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Paula C. Murray

Frank B. Cross

THE CASE FOR A TEXAS COMPULSORY UNITIZATION STATUTE

PAULA C. MURRAY*
FRANK B. CROSS**

I. INTRODUCTION

Compulsory unitization of oil and natural gas reservoirs would substantially enhance the welfare of the United States and of Texas in particular.[1] The present regulated free market for oil production pro-

* B.A., Baylor; J.D. University of Texas at Austin; Associate Professor, Business Law Faculty.

* B.A., University of Kansas; J.D. Harvard School of Law; Associate Professor Business Law Faculty.

1. 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION: VOLUNTARY—

duces both inefficiencies and inequities. As a consequence, oil exploration is discouraged, oil production is unnecessarily costly and wasteful, and the private distribution of oil revenues can be arbitrarily unfair. Compulsory unitization would remedy many of these shortcomings which result from extant structures.

In this context, the term "unitization" means the cooperative development of an entire reservoir of oil or gas. Many different individuals are likely to have some ownership interest in the oil reservoir, and unitization is distinguished from non-cooperative independent individual development of the resources. Another form of cooperative joint development is known as "pooling," but pooling typically covers a relatively small area—less than the entire reservoir.

The primary virtue of unitization is the improved efficiency of oil production.[2] This enhanced efficiency is an important objective to pursue. One leading economist in the area, Professor Stephen McDonald, observed that "[t]he economic efficiency with which we exploit our petroleum resources is of interest to everyone in the United States, for it helps determine the level of well-being of each of us."[3] While economic efficiency is generally a presumptively valuable end for government action, productive efficiency may be unusually important in the case of oil and gas production.

Oil and gas production is vital to the economy and creates benefits to society above and beyond the benefits to producers and consumers. Maintaining a strong domestic production capability is vital to national security.[4] Oil imports are higher than ever[5] and are projected

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COMPULSORY 1 (2d ed. 1967). Myers states "The consolidation of oil and gas leases or other mineral interests in a field or common source of supply, or a substantial portion thereof, is generally referred to as 'unitization' as distinguished from the word 'pooling,' which is applied to such interests covering comparatively small tracts." *Id.*

2. *See* text section II, THE CONTEXT FOR POOLING AND UNITIZATION.

3. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 2 (1971).

4. *See, e.g., U.S. Energy Security, Hearings on H. 361 Before the Subcomm. on Energy and Power*, 100th Cong., 1st Sess. 4 (1987) (statement of Secretary of Energy Herrington). Herrington contends that "the weakening of our domestic oil infrastructure holds the potential for significant detrimental ramifications for energy security" and that "our energy security is linked to the fate and fortunes of our domestic petroleum industry through this century"; J.H. LICHTBLAU, OIL AND AMERICA'S SECURITY 36 (1988) (stating that "the United States is moving toward another energy crisis simply because it faces greater foreign oil dependency").

5. *See* Wendall H. Ford, *Energy Policy, the Environment, and Congress*, PUBLIC UTILITIES FORTNIGHTLY, March 16, 1989, 14, 15 (noting that oil imports now exceed those of 1973 oil crisis).

to increase in the future.[6] Domestic production has become a matter of particular concern, because oil production in the United States has steadily decreased over the past five years.[7] In addition, increased oil and gas production remains especially important to the Texas economy.[8]

Notwithstanding the importance of efficient oil and gas production, prevailing economic structures create considerable inefficiency. This system enables each individual to extract petroleum or natural gas resulting in an anarchic free-for-all that bears little resemblance to the free market for most goods. Unitization of oil fields will treat the cause of the market problem and cure the most serious inefficiencies. At the same time, unitization also offers a more equitable distribution of oil revenues. Economists have suggested that "all of the significant evils of unregulated petroleum production sprang from flexible adjustment of current versus future recovery under changing circumstances".

By holding out to explorers the prospect of being able to develop and produce new discoveries on the most economical terms, unitization would encourage exploration. Unitization would also contribute to solving the problem, now referred to as the "energy crisis"—the problem of equating supplies of oil and gas with growing demand in the years ahead. Unitization would also result in true protection of correlative rights and would allow us to dispense with all of the elaborate and expensive machinery of present detailed regulation, leaving only that necessary to restrain drilling and production in the preunitization period of information-gathering and to protect the environ-

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6. *See* George B. Crist, *Soviet Expansion, in* 54 VITAL SPEECHES OF THE DAY 514, 515 (1988). "A Department of Energy study estimates that our imports could double over the next ten years, eventually accounting for one-half or more of total projected U.S. oil consumption." *Id.*

7. *See* Matthew L. Wald, *Oil Activity Has Shifted From U.S.*, N.Y. TIMES, July 4, 1990, at 43. Wald notes that domestic production has fallen seventeen percent since 1986 and is projected to drop an additional three to four percent in 1990. *Id.* The future problem will be compounded because the nation's largest oil field at Prudhoe Bay, Alaska has already begun to decline in production. INTERSTATE OIL COMPACT COMMISSION, 1989 ANNUAL REPORT 43 (1989).

