of the hold shall be installed.
- (3) All drill stem tests shall be started and completed during daylight hours. "Started and Completed" shall mean the opening and the closing of the drill stem testing tool valve or valves controlling the flow through the choke.
- B. Any rubbish or debris that might constitute a fire hazard shall be removed to a distance of at least 100 feet from the vicinity of wells, tanks and pump stations. All waste shall be disposed of in such a manner as to avoid creating a fire hazard or polluting streams and fresh water strata.
- C. Each operator shall so conduct his operations and maintain his equipment as to reduce to a minimum the danger of explosion of fire and consequent waste.

SECTION IX - DRILLING FLUIDS

The Inspectors and Engineers of the Department of Conservation shall have access to the mud records of any drilling well, except those records which pertain to special muds and special work with respect to patentable rights, and shall be allowed to conduct any essential test or tests on the mud used in the drilling of a well. When the conditions and tests indicate a need for a change in the mud or drilling fluid program in order to insure proper control of the well, the District Manager shall require the operator or company to use due diligence in correcting any objectionable conditions.

SECTION X - WELL ALLOWABLES, COMPLETION, PRODUCTION, PRODUCTION RECORDS AND PRODUCTION TESTS

- A. Allowables will be set by the Commissioner after proper notice and hearing.
- B. Upon initial completion, a four point multiple step draw down test shall be made in conformity with (sic?)

- C. Monthly production shall be reported to the District Manager with the original to the Department in Baton Rouge on Form GR-5PD within 45 days following the end of the reporting month.

SECTION XI - WATER, GAS AND GEOTHERMAL BYPRODUCTS MEASUREMENTS

- A. GALLON shall mean one (1) (U.S.) gallon or 3.7852 liters of fluid at a temperature of 60°F and a pressure of 14.73 psia.
- B. Pressure and temperature shall be measured at the wellhead for purposes of determining the energy content of the water. The volume (gallons) of the water and attendant temperature and pressure shall be measured and recorded after gas removal.
- C. A cubic foot of gas is hereby defined as that amount of gaseous hydrocarbons contained in a cubic foot of space at the base temperature of 60°F and an absolute pressure of 14.4 lbs/sq.in. plus 10 oz./sq.in., which temperature and pressures are referred to as the base temperature and pressure, respectively.
- D. Basic orifice coefficients used in the calculation of gas flow shall be those contained in the American Gas Association's Gas Measurement Committee Report No. 1. and No. 2, or some other basic orifice coefficients generally accepted in the industry and approved by the Department of Conservation such as those published by the Foxboro Company, American Meter Company, and Pittsburg Equitable Meter Company. Corrections for base pressure, base temperature shall be made. Corrections for super-compressibility are recommended when equal to or greater than one per cent (1%) in cases where data are available. Corrections for Reynolds number and expansion factor are recommended only in cases where their combined corrections equal to or exceeds one per cent (1%).
- E. Gas Measurements with Pitot Tubes shall be based on Reid's formula and shall follow recommendations similar to those set forth in Appendix 4 of the Bureau of Mines Monograph 7. Corrections for base pressure, base temperature, shall be made as in orifice measurements.
- F. Gas measurements with orifice Well Tests shall follow recommendations similar to those set forth in Bulletin #E-7 of the American Meter Company. Corrections for base pressure and base temperature, and gravity shall be made as in orifice measurements.
- G. The wellstream shall be sampled at the wellhead quarterly and appropriate chemical analysis determined and recorded. Byproducts shall be measured using customary units and the results recorded.

SECTION XII- DELEGATION OF AUTHORITY

It is the duty of the Commissioner of Conservation or his Agents, to make such changes in the monthly production and proration orders as may appear reasonably necessary for the purposes of safety conservation, and the prevention of waste, in accordance with the orders and regulations of the Department.

SECTION XIII - BOTTOM HOLE PRESSURE

The Commissioner shall have the authority to require bottom-hole pressure and temperature surveys of the various fields at such times as he may designate. However, operators shall be required to take bottom hole pressure and temperatures in all wells upon initial completion. Tubing and tubing heads shall be free from obstructions in wells used for bottom-hole pressure test purposes.

SECTION XIV - POLLUTION CONTROL

- A. Disposal of all geothermal/geopressured operations waste material into the surface waters of the State shall be done pursuant to and under the control of regulations and procedures set forth by the Stream Control Commission or other appropriate state or federal agencies having control over such surface disposal.
- B. Produced salt water and related waste material may be sorted in pits where such pits have been approved of by the Commissioner of Conservation.
- C. Produced salt water shall not be disposed of into a zone producing or productive of hydrocarbons unless such disposal is approved by the Commissioner of Conservation after a public hearing or unless prior approval has been granted to use the proposed zone for salt water disposal.
- D. Prior to disposing of salt water by injecting same into any subsurface formation a permit therefor must be obtained from the Commissioner of Conservation. Such permit may be issued by the Commissioner without a public hearing when the applicant has complied with the following requirements:
 - (a) Application (in the form of a letter) for a permit for underground disposal of salt water produced from wells shall be submitted in duplicate to the appropriate District Manager. Such application shall include or be accompanied by:
 1. An electrical log of the well with the proposed zone marked in the case of a well already drilled. A statement of the proposed zone to be used for disposal and the approximate depth of said zone in the case of undrilled wells.
 2. A plat showing the location, or proposed location, of the disposal well.