8. While the percentage of the Texas economy dependent upon oil and gas has steadily decreased over the past 15 years, such production remains the source of over 15% of the state's gross domestic product. Interview with Gary Price of Texas Controller of Public Accounts, (August 15, 1990) (citing results of Texas economic model database). *See also* HOUSTON POST, July 30, 1988, at E3 (quoting Texas Railroad Commissioner John Sharp to the effect that natural gas is the key to rebuilding Texas' economy).

ment from drilling and producing activities.[9] Society has foregone many of these benefits for decades. As recoverable oil and gas supplies dwindle, however, the benefits of unitization become more vital for the welfare of Texas and the nation. Adoption of a strong and effective compulsory unitization statute is increasingly essential.

II. THE CONTEXT FOR POOLING AND UNITIZATION

To appreciate of the significance of unitization one must have at least an elementary understanding of geological principles and traditional property law. Problems arise because geology does not follow Blackstone. Traditional structures of private property rights conflict with the physical characteristics of oil and natural gas reserves, thus producing inefficiency.

Reserves of petroleum and natural gas are found under pressure in fractured underground rock formations.[10] The rock creates an essentially impermeable seal around the petroleum or natural gas reservoir which traps the liquid or gas in place.[11] The reservoirs may assume a variety of forms, but these differences have relatively little importance for our purposes. Significantly, petroleum reservoirs typically contain water and natural gas in addition to the oil.[12]

The underground pools of oil can assume many shapes or sizes. Some stretch horizontally, parallel to the upper ground, while others fill vertical fractures, perpendicular to the land's surface. Some oil reservoirs are extremely large, stretching many miles in length. A single reservoir may underlie the surface property of scores of landowners.

Oil exploration is a search for these underground reservoirs. When a well is drilled and reaches an oil reservoir, the pressure in the reservoir forces the oil up the well where it can be recovered and used. However, oil itself compresses poorly and yields little of the pressure vital to its extraction. Fortunately, the natural gas or water usually found with the oil is much more easily compressed, and will produce

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9. WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 77 (1967) (quoting Professor Stephen McDonald).

10. *See* Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis*, 27 U. FLA. L. REV. 196, 198-99 (1974).

11. *See generally* Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 305-06 (1973).

12. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 12, 13 (1986).

the pressure necessary for oil recovery. In essence, the pressurized gas or water expels the oil and expands to fill the void left by the expelled oil. The amount of such pressure depends on many factors, including the quantity of water or gas; the shape of the reservoir; and the location of the oil, gas, and water found therein. These characteristics of oil reservoirs and pressure-driven production are ill-suited for classical private property concepts.

Historically, the owner of the surface land presumptively owned all the ground under his or her land (unless otherwise alienated). A landowner therefore theoretically owned the amount of oil underlying his or her land in the natural, or original state. This property rights system is generally known as the "rule of capture."[13] This approach to private property works reasonably well for solid minerals that remain in place but creates problems when dealing with liquids or gases that can flow from one underground zone to another.[14]

A simple, representative example will demonstrate the problems with traditional property law concepts. Suppose that an oil field underlies the rural property of fifteen different individuals. Under the rule of capture, one property owner could drill a well on his or her own property and drain all the extractable oil or gas from the reservoir. As the first owner produced oil, the reservoir pressure would cause the remaining oil to flow from under the neighbors' land, to under the driller's land and then up the well. If the original position of the parties is accepted as equitable, the driller is legally stealing the neighbors' oil by drawing it from beneath his neighbor's land. The relative ability to do this is dependent on structural geological principles that are not necessarily related to the amount of oil originally underlying a piece of land. This is because "the expansion of gas or water drives the oil laterally as well as vertically in the reservoir, so that some wells initially producing oil gradually become gas or water producers as the gas-oil or water-oil interface passes them," while other wells "lying in the direction in which oil is driven produce

13. For the early development of the rule of capture from traditional property law, see Westmoreland and Cambria Natural Gas Co. v. Dewitt, 18 A. 724 (Pa. 1889). *See generally* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843 (1986) (summarizing the rule of capture).