3. A statement of estimated daily volume of salt water to be injected.
4. A statement of other known instances in which the proposed disposal zone has been used for salt water disposal.
5. A statement by the applicant that such disposal well will be completed in a manner to insure that the disposal products are injected into the proposed injection zone and that provision has been made for adequate protection of fresh water sands and other zones of commercial value. A schematic diagram of the disposal well showing the casing and cementing program shall be attached together with an explanation thereof. Where only one string of casing protects fresh water sands, a packer shall be set on tubing at a depth below fresh and brackish water sands, or some other method of completion which would insure adequate protection of fresh water sands. Adequate provision must be made to insure that the casing is set below the base of fresh and brackish water sands.
6. A permit for annular disposal of salt water may be issued for an interim period of one (1) year provided the applicant has complied with the procedure outlined herein.
7. In areas of questionable sand or zone correlations, (typical example being the Wilcox Zone) an operator desiring to dispose of salt water into one such zone, shall first consult with all offset operators in the field in an effort to resolve the correlations. Should these operators agree that the zone sought for injection of salt water is not connected with or a part of a hydrocarbon bearing sand, such operator may obtain authority from the Commissioner of Conservation through administrative procedure for disposal into such sand provided the application is accompanied with evidence of concurrence by said offset operators. Should these operators fail to agree then the operator seeking such authority may make application for public hearing as provided for in section 3 hereof.
8. The Louisiana Geological Survey shall check each permit application and advise in writing the appropriate District Manager, the Baton Rouge Office and the applicant of approval or denial. If denied, the reason for denial shall be given. The District Manager will issue the Work Permit when approval is granted.

9. The Commissioner of Conservation shall cause an inspection to be made of each completed disposal facility to insure compliance with this Amendment. A copy of the inspection report shall be left with the operator or his field representative.

10. If any request for permit is denied by the Commissioner of Conservation, the applicant shall be granted a reasonable period of time to either construct or make arrangements for other adequate disposal facilities.

11. A reasonable estimate of the amount of salt water injected annually into each disposal well shall be reported to the Louisiana Geological Survey with a copy to the appropriate District Manager, such report to be filed during the first quarter of the next calendar year. This shall not be applicable to secondary recovery projects where the amounts injected are already required to be reported to the Department of Conservation.

12. Exceptions to this Amendment may be granted without a public hearing upon written request by an operator to the Commissioner of Conservation and upon showing that good cause therefor exists. Such exceptions may be granted administratively provided that inspection of the disposal facilities does not disclose any salt water damage or pollution. If pollution or surface damage is detected, production from the well or wells shall cease until compliance with the provisions of this Amendment is accomplished and the Commissioner of Conservation then grants the exception requested.

SECTION XV - DIRECTIONAL DRILLING AND WELL SURVEYS

- A. Except as otherwise provided in this section, every well drilled in the State of Louisiana shall be drilled in such a manner that at any measured depth the actual or apparent location of the well bore shall be within a circle whose center is the surface location and whose radius is equal to said measured depth multiplied by the factor 8.087156. The actual or apparent resultant deviation of the well bore from the vertical shall not be in excess of five degrees (5°) at any measured depth. In the event a survey indicates that the well bore is outside the above circle at any measured depth, the well bore must be straightened and drilling may continue only within the specified limit. A directional survey shall be required and shall be filed with appropriate District Manager as confirmation that the well bore has been straightened and is in fact within the above limit.

After an operator has commences drilling a well and desires to change the bottomhole location by directionally controlling and intentionally deflecting said well from the vertical

whether more or less than five degrees (5°), unless done to straighten the hole or to sidetrack junk in the hole or because of other mechanical difficulties, he shall first make application for an amended location showing by attached plat the amended projected bottomhole objective and secure an amended permit to drill before commencing such operations. The amended bottomhole location or objective shall comply with all minimum distances from lease or property lines as prescribed by all Statewide Orders or any other applicable field orders.

In the event a well is to be drilled at a distance from a property line where such distance is less than the apparent resultant lateral deviation, as determined by multiplying the proposed total depth of the well by a factor 0.087156, a Permit to Drill for Minerals will be issued with the understanding that the operator will be required to furnish the appropriate District Manager with Inclination and/or Directional Survey data as proof that the well will be completed in compliance with the provisions of this Order before an allowable is assigned to said well.

- B. An INCLINATION SURVEY shall be made on all wells drilled in the State of Louisiana with the first shot point at a depth not greater than that of the surface casing seat and succeeding shot points not more than one thousand feet (1000') apart. Inclination Surveys conforming to those requirements may be made either during the normal course of drilling or after the well has reached total depth. Such survey data shall be certified by the Operator's representative and/or drilling contractor and shall indicate the resultant lateral deviation as the sum of the calculated lateral displacement determined between each Inclination Survey point assuming that all such displacement occurs in the direction of the nearest property line. If a Directional Survey determining the bottom of the hole is filed with the Commissioner of Conservation upon completion of the well, it shall not be necessary to furnish the Inclination Survey data. Except as otherwise specified herein, all Inclination and/or Directional Survey data shall be filed along with Form WH (Well History).
- C. A DIRECTIONAL SURVEY shall be run and three (3) certified copies thereof filed by or at the direction of the operator with the appropriate District Manager of the Department of Conservation on all future wells drilled in the State of Louisiana where:
- (1) The well is directionally controlled and is thereby intentionally deflected from the vertical, or

(2) The surface location is less than 330 feet from the nearest property line, and the well is drilled below the depth of 3,786 feet, or

(3) The resultant lateral deviation is calculated from Inclination Survey data is a distance greater than the distance from the center of the surface location of the well bore to the nearest property line, or

(4) The well bore deviates laterally a resultant distance greater than that determined by a five degree (5°) angle from a vertical line passing through the center of the surface location of the well bore.

Property line as used herein, shall mean the boundary dividing tracts on which mineral rights, royalty rights or leases are separately zoned, except that where a unit is defined in Section 9, Paragraph N, of Revised Statutes of 1950, has been created, the boundaries of the unit shall be considered the property line.

- D. The Commissioner of Conservation, on his own initiative or at the request of an offset operator, shall have the right to require the operator to run a Directional Survey on any well if there is reasonable cause therefor. Whenever a survey is so required by the Commissioner at the request of an offset operator and the operator of the well and the offset operator are unable to agree as to the terms and conditions for running such survey, the Commissioner, upon request of either, shall determine such terms and conditions, after notice to all interested parties and a public hearing.
- E. Unless required by the Commissioner of Conservation under Paragraph 4 hereof, a Directional Survey shall not be required for any well which is not directionally controlled and thereby intentionally deflected from the vertical and which has a surface location, maximum angle of deviation, and total depth, all in compliance with the provision hereof.
- F. The Commissioner of Conservation may assess appropriate penalties for failure to comply with any of the provisions hereof.