14. *See* Granville Dutton, *A Summary of Statutory Pooling in Various States*, THE LANDMAN, May 1985, at 35 (noting that surface property lines do not stop the flow of hydrocarbons through reservoirs).

more—sometimes many times more."[15]

The owner of even a tiny tract of land, if located strategically atop an oil field, might theoretically extract all the available oil from an immense amount of surrounding acreage. This is not theft, however, as property owners have no vested property right in oil beneath their property that may subsequently migrate to the property of others.

Informed neighbors will realize that their potentially lucrative oil reserves are being drained away. The interests of the neighbors are often referred to as "correlative rights," but the interests are not rights in a legal sense. The traditional legal rules did not permit the neighbors to halt the driller's operations, nor could the neighbors compel the driller to share in the recovered oil. The neighbors only recourse in order to protect their own oil reserves was to drill quickly themselves and drain as much of the oil as they could, before it was lost to others. An early Pennsylvania decision observed:

> every landowner or his lessee may locate his wells wherever he pleases, regardless of the interests of others . . . . He may crowd the adjoining farms so as to enable him to draw the oil and gas from them. What, then, can the neighbor do? Nothing, only go and do likewise.[16]

The need to "go and do likewise" can produce a mad rush to drill and extract as much oil as possible:

> The owner (or lessee) of the original location can protect his initial title only by drilling wells and taking possession of the petroleum in place before it is drained away by wells on neighboring land. In consequence of the rule of capture, the process of unregulated development and exploitation of petroleum deposits tends to be a race for possession by competitive operators.[17]

Under this system, where everyone overlying an oil reservoir drills as much and as quickly as possible, all property owners may recover something, but there is no close correspondence between the oil recovered by an individual landowner and the amount of oil originally un-

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15. Stephen L. McDonald, *Unit Operation of Oil Reserviors as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 306 (1973).

16. Barnard v. Monongahela Gas Co., 65 A. 801 (Pa. 1907).

17. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 31 (1971); *see also* WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATIONS 21 (1967). Lovejoy and Homan explain: "Where a number of operators are producing independently from a common source of supply without regulations of any sort, the rational behavior of each will be to drill and produce as rapidly as possible in order to avoid being drained by his neighbor."

derlying that person's property. Thus, the rules did not particularly conform to the equitable goal of assigning oil rights in proportion to the oil underlying a piece of land. Instead, each rights owner had an incentive to drill and capture or seize as much of the oil reservoir as physically possible.

The above described free market rule of capture also had further perverse efficiency consequences in a form often known as the "prisoners' dilemma." This game theory construct describes a situation where multiple parties can all mutually gain from cooperation but where any individual party may gain even more by being a single hold-out from cooperation. In our present context, consider a small reservoir overlain equally by three rights owners. While the following scenario is necessarily simplified, it is adequately representative of the problems created by traditional rules. Assume that the total recoverable oil from the reservoir is expressed by 3B.[18] The total costs of extracting this oil are represented by 3C.[19] If the reservoir is a proven one, and its oil resources are readily accessible, 3B will exceed 3C by a significant margin, yielding significant net profits to the three owners. If the three rights owners cooperate and share equally, the production, costs and profits will be borne as follows:

1) B - C
2) B - C
3) B - C

While this yields an efficient result and significant profit to each rights owner, the desire to maximize individual profits can cause the system to break down. Suppose that rights owner number 1 decides to increase its revenues by increased drilling (doubling its efforts). This alters the allocation of benefits and costs and yields the following breakdown:

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18. Given the uncertainty of oil drilling, benefits may often be expressed as the probability of success (p) multiplied by the potential benefits of success (B). The probability term is subsumed in our definition of B—the term B is already discounted by probability of failure. This is done for purposes of illustrative simplicity and because in many proven reservoirs the probability of success is virtually certain. Defining total benefits as 3B, rather than simply B, does not effect the equation and is also done for ease of illustration.

19. The costs of oil production, expressed as 3C, do not represent some unalterable cost of oil production. As will be seen below, vastly different costs may be required to extract any given quantity of oil. For purposes of the illustration, 3C represents the most efficient, least costly method for producing the 3B of oil.

1) 1.5B - 2C
2) .75B - C
3) .75B - C

The first rights owner has decreased his profit rate but, depending on other assumptions, may have significantly increased his overall profits.[20] In so doing, he has reduced the overall recovery of the other two owners, as well as their rates of return. While total benefits cannot exceed the physically-defined 3B total oil resources, the extraction cost for these resources has increased from 3C to 4C, with an additional one-third of original efficient total cost, which is pure economic waste.

Now suppose that the second rights owner likewise doubles its drilling, while the third owner continues to act in a "cooperative" manner. The result is:

1) 1.2B - 2C
2) 1.2B - 2C
3) .6B - C

Here, the profit rate for all three rights owners continues to drop, and the third owner suffers even more for continuing to cooperate. Significantly, while excess drilling by any party reduces the rate of return from the reservoir, the reduction in the rate of return is shared by all other rights owners as well. Thus, an individual can expand his or her total return, while forcing the neighbors to share in the reduced rate of return.

Now assume that all of the three rights owners cease cooperating and double their drilling efforts in order to seize the maximum recovery. The consequences can be expressed as:

1) B - 2C
2) B - 2C
3) B - 2C

We are now back to the original allocation of benefits recovery, but each owner must spend twice the original costs to achieve this same recovery level. Each suffers a significantly reduced rate of return, and society suffers a net efficiency loss of 3C by expending twice the neces-

20. One might question why rights owner number 1 would suffer a decreased rate of return on his investment, even for the benefit of greater total profits. His action is logical though, so long as the profit rate continues to be higher than he could receive from some alternative expenditure of C.

sary costs of recovery. While the reservoir will be drained much faster during this last scenario than it was in the original scenario, this fact is unlikely to compensate for the substantial increase in withdrawal costs. While a barrel of oil produced today will ordinarily be worth more to society than a barrel of oil produced a year from now, this discounting benefit will not justify the rush to produce caused by the rule of capture.[21] The inefficient incentives created by the rule of capture clearly produce unnecessary production costs.[22] Moreover, the rush to produce will distort prices and disrupt markets even in the short-run, thereby creating still greater inefficiencies.[23]

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21. *See* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 845 (1986). The author noted that critics do not recognize that the "possibility that the increased recovery of oil and gas at some future date may not be worth, to producers or to society, the required sacrifice of current consumption." *Id.* In a time when future oil prices are expected to decline significantly, there may be a group benefit to this quickened extraction of the reservoir when oil prices are higher. If oil prices are ascending, however, much of this benefit is lost. If oil prices ascend in the future at a rate higher than the discount rate, the inefficiency is even greater than that suggested by the scenarios. Given the world's limited supply of oil, there is reason to believe that ascending future oil prices are a likely event in the real world.

More importantly, unitization is the only way to ensure that oil is produced at the optimum time. Under the free market rush, it would be an odd coincidence that production coincided with efficiency over time. Under unitization, however, efficiency is encouraged. Professor McDonald explained:

> If, given initially a benefit-maximizing distribution of production over time, expected future demand should rise relative to current demand, the corresponding rise in expected future net proceeds would lead to an incremental shift from current to future production. Similarly, a fall in expected future demand would lead to an incremental shift from future to current production. In short, the definition implies that production will always shift incrementally from periods when oil is less valuable to periods when it is more valuable, so that the benefit-maximizing distribution of production over time is continuously sought under changing conditions.

Stephen L. McDonald, *Unit Operation of Oil Reservoir as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 310 (1973).

22. *See* 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION: VOLUNTARY COMPULSORY 2 (2d ed. 1967). Myers states:

> . . . [I]t has already been established that on the average the cost of producing a barrel of oil or a cubic foot of gas under joint operations is lower than under 100 % operations. Operating separately owned properties under the law of capture means a wasteful duplication of material and equipment. Many more wells are drilled than are necessary efficiently to drain the reservoir.

Id. (citations omitted).

23. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 32-33 (1971). Professor McDonald explains:

> Under the rule of capture unmodified by regulation, production from a newly discovered oil deposit rises quickly to a peak and then, with progressive loss of reservoir pressure, recedes almost as quickly to a fraction of the peak level. Consequently, if an oil discovery

These above described inefficiencies are a natural consequence of individualized profit maximization. Indeed, as the series of scenarios suggests, excess drilling need not necessarily result from the greedy nature of rights owners. The fear of a greedy over-drilling neighbor may provide sufficient reason for excessive, inefficient drilling, in order to protect one's self at least partially from the over-drilling of others.[24] The rule of capture virtually compelled operators to " 'git there fustest with the mostest' wells."[25]

The above scenarios illustrate how individual access to a jointly-held resource can produce a very inefficient system for extraction of that resource. This illustration deals only with the cost side of the equation. However, individual, non-cooperative oil production will not only increase the costs of production, but will also dissipate the

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is large in relation to existing total reserves or is developed simultaneously with several other discoveries, prices tend to be depressed during the phase of relatively high production and elevated during the subsequent phase of relatively low production. The resulting pattern of wide and irregular price fluctuations, occasionally aggravated by cyclical shifts in demand, may limit the recovery of petroleum from known and discoverable reservoirs. Depressed prices not fully offset by the (discounted) expectation of elevated prices in the future force the early abandonment of some marginal wells, reservoirs, and exploratory prospects. By adding to business risks, wide and irregular price fluctuations may tend to discourage the entry of new firms, reduce the availability of credit, and increase the degree of concentration in the industry. They may thus dampen exploratory activities and in the long run reduce the quantity of petroleum recoverable from available natural deposits.

Id.

24. *See* Granville Dutton, *A Summary of Statutory Pooling in Various States*, THE LANDMAN, May 1985, at 35-36 n.14. Dutton argues:

> Owners of the land overlying a portion of a reservoir could not avoid wasteful production rates by limiting the number of their wells if a neighbor drilled his property to a greater density and produced his wells at capacity. Worse still, the owners limiting their numbers of wells would not only have the amount of recoverable hydrocarbons under their property reduced by their neighbor's wasteful practice, but would also have a portion of their remaining recoverable hydrocarbons drained away as the fluids flowed toward the lower pressure brought about by the excessive withdrawals.
>
> This situation produces every incentive for any given rights owners to overproduce and no incentive to limit production as efficiency might dictate.

Id.

25. Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis*, 27 U. FLA. L. REV. 196, 201 (1974). Mr. Mellen explains:

> This common law privilege of draining a neighbor's land, and the attendant necessity of protecting against such capture by offset wells, combined to cause much unnecessary drilling and brought about haphazard production with no relation to market requirements. Disorderly drilling patterns resulted in great economic and physical waste, and government intervention became necessary to control the destructive self-interests of competing landowners.

Id.

benefits achievable from a reservoir due to certain geological characteristics of oil fields.

The most efficient production of oil from a field requires a reservoir-specific rate of production and careful well location.[26] This rate is generally called the "maximum efficient rate" or "MER" of production.[27] The production rate of an oil field must be controlled to maintain the pressure necessary to force the oil out. The location of wells is also critical because if wells are drilled into the portion of the reservoir containing gas or water, these wells permit escape of the very substances that produce the pressure necessary to recover the oil. Engineering studies can now approximate the most efficient rate of production and well location for a particular reservoir.

Excess, uncoordinated drilling can thus reduce the overall amount of oil recovered from a reservoir. In the above hypothetical scenario, we assumed that the total oil extracted would be 3B, regardless of drilling rate. In reality, excess drilling can also reduce the total amount of recoverable oil. If we assume (albeit simplistically) that double the efficient drilling rate can reduce the ultimately recoverable oil by one-half, the following consequence results from our hypothetical example:

1) .5B - 2C
2) .5B - 2C
3) .5B - 2C

Now, society suffers a net loss of 3C in excess costs and 1.5B in foregone benefits from inefficient, uncooperative production. Moreover, the rate of return from production continues to decline significantly for each individual owner even as they seek to maximize their individual profits. While some might suggest that this result is the consequence of inaccurate assumptions in our hypothetical scenarios, the

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26. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 13 (1986).

27. *See generally* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 18-21 (1971); *see also* Stephen L. McDonald, *Unit Operation of Oil Reservoirs an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 306 (1973). McDonald explains,

> If the rate of extraction exceeds some critical level, commonly known as the maximum efficient rate or MER, gravity can no longer keep gas and water segregated from oil; these less viscous fluids form channels through the oil to producing wells, bypassing pockets of oil and, as produced at the wells, depleting reservoir pressure.

Id.

real-world results of the rule of capture roughly parallel those of our final hypothetical case:

> [In 1931] William Farish, president of the Humble Oil and Refining Company, testified that unitized pools with proper gas conservation and repressuring could produce oil at one-fourth the cost of competitive drilling operations and produce 50 percent more oil per acre in the long run.[28]

The typical wildcat drilling and production under the rule of capture left approximately eighty-five percent of a reservoir's oil in the ground, beyond recovery.[29] The extent of economic waste is rather stunningly exemplified by a study that found that in the East Texas field, producers drilled over seventeen thousand wells, when the reservoir could have been efficiently drained with only fifteen hundred wells.[30] One study estimated that during the years 1947-1952, the state of Texas wasted one hundred million dollars on the costs of unneeded wells[31]—an amount that obviously would be far greater in 1992 dollars.