SECTION XVI - PLUGGING AND ABANDONMENT

A. SCHEDULE OF ABANDONMENT

(1) Dry Holes

All wells drilled for geothermal resources found to be dry prior to or after the effective date of this order shall be plugged within ninety (90) days after operations have been completed thereon or (90) days after the effective date of this order, whichever is later, unless an extension of time is granted by the Commissioner of Conservation.

(2) Other Wells on or After Effective Date of order

(a) All wells wherein production operations or use as a service well have ceased on or after the effective date of this order shall continue to be reported on the Form GR-5PD with the appropriate notation that the well is off production or no longer in use as a service well along with the date of last production or date the service well ceased to be used.

- B. The responsibility of plugging any well over which the Commissioner of Conservation has jurisdiction shall be the owner(s) of record.
- C. In the event any owner(s) responsible for plugging any well fails to do so, and after a diligent effort has been made by the Department to have said well plugged, then the Commissioner may call a Public Hearing to show cause why said well was not plugged.
- D. The Commissioner or his agent may require the posting of a reasonable bond with good and sufficient surety in order to secure the performance of the work of proper abandonment.
- E. The District Manager shall be notified immediately by the new operator whenever a change of operator occurs. This must be accomplished by submitting Department of Conservation Form GR-10-A (Application for Amended Permit to Drill for Minerals) to reflect the new operator.
- F. PLUGGING PROCEDURES

(1) Notification of intention to plug any well or wells over which the Commissioner of Conservation has jurisdiction, shall be given to the appropriate District Manager prior to the plugging thereof. Notification shall be made in writing to the District Office in the form of a WORK PERMIT (Form GR-4) for which an original and three copies are required. Where plugging involves a well with a rig on location, the District Manager may grant verbal approval to plug and abandon the well provided the WORK PERMIT is subsequently submitted. Any operator who fails to comply with this requirement may be required by the District Manager to place additional cement plug(s) and/or prove the plug(s) are placed as the operator states they are.

(2) Once an operator has been issued a WORK PERMIT to plug and abandon a well by the appropriate District Manager, then said operator shall be required to contact the appropriate inspector a minimum of twelve (12) hours prior to beginning the plugging operations. During drilling

and/or workover operations, the requirement to contact the appropriate Inspector a minimum of twelve (12) hours prior to beginning the plugging operations shall be waived at the time verbal notification is made to the District Office.

(3) In plugging wells, it is essential that all oil or gas bearing formations be protected.

a. Sufficient cement shall be used to adequately isolate each perforated pool, one from the other. A cement plug of at least one hundred feet (100') shall be placed immediately above or across the uppermost perforated interval of the pool. If he deems it advisable, the District Manager may allow a bridge plug with a minimum of ten feet (10') of cement on top be placed immediately above each producing pool.

b. In wells completed with screen or perforated liners, if it is impractical for the operator to remove the screen or perforated liner, he shall place a cement plug of at least one hundred feet (100') with the bottom as near as practical to the top of the screen or liner. If the District Manager deems it advisable, a bridge plug with a minimum of ten feet (10') of cement on top and placed as near as practical to the top of the screen or liner may be used in lieu of the cement plug.

c. When production casing is not run or is removed from the well, a cement plug of at least one hundred feet (100') shall be placed from at least fifty feet (50') below the shoe of the surface casing to at least fifty feet (50') above. In lieu of the above, the operator shall have the option of using a cement retainer placed at least fifty feet (50') above the surface casing shoe and a sufficient amount of cement shall be squeezed below the retainer to form a cement plug from the base of the retainer to fifty feet (50') below the base of the surface casing. A ten foot (10') cement plug shall be placed on top of the retainer.

d. If fresh water horizons are exposed when production casing is removed from the well, or as a result of production casing not being run, a cement plug shall be placed from at least one hundred feet (100') below the base of the deepest fresh water sand to at least one hundred fifty feet (150') above the base of the sand. A cement plug of at least one hundred feet (100') shall be placed from at least fifty feet (50') below the shoe of the surface casing to at least fifty feet (50') above it. In lieu of the above,

the operator shall have the option of using a cement retainer placed at least fifty feet (50') above the surface casing shoe and a sufficient amount of cement shall be squeezed below the retainer to form a cement plug from the base of the retainer to fifty feet (50') below the base of the surface casing. A ten foot (10') cement plug shall be placed on top of the retainer.

e. The setting and location of the first plug below the top thirty foot (30') plug shall be verified by tagging. In the event a retainer is used, tagging will not be necessary.

f. Additional cement plugs shall be placed to adequately contain any high pressure oil, gas or water sands or as may be required by the District Manager.

g. A thirty foot (30') cement plug minimum shall be placed in the top of the well.

h. Mud laden fluid of not less than nine (9.0) pounds per gallon shall be placed in all portions of the well not filled with cement, unless otherwise approved by the District Manager.

i. All cement plugs shall be placed by the circulation or pump down method unless otherwise authorized by the District Manager. The hole must be in a static condition at the time the plugs are placed.

j. After placing the top plug, the operator shall be required on all land locations to cut the casing a minimum of two feet (2') below plow depth. On all water locations, the casing shall be cut a minimum of ten feet (10') below the mud line. If an operator contemplates reentering the well at some future date for salt water disposal or other purpose, the District Manager may approve after receiving written request from an operator not to cut off the casing below plow depth or mud line.

k. The plan of abandonment may be altered if new or unforeseen conditions arise during the well work but only after approval by the District Manager.

(4) Upon plugging any well for any cause, a complete record thereof shall be made out, duly verified and filed in triplicate on Form P & A in the District Office within twenty (20) days after the plugging of such well. A cementing report shall be filed with the plugging report.