All the above scenarios took a *post facto* approach, after assuming that oil and natural gas production would go forth. In addition to the excess cost and loss of resources identified above, the pure rule of capture can create a disincentive for even efficient future production, when viewed *pre facto*. As mentioned above, both social and individual efficiency would dictate drilling and production whenever B would exceed C. Our sequence of scenarios demonstrates that for some situations where B exceeds C, the actual return under the private market will be only .5B - 2C. Under this latter return, the rational profit maximizer will drill only when B exceeds 4C. Thus, where B = 3C, a potentially very efficient situation for drilling and production, free market structures under the rule of capture would discourage such production. Professor Stephen McDonald observed that "the certain prospect of high development costs due to dense drilling in new reservoirs restricts the number of exploratory pros-

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28. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 46 (1971).

29. *See* 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION: VOLUNTARY COMPULSORY § 101 (2d ed. 1967).

30. *See* WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 121 (1967).

31. Robert E. Hardwicke, *Oil-Well Spacing Regulations and Protection of Property Rights in Texas*, 31 TEX. L. REV. 99, 111 n.27 (1952).

pects worth pursuing under given price expectations and thus, in the long run, reduces the quantity of petroleum economically recoverable from available natural deposits."[32]

The dampening effect on exploration can be figuratively illustrated.[33] The horizontal axis in the following graphic depiction is labeled "prospects," which is meant to encompass the costs of exploration, the probability of finding oil, and the costs of development in the event oil is found. As prospects improve, developers will demand a smaller prospective rate of return, but fewer prospects will require a greater prospective rate of return to justify exploratory activity. The curve X illustrates the rate of return required for each given degree of prospect in an efficiently operating market. At a given rate of return R, the optimum social amount of exploration is represented by A. As previously discussed, the inefficiencies created by current rules for development make production more costly and less profitable. This shifts the curve of prospective profitability left to X', which produces an amount of exploration of A'. The difference between A' and A is a social loss of efficient exploratory activity. Thus, absent unitization, producers will develop existing oil fields inefficiently and will fail to find and efficiently develop other oil fields. The discouragement of exploration is particularly unfortunate, because new exploration for oil and gas in the United States is currently at a low rate and declining.[34]

The presence of natural gas in tandem with oil creates additional problems of cooperation, if different parties own access to the oil reservoir and the gas-cap associated with it. The owner of natural gas rights will wish to withdraw the gas, though this will substantially reduce the oil recoverable by reducing reservoir pressure. If the oil rights owner gets the jump on production, it will extract the gas belonging to the gas rights owner, as a consequence of reservoir migration of the natural gas. Thus each party has a strong incentive to produce as much oil or gas, as quickly as possible.

Traditional property rights structures produce obvious inefficien-

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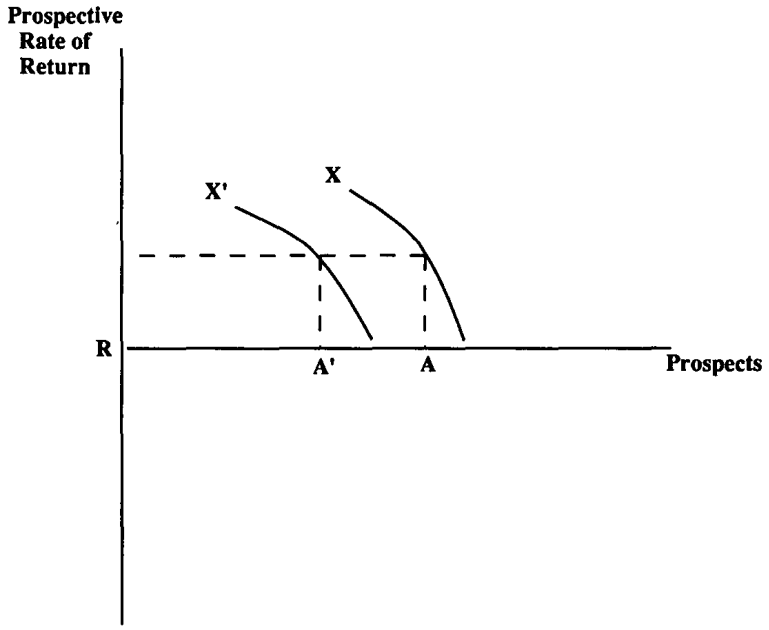
32. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 32 (1971).