G. WELL TO BE USED FOR FRESH WATER

When the well to be plugged may be safely used as a fresh water well and the owner or owners of the well have, by mutual written

agreement with the landowner, agreed to turn the well over to the landowner for that purpose, then the well need not be filled above the plug set below the fresh water formation; provided, however, that the signed agreement or (if recorded in the public records) a certified copy thereof be filed with the appropriate District Manager, which shall relieve the owner or owners who turn the well over to the landowner from the responsibility above the plug. The plugging report shall indicate that the well has been or will be converted to a fresh water well.

H. TEMPORARY ABANDONMENT OF DRILLING WELLS

Any drilling well which is to be temporarily abandoned and the rig moved away, shall be mudded and cemented as it would be for permanent abandonment, except a cement plug at the surface may be omitted.

SECTION XVII - EXCEPTION AND HEARINGS

If any operator can show to the Commissioner that the drilling and producing methods herein prescribed or the particular method by him prescribed for securing tests of well, or any other part of this order, as applies to his well or wells, result in waste or as to such operator are unreasonable, the Commissioner may enter such an order, as a special exception to the aforesaid rules and regulations, as will prevent such waste or eliminate such unreasonable restraint, as may result from the application of the aforesaid rules and regulations to the well or wells of such operators; provided, however, that before any operator shall be allowed the benefit of an order granting an exception as authorized by this Section, such operator must establish that such exception, if granted, will not result in waste in the field as a whole or give him an inequitable and unfair advantage over another operator or other operators in the field. No special exception will be granted except upon written application, fully stating the alleged facts, which shall be the subject of a hearing to be held not earlier than ten (10) days after filing of the application. Prior to the hearing upon such application, at least ten (10) days notice thereof shall be given by publication, adjacent operators where appropriate may be given at least ten (10) days notice of said hearing by personal service, or by Registered Mail.

SECTION XVIII - APPLICATION OF SPECIAL FIELD ORDERS

This order shall be cumulative of, and in addition to, all special orders, rules and regulations affecting the drilling and production of oil and gas, as heretofore promulgated. In case of any conflict between this order and the special orders on specific fields, said special orders on specific fields shall govern.

SECTION XIX - SUBSIDENCE

- A. The operator of a proposed geothermal well is responsible for establishing representative elevations of the land surface in the area of the proposed development. Plans for establishing these reference elevations must accompany the Application for a Permit to Drill the well.

- B. Surface elevation of the wellhead will be determined in accordance with U.S.G.S. standards for Fourth Order Leveling and will be filed with the Completion Report and annually thereafter.
- C. A gamma ray-neutron log including a collar locator log will be run from total depth to the base of the previous casing string and filed with the Completion Report.
- D. If in the opinion of the Commissioner there is evidence of subsidence, the Commissioner shall have authority to require a hydrogeologic study or such other actions as he deems necessary.

APPENDIX 4GEOHERMAL LEASE

This agreement entered into and effective on the _____ day of _____ 19 ____ by and between

hereinafter simply referred to as "Lessor" (whether one or more) and hereinafter simply referred to as "Lessee"

W I T N E S S E S T H A T:

Lessor, in consideration of the sum of _____ Dollars (\$ _____), receipt of which is acknowledged, and of the other benefits hereafter stipulated, leases the lands hereafter described to Lessee for the purposes and upon the terms and conditions hereafter set forth.

Article 1: Purposes of The Lease:

1.01 Lessor shall, with respect to the leased premises, have the sole and exclusive right to prospect for, develop, produce, and retain geothermal or geopressured waters or other waters found at depths of greater than _____ feet below the surface of the earth and to use and appropriate such waters and the neat and pressures thereof for any useful purpose, and also to retain and use or dispose of any substances of any type or nature including petroleum, natural gas or other hydrocarbons which may be found in solution in cr be produced in association with such waters.

1.02 There is excluded however from the rights leased the right to produce and save oil, gas or other hydrocarbons which are accumulated in reservoirs under the leased premises and which may be economically produced in paying quantities by conventional methods of production at the time of their discovery. All of the substances which may be produced and saved under the terms of this lease are herein referred to as the geopressured products.

Article 1.01 (Alternate Provision)

1.01 Lessee shall have the sole and exclusive right to prospect for, develop, produce and retain all geopressured or other waters, oil and gas or other hydrocarbons, salt, sulphur or any other useful substance or mineral of any type or nature of present or future value which may occur naturally in or as a part of the land described hereafter as the leased premises and which may be found or produced from under such lands between the following depths or from the following formations to wit:

1.03 Lessee is also granted the right to use the leased premises for any purpose incidental to or necessary for the production, utilization or disposition of the geopressured products from the leased premises or from other lands in the same area or field including, specifically, the right from time to time to conduct exploration activities, drill wells, lay pipelines, build roads and canals, locate rigs, tanks, separators, compressors, or other facilities necessary or useful to the development, production, utilization or disposition of the geopressured products produced from the leased premises or such other lands.

1.04 Lessee may utilize the leased premises to dispose of any waste water or other substances produced or obtained in the exercise of the rights granted under the terms of this lease, or derived from other lands in the same area or field by injecting such substances into the ground, or by otherwise disposing of them in any manner permitted by law.

1.05 Lessor reserves the right to utilize the leased premises concurrently with lessee for any purpose which does not impede, interfere with or render unduly burdensome the rights of the Lessee.

Article 2. Lands Covered:

2.01 The lands leased are as follows:

The lands described (or so much thereof as may from time to time hereafter remain subject to this lease) are referred to as the "Leased Premises."

2.02 If Lessor owns less than a full interest in the leased premises or the right to produce geopressured products from them or if such rights are subject to existing servitudes, leases or other burdens which will diminish Lessee's rights to produce and appropriate all of the geopressured products from the leased premises, this lease shall from time to time cover and affect the entire interest in the lands comprising the leased premises as such burdens or encumbrances are extinguished or removed from the land or if they become owned by Lessor, or Lessor's successors and assigns in any manner whether or not such lesser interest or burdens are declared and this lease shall cover and affect all rights now or hereafter owned or possessed by the Lessor or Lessors' successors in title to the lands described as comprising the leased premises.

2.03 If Lessor owns less than the entire interest in all or any portion of the leased premises or the mineral rights relating thereto which are leased hereunder (whether such lessor interest is herein specified or not) which diminish Lessee's rights to produce and save the entire amount of geopressured products produced from the leased premises then the rentals and royalties due with respect that part of the leased premises as to which such an interest is outstanding in others shall from time to time be reduced proportionately to reflect the interest granted Lessee under this lease. If there are any outstanding rights to receive rentals, royalties or other non-operating charges against the property or rights leased hereunder such charges, whether declared or not shall be payable out of and directly reduce the amount of rentals and royalties otherwise payable to Lessor hereunder. The failure to reduce rentals or royalties shall not affect Lessee's rights to thereafter reduce the same nor shall such reduction affect or limit lessor's warranties or the rights of Lessee stipulated under Article 9.

Article 3. Term:

3.01 The term of this lease shall commence on its effective date and, unless sooner terminated under the terms hereof, shall continue until all of the following events have occurred:

- A. Ten years has elapsed from the effective date;
- B. Three years has elapsed from the day on which any geopressured products are last produced under the terms of the lease or the lessee has last engaged in operations on the leased premises and;
- C. All wells capable of producing geopressured products under the terms hereof but which are not being so produced for any reason are finally plugged and abandoned.

3.02 Notwithstanding the provisions of Article 3.01(C) in no event shall the term of this lease continue for a period of more than ten consecutive years without actual operations being conducted or actual production of geopressured resources having occurred under its terms.

3.03 The term "operations" shall mean drilling, reworking or other activities conducted, in good faith under the terms of the lease, which are reasonably designed or intended to obtain or restore production of a geopressured product from the leased premises whether or not such activities are successful.

3.04 If any part of the leased premises is unitized, the effect of the unit wells and any operations on the unit or any production from such unit allocated to the leased premises shall not be considered in determining the term of this lease with respect to that portion of the premises outside the boundaries of the unit and this lease shall separately terminate as to such portion of the leased premises outside of such units when the conditions specified in Article 3.01 have otherwise occurred. If a unit is formed while operations are being conducted, production is occurring or a shut-in-well is located on the leased premises such operations or production shall be deemed to have terminated and the well shall be considered as no longer capable of producing geopressured products with respect to that portion of the leased premises outside the unit boundaries as of the effective date of the unit.

3.05 If any part of the leased premises is unitized with other lands, operations on or production from the unit (to the extent that latter is allocated to the leased premises) and the unit wells located on such other lands shall be deemed to be occurring on or from the leased premises and the well shall be deemed to be located upon the leased premises, as the case may be, from and after the effective date of such unitization, but the effect thereof, for purposes of determining the term of the lease only, shall be restricted to the unitized portion of the leased premises as provided by the preceding Article 3.04.

3.06 The provisions of Article 3.04 and 3.05 shall not be deemed to effect a division of the rights and obligations of this lease unless and until such time as the term of the lease may expire as to a portion of the leased premises as a result of such provisions.

3.07 Operations on a unit comprising all or any part of the leased premises; production from such a unit to the extent it is allocated to the leased premises by the terms of the order or agreement creating the unit, and all wells located upon such a unit shall be deemed to have occurred on or from the leased premises or be located on the leased premises, as the case may be, for all purposes of the lease except to the extent the effect thereof is expressly limited by Article 3.04.

Article 4. Production Royalties:

4.01 The following royalties shall be payable to Lessor with respect to the geopressured products produced and saved from the leased premises or allocated thereto from units comprised of a part of leased premises:

- A. _____ of the amount actually received by the Lessee from the sale or use of the geopressured water, or the heat, pressure or other sensible energy contained in such water at the point of sale or utilization.
- B. The proportions set forth below of the amount actually received by Lessee from the sale or other disposition of methane, natural gas or other hydrocarbons existing in gaseous form in the reservoir or formation prior to production (all herein called "methane") actually produced and saved from or allocated to the leased premises. When the average methane content of the geopressured waters is:
- a.) less than _____ cubic feet per barrel of water the royalty shall be _____;
 - b.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____;
 - c.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____;
 - d.) at least _____ cubic feet per barrel of water but less than _____ cubic feet per barrel of water the royalty shall be _____ and;
 - e.) _____ cubic feet or more per barrel of water the royalty shall be _____.
- C. _____ of the amount actually received by lessee from the sale or other disposition of hydrocarbons, except methane, produced and saved from or allocated to the leased premises; and
- D. _____ of the amount actually received by the lessee from the sale or other disposition of all other geopressured products produced and saved from or allocated to the leased premises.

4.02 The "amount actually received" by lessee for any geopressured product for purposes of calculating the royalty due hereunder shall be the actual price paid lessee for the geopressured product in its first marketable form in or near the field in which it is produced and after deduction of any charges, costs, or other amounts actually deducted from or credited by the purchaser against the stated price whether in the form of transportation, treatment, processing or similar charges and not otherwise accruing to the credit of lessee under the terms of the sale or other arrangements with the purchaser or acquirer for sale or use of the geopressured product.

4.03 If lessee does not dispose of the geopressured product or any portion thereof but consumes or uses it either on or off the leased premises for the generation of electricity; for use in its own pipelines; as process heat and energy for power or for any other useful purpose (except such as are excluded from the royalty by Article 4.05) the royalty payable with respect to such geopressured product shall be calculated upon the market value of such geopressured product at its point of use or the taking of it by lessee into lessee's pipelines, trucks or other means for transportation away from the field where it is produced.

4.04 Lessee shall install and maintain measuring devices of a type recognized in the industry as being standard or customary and shall operate and maintain them in accordance with recognized operating procedures to measure the geopressured waters hydrocarbons or other geopressured products produced under the terms of this lease and determine the royalties payable hereunder. The methods and procedures prescribed from time to time by the Louisiana Commissioner of Conservation or other regulatory agency having jurisdiction over the production of geopressured products from the leased premises for the measuring and reporting of such products shall be deemed to conform to the requirements of this article.

4.05 Production royalties shall not be payable with respect to any geopressured product which is not actually saved and disposed of or consumed for some useful purpose nor with respect to any geopressured product which is lost, used or consumed by lessee in the production or processing of the geopressured products or the disposition of waste products resulting therefrom.

4.06 All severance, production, sales or other taxes directly assessed against or measurable by the amount or value of the geopressured products produced under the lease (except corporate franchise taxes; federal and state income taxes; utility taxes and property taxes levied upon the value of the lessee's improvements) shall be chargeable against Lessor and Lessee in the proportion of their respective interests in the gross proceeds from the disposition of such products as fixed by the production royalties payable with respect thereto and without regard to the legal incidence of the tax.

Article 5. Minimum Rentals:

5.01 If during any year ending on the anniversary of the effective date the production royalties which have been paid or are payable for production occurring during such year under Article 4 from any part of the leased premises do not equal the sum of _____ dollars per acre for each acre of the leased premises, which amount is referred

to as the minimum rental amount, the lessee shall pay as rental to the Lessor an amount (herein called the minimum rental) sufficient to cause the total of the royalties and such minimum rentals to equal such minimum rental amount.

5.02 The minimum rental amount shall be pro-rated by area and time with respect to the leased premises or any part thereof as to which the lease has terminated or been cancelled or released during the year for which it is calculated. The minimum rentals, if any, required to be paid under Article 5.01 shall be determined after deduction of all production royalties payable under the lease from the minimum rental amount and shall be due on the last day of period for which they are calculated. They shall be payable at the same time and in the same manner as any royalty which would be due for the calendar month following the month in which the anniversary date of the lease falls; and shall accrue to those persons entitled on the anniversary date to receive such rentals or, with respect to any part of the leased premises as to which this lease has terminated during the calendar year with respect to which the minimum rentals are calculated to those persons entitled to receive the same on the date the lease terminates with respect to the portion of the leased premises as to which the lease has terminated.

Article 6. Payment of Amounts Due the Lessee

6.01 All rentals, royalties or other sums which may be owed to Lessor under the terms of this lease may be paid by check or draft of Lessee delivered to or properly deposited in the mails addressed to Lessor at the address (or addresses) given in article 6.02 below.

If Lessor is more than one person the payment shall be made to the various parties hereto in the proportions set forth by each Lessor's name, subject however to the provisions of article 6.05.

Lessee may continue to make payment in the manner specified in this article until the same is duly changed in accordance with the provisions of this lease notwithstanding any other actual or constructive notice by Lessee of a change or modification in the rights of any person to receive such payments.

6.02 The place of mailing payments due hereunder and the proportions in which each lessor is to be paid (if there are more than one) shall be as follows:

NAME	ADDRESS	PROPORTION
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6.03 If any payment made hereunder is not accepted or is returned for any reason when properly mailed or delivered, Lessee shall be deemed to have made the payment at the time and in the manner which would have occurred if the payment had been accepted or delivered. Lessee shall remain obligated to pay or deposit the amounts due to a new address or to the proper persons when it has been supplied with proper evidence of the right to receive such payment or with a new address, as the case may be, in accordance with the terms of the lease.

6.04 Lessor (or any person or persons entitled to receive payment separately) may change the address for mailing or delivery of notices from time to time by delivering to Lessee a properly signed document identifying a new and proper mailing address.

6.05 If Lessor is more than one person and the proportions in which payments are to be made to each is not specified herein, or if payments due Lessor or any of them become payable to more than one person from time to time hereafter and Lessee receives proper evidence thereof as provided herein, Lessee may nonetheless make such payments jointly to all persons entitled to receive them and mail or deliver such payment to any one of them, unless Lessee also receives a division or transfer order in a form customarily employed by Lessee properly executed by all parties in interest specifying how such payments are to be divided. If any such order directs that payments, which were formerly made to one person or several persons jointly, be made to more than six persons separately, Lessee may require the parties to designate one person to receive the payments or to designate that such payments be divided in a manner as to require no more than six separate payments.

6.06 The designation herein of the proportions in which payments are to be divided or the execution of a division order or agreement by or among Lessors and other persons entitled to receive rentals and royalties directing the manner in which payments are to be divided or agreeing to their allocation or apportionment whether or not it is in accordance with the ownership of the premises and whether it is accepted by Lessee shall not be deemed to supersede or affect the provisions of Article 6.07 or 7.01.

6.07 No change in ownership, status or in the person entitled to receive payments hereunder shall affect the right of Lessee to deal with the person previously entitled to receive such payments and the effectiveness of any payment made with respect to this Lease shall be valid unless Lessee shall have been furnished proper and reliable evidence of such change including certified copies of any act, order, judgment or decree evidencing the same. Nor shall any change in the method of payment or in the person entitled to receive a payment be effective as to Lessee (at its option) until 45 days after Lessee has been delivered proper and complete evidence of such transfer or change in the manner required by this Article 6.

6.08 Lessee may give any notices to, and may contract with the Lessor, or Lessor's successor's or assigns or any other persons having an interest in the leased premises, in all respects concerning this lease or the leased premises so long as such persons are authorized to receive payments from Lessor under this Article 6 and the successors or assigns of Lessor shall be deemed to have given plenary power and authority to such Lessor or successor to so act until the provisions of this article have been fully complied with in such a manner as to require lessee to make payments to them. All notices required to be given lessor under this lease may be mailed or delivered in the same manner and with the same effectiveness as is specified herein for the payment of rentals or royalties hereunder.

6.09 Lessee or any purchaser of the geothermal products may also require Lessor, or any of them, or any other person entitled to receive payment of rentals or royalties from time to time to execute division orders in a form customarily employed by the Lessee or purchaser specifying or acknowledging the rentals or production royalties which person may from time to time be entitled to receive from the leased premises. The execution of such a division order shall not be deemed to diminish the warranties contained in this Lease nor to preclude or estop Lessor or any other person signing the division order from thereafter asserting, as against any person other than the purchaser of the geopressured products relying upon such a division order and the lessee that any interest in the leased premises or production therefrom is owned by them contrary to the terms of the division order.

Article 7. Ownership of the Leased Premises and Changes Therein:

7.01 The leased premises shall be operated and dealt with as an entirety whether or not Lessor is more than one person and without regard to the ownership of the premises or whether Lessor

shall assign or transfer any interest in the leased premises or whether such premises are now owned or may hereafter become separately owned. Lessee shall not be obligated to separately record or account for production occurring from any part of the premises or to protect any portion of the leased premises from drainage occurring on any other portion. Subject to the provisions of this Article 7.01 and the provisions of Article 6, Lessors may from time to time divide or allocate in such manner as they deem proper, or may have agreed the rentals and royalties payable hereunder, but such agreement by Lessors as to the division or allocation of the rentals or royalties payable hereunder, whether or not accepted or agreed to by Lessee, shall be deemed to modify or affect the provisions of this Article 7.01.

7.02 Subject to the provisions of Article 7.01 the interests of Lessor may be freely assigned or transferred and all provisions hereof shall inure to the benefit of and bind the successors and assigns (in whole or in part) of Lessor (whether such succession or assignment occurs by sale, inheritance, assignment, or otherwise), but regardless of any actual or constructive notice thereof, no change in the ownership of the land or any interest therein or change in the capacity or status of Lessor or any other owner of rights hereunder, whether resulting from sale or other transfer, inheritance, interdiction, emancipation, attainment of majority or otherwise, shall impose any additional burden on Lessee or affect any other the requirement or provisions hereof including particularly those of Article 6 relative to the time and manner by which such changes may be made effective as to Lessee.

Article 8. Assignments, Subleases and Releases of the Lease:

8.01 The assignment, sublease or other alienation in whole or in part of this lease by Lessee (all referred to as a "transfer") shall not diminish Lessor's rights or remedies to enforce, as against the transferees the obligations of the Lessee arising prior to the date of such transfer, but shall relieve the transferor of any obligations with respect to the portion of the premises or interest therein transferred which may arise after the date of the alienation and Lessor shall thereafter look exclusively to the transferee for performance of such obligations. Any transferee of an interest in this lease, shall, by accepting such a transfer or the benefits of the interest transferred be deemed to have assumed the obligations thereof to the extent provided by this Article 8.01.

8.02 All notices requires to be given to Lessee by Lessor may be delivered or mailed to Lessor as herein provided to the address given for Lessee herein. No change in Lessees identity or assignment of the lease shall affect or change Lessor's right to deliver or mail such notices to the address given until Lessor shall have been notified in writing by Lessee of a new address.

8.03 The assignment from time to time of the entire interest of Lessee in this lease as to a geographically defined area of the leased premises in such a manner that all of the benefits and the rights and obligations of the lease shall be vested as to each such segregated portion entirely in separate persons shall divide the lease and the rights and obligations with respect to each such portion shall thereafter be considered as separate and distinct leases.

8.04 Lessee may at any time and from time to time during the term of this lease release this lease as to the entire leased premises or any part thereof by mailing to Lessor a properly recordable act of release identifying the lease and describing the premises to be released (if less than all of leased premises are released) or by filing such act with the proper Register of Conveyances and Lessee shall thereupon be completely and absolutely relieved of any responsibility for the obligations of this lease, accruing on or after the time of such release, to the same extent and as if the term thereof had expired as to such premises.

8.05 In case of cancellation or termination of this lease for any cause, other than the release by lessee or the expiration of its term, Lessee shall have the right to retain and continue the lease in effect as to that portion of the leased premises on which there are wells producing or capable of producing geopressured products and which is included within the producing acreage allocated to such wells by the Commissioner of Conservation or, if unitized, which are included in any unit for such wells unless the cancellation occurs as a result of the failure of Lessee to comply with the obligations of this lease relative to the operations of the well or wells referred to.

8.06 In the event of a partial release of a portion of the leased premises or the cancellation or termination of this lease as to any part thereof, and notwithstanding any other provision hereof to the contrary Lessee shall retain, with respect to the entire leased premises, the rights granted by Articles 1.02 and 1.03 insofar as they may be necessary or useful to the exercise or enjoyment of Lessee's rights as to the portion of the leased premises retained by Lessee. The area over which Lessee enjoys only those rights granted by Articles 1.02 and 1.03 shall not be considered as part of the leased premises for purposes of calculating the minimum rental amount under Article 3.

Article 9. Other Rights and Obligations of the Parties:

9.01 Lessee shall conduct all operations pursuant to and exercise all rights granted under the terms of this lease as a

prudent operator and in compliance with all applicable legal requirements. Lessee shall indemnify and hold Lessor harmless from all liability or expense to others as a result of any action or activity beyond or contrary to the rights granted hereunder which are taken or performed by Lessee or for Lessee by any other persons conducting activities on the leased premises as a consequence of Lessee's rights.

9.02 The Lessee shall be responsible for all damages to the timber and growing crops of the Lessor caused by Lessee's operations whether prudently conducted or otherwise but shall not otherwise be responsible for any damages or injury to the leased premises or to the property of crops of other persons now or hereafter occupying or possessing the leased premises under rights from Lessor which are caused by the prudent exercise of the rights granted hereunder.

9.03 The Lessor recognizes that the minimum rentals due and payable under the terms of this lease during periods when there is no production are partly in lieu of and as compensation for Lessee's obligation to develop the premises and in consideration of the payment of such minimum rentals Lessor agrees Lessee shall be under no affirmative duty to develop or explore the premises except as is provided for by Article 9.04.

9.04 Lessee shall protect the premises from drainage subject to the following conditions:

A. Lessee shall be under no obligation to protect the premises from drainage by a well located upon other lands of the lessor or any of them or on units in which such lessors participate.

B. Lessee shall be under no obligation to protect the premises from drainage by wells located more than 1,000 feet from the leased premises.

C. If a well is located less than 1,000 feet from the leased premises, Lessee will drill such wells as would be reasonably prudent to counteract the drainage occurring or in lieu of drilling such a well may pay as a rental monthly so long as such drainage continues an amount of money which would equal the production royalties which would be payable with respect to the production which would be obtained from the leased premises if the well which is draining the premises were located upon such leased premises and was producing the same substances and amounts as are from time to time actually being produced by it while draining such premises. The rentals

so payable shall be considered production royalties for purposes of determining the minimum rentals due under Article 5.01. No such rentals shall be payable under this Article unless it reasonably appears that a well drilled on the leased premises would be both productive and profitable nor shall they be payable if a well which reasonably offsets the well draining the premises and counteracts the drainage is actually drilled on the leased premises if any portion thereof is unitized with the lands upon which the well draining the premises is located.

D. Lessee shall be under no obligation to seek unitization of the leased premises with any other premises in the vicinity.

9.05 All minimum rentals and production royalties due Lessor from time to time shall be the obligation of the Lessee. The failure to pay the proper amount of rentals or royalties or a delay in paying them or the erroneous determination as to the person or persons entitled to receive them, or other errors in such payments resulting from a good faith or honest error or oversight or an erroneous interpretation of this lease or other contract relating to it and not caused by the fraudulent or intentional effort of Lessee to defeat the payee's ultimate rights thereto shall not give rise to any action to resolve or cancel this lease but Lessee shall remain liable for any sums properly due hereunder together with interest thereon at the legal rate from the date such sums were payable until they are paid.

9.06 If at any time Lessor believes any obligation of the lease has not been or is not being complied with by Lessee, Lessor shall notify Lessee in writing specifying the default claimed and corrections necessary to remedy the obligation being breached, with such particularity to fairly apprise Lessee of the manner and extent of the default claimed by Lessor. Lessee, if the legally required to perform such obligation shall have sixty (60) days after receipt of such notice to commence compliance therewith. Completion of such compliance need not be effected within the sixty day period provided it is prosecuted with reasonable diligence to completion in a manner consistent with the prudent operation of the lease and the obligations of Lessee.

9.07 Lessor hereby warrants and agrees to defend the title to the leased premises except as to those matters expressly disclosed herein. Lessee may discharge any tax, mortgage or other encumbrance upon the land whether declared herein or not and shall be deemed subrogated thereto. Lessee may apply any rentals or royalties accruing hereunder to the payment or repayment of such amounts.

9.08 Lessee shall have the right to take a lease or leases from others claiming to have or appearing to have rights adverse to those leased hereunder whether such claims are well founded or not.

9.09 If Lessor's title or any interest therein which would be adverse to this lease is claimed by others, Lessee may withhold payment of any rentals or royalties until Lessor has established his right to such sums. Lessee may also institute actions for the declaration of its rights or that of lessors and deposit such rentals or royalties into the registry of the Court until the final determination of such rights, or may otherwise take such steps as may be reasonably necessary to assure Lessee of its rights hereunder or to protect it from having to seek refund or recovery of any amount payable to Lessor or any other person as a result of such claims whether or not such claims prove to be well founded.

9.10 Lessee shall pay all ad valorem or other property taxes levied upon or assessed against lessee's equipment or facilities or the leased premises as a result of Lessee's operations thereon.

9.11 Upon termination or release of this lease, entirely or as to a part of the leased premises, Lessee shall restore the premises or that part released or terminated and not being used as permitted by Article 8.05 for the exercise and enjoyment of the rights leased as to portions of the leased premises retained by Lessee, to substantially the same condition as when they were leased by removing all equipment, plugging and abandoning all wells in the manner required by governmental authority, filling all pits or excavations and generally restoring the surface to its original condition. Lessee shall not, however, be responsible to remedy or correct such things as the loss of productivity or condition of the ground (other than to smooth or level its surface) the removal of trees or damage to shrubs or soil or other consequential injuries which are the ordinary and usual consequences of the operations or activities authorized to be conducted hereunder.

Article 10. Force Majeure:

10.01 The obligations of this Lease shall be subject to all lawful State or Federal law or order regulating operations on the land. If Lessee is prevented from complying with any express or implied covenants of this Lease from conducting drilling or reworking operations thereon, or from producing therefrom by reason of scarcity or inability, after effort made in good faith, to obtain equipment or material or authority to use same, or by failure of carriers to transport or furnish facilities for transportation, as

a result of force majeure, any Federal or State law, or any order, rule or regulation of governmental authority, or other cause beyond Lessee's control, then while so prevented, Lessee's obligation to comply with such covenant shall be suspended and Lessee shall not be liable for damages for failure to comply therewith; and the term of this Lease shall be extended while and so long as Lessee is prevented by any such cause from conducting drilling or reworking operations on or from producing from the leased premises and the time during which Lessee is so prevented shall not be counted against Lessee.

Article 11. Execution in Counterpart and Effect:

11.01 This Lease may be executed in separate multiple counterparts or by separate acts of ratification or joinder by the various persons who are identified as parties hereto and if so executed all such counterparts or acts shall be construed together as constituting one agreement and contract. The failure of any person identified as a Lessor herein shall not affect the validity of the lease as to those persons who do execute the same and it shall be fully effective as to them, but they shall be deemed to have warranted title only to the interest in the premises which they are respectively identified herein as owning, or in the absence of such identification, to the extent of the interest owned or claimed by them.

In witness whereof the parties have to have caused this act to be executed as of the effective date first set forth above in the presence of the witnesses whose names are affixed by their respective signatures.

Witnesses:

Lessor

Lessee

(Those should then follow or be attached to the lease an appropriate acknowledgement form).