33. The following description and figure are adapted from STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 87 (1971).

34. *See* Matthew L. Wald, *Oil Activity Has Shifted from U.S.*, N.Y. TIMES, July 4, 1990, at 43 (national edition) (noting that for first time, U.S. oil companies are spending more on foreign than domestic exploration for oil).

FIGURE 1



cies. Because each landowner has an incentive to recover as much oil as soon as possible (before it is extracted by a neighbor), profit maximization forces the highest possible short-term production rate, which may be far in excess of the long-term efficient production rate. Well location will not be sensibly planned but will respond to property lines. Moreover, the various landowners are likely to drill many more wells than necessary to drain the reservoir, thereby wasting considerable capital investment in drilling equipment.

The free market free-for-all created by the rule of capture wasted considerable money and oil. Too much oil was pumped too fast from too many wells. Most unfortunately, improper drilling in the early stages of recovery prevented drillers from ever using more efficient techniques. Once a reservoir is inefficiently tapped, much of its oil may be lost forever.

In addition to economic and physical inefficiency, the traditional rules were also arbitrary and inequitable. Where some property has a structural advantage, "producers' rights to the oil originally in place beneath their surface leases are not protected by allowing each well draining a tract of given size to produce at the same rate as every

other in the reservoir as long as it can."[35] Even if every property owner produces as rapidly as possible, the resulting distribution of ultimate oil production will bear no correlation to the amount of oil originally beneath the property of each owner.[36]

As our scenario suggests, individual rights owners, as well as society as a whole, can benefit significantly from cooperation.[37] Unfortunately, it is known both theoretically and empirically that cooperation will not necessarily ensue. Transaction costs may prevent cooperative agreement, especially given the large number of rights owners from whom cooperation may be required.[38] Owners may find it "time-consuming and expensive to secure all the necessary signatures to a voluntary unitization agreement."[39] Moreover, while there is a joint interest in cooperation, any single rights owner may benefit from refusing to cooperate. Analogously, some owners, realizing that their participation is essential to the success of the whole, may engage in "profitable obstructionism" holding out with "exorbitant demands as the price of their consent."[40] So long as a single landowner may block a project with substantial benefits to the group, the power to refuse to participate "can be parlayed into the power to insist upon unjust enrichment."[41] Similarly, there is an incentive to cheat on any coopera-

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35. Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 308 (1973).

36. *See id.* Noting that "[w]ells having structural advantage continue to produce long after they have extracted all the oil originally in place beneath them—their owners thus gaining valuable property at the expense of those whose wells suffer from structural advantage." *Id.*

37. In addition to the increased profits attributable to the increased efficiency described above, unitization further benefits individuals through risk avoidance. *See* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 845 (1986) ("noting that participation in all wells rather than relying upon on well stabilizes, prolongs, and protects royalty owner's income").

38. 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS 433 (1991).

> The very existence of hundreds, sometimes thousands, of different royalty and working interest owners in some large fields discourages voluntary unitization. The costs of negotiating with so many different interests is high. Very often, some owners cannot be located at all. Title defects in the unit area must be cleared or litigated. All of this is expensive.

Id.

39. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 214 (1971).

40. *Id.* at 214-15.

41. John C. LaMaster, Project, *Student Symposium on Oil and Gas: Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 846 (1986).

tive agreement. To promote efficiency and equity, legal structures must encourage cooperative action and discourage cheating.

All these problems obstructed voluntary pooling or unitization, even if it could be negotiated under a veil of ignorance regarding a party's relative ability or vulnerability to cheating. Existing common law allocation systems even further complicated the task of reaching agreements even further. Some rights owners have sites that are structurally favorable for producing neighboring gas due to geological good fortune. For some owners, "the reservoir contents tend to migrate toward their wells, giving them an opportunity to recover more petroleum than was originally in place beneath the surface area of their property."[42] Those who benefited, even unfairly, from traditional rules have little incentive to rationalize the system economically. A leading treatise explains:

> Tract owners with a natural structural advantage will want to retain the value of this advantage in the unitization formula. Such owners are unlikely to agree to a unitization agreement that does not give them at least as much oil or gas as they would have received by "going it alone." Even if the increase in ultimate recovery from unitization is so great that these owners will receive more from unit operations under almost any reasonable allocation formula than from individual development, the owners have a much stronger bargaining position in the negotiations than less-favored tract owners. They can hold out for the most favorable allocation formula, secure in the knowledge that the regional migration of oil will continue toward their tracts during any delay in negotiations. If the others in the reservoir unitize without the participation of the owners of better-located tracts, the pressure maintenance operations of the unit may well increase the amount of oil migration toward the unsigned tracts. The holdouts then benefit from the unit without incurring any costs of the pressure maintenance activity. This disincentive to unitize voluntarily is called "profitable obstructionism."[43]

In addition to disincentives for cooperation resulting from the rule of capture, other traditional common law principles also discouraged pooling or unitization. The danger of tort liability means that a group "that cannot secure unanimous voluntary agreement must place its

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42. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 25 (1971).

43. 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS 431 (1991).

injection and producing wells in suboptimal positions and produce them at suboptimal rates or else risk having to pay damages to the injured estate."[44] Leases may "prohibit cross assignment, pooling of production, or other acts necessary to effect a plan of unit operation."[45] Other disincentives are particular to Texas law, as explained by Professor Weaver:

> Texas courts have added certain other doctrines that make Texas' jurisprudence even more inimical to unitization and pooling. The worst offender in this regard is the rule that the owner of the right to lease (the executive right) does not have the right to pool the owners of nonexecutive interests in the land. Because of this rule, the proponents of unitization must negotiate with a much larger number of owners in the field. If some nonexecutive owners refuse to join the unit's risk of tort liability increases, and the optimal placement of wells and transfer allowables is further hindered. The economics of drilling on a tract with an unsigned interest makes unitization difficult to effect.[46]

Structures outside the common law create further disincentives to unitization, such as that "created by state regulatory orders that favor small-tract owners by granting liberal exceptions to the well-spacing rules and by prorationing fields on the basis of formulas that allocate production according to the number of wells drilled on each tract, irrespective of the tract's acreage."[47] Psychological barriers also confound unitization, as individual owners may have some pride in control of their oil operation or mistrust of the parties needed for cooperative extraction.[48] Other problems may also arise from independent oil producers' distrust of the major oil companies,[49] and from the inertia created by established "customs, usages, rules, and habits of thought."[50]

Even if an unusually cooperative group of neighbors can overcome

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44. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 254 (1986).

45. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 213 (1971).

46. 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS 432 (1991).

47. *Id.*

48. *Id.* at 432-33.

49. *See* WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 74.

50. *Id.* at 74-75. "Established rules and habits are unlikely to undergo substantial changes unless subjected to internal stresses or external pressures." *Id.* at 264.

all the above economic and psychological obstacles to voluntary unitization, effective unitization may still be frustrated. Constructing an equitable unitization agreement may require "knowledge about the reservoir and its environment that can be acquired only after substantial development."[51] Awaiting substantial development, however, can undermine the ultimate benefits of unitized production and will inform individuals of their structural advantages, providing them a considerable economic incentive not to cooperate in a unitization agreement.

The traditional common law rules of property rights in oil and gas had the effect of discouraging cooperation. The resultant production of oil and gas was necessarily economically inefficient. The allocation of resources was also inequitable, insofar as it encouraged parties to benefit from socially inefficient actions that obtained the oil underlying the land of others.

Unitization of oil fields can overcome the inefficiencies in traditional property rules for oil and gas production. Cooperative unit production from a reservoir eliminates the perverse rush to drill, with its attendant excessive costs and reduction in eventual recovery.[52] Cooperative unitary operation has other efficiency benefits as well. For example, coordinated development can enable the selection of the best natural pressure drive,[53] can permit the flexible adjustment of production in response to market conditions,[54] and can permit the use of the optimum number and location of wells.[55] Unitization also can enhance the process of discovering new oil:

> [B]y holding out to explorers the prospect of being able to develop and produce new discoveries on the most economical terms, it would en-

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51. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 25 (1971).

52. Texas Mid-Continent Oil & Gas Association, *Fieldwide Unitization: Vital to the Future of Texas* [hereinafter *Fieldwide Unitization*] 11 (1973). "[U]nit cooperation among producers further aids this objective by eliminating uneven withdrawal of oil or gas from the reservoir and by tending to assure more reliable and successful pressure maintenance operations"). *Id.*

53. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 202 (1971). McDonald explains: "in an oil reservoir in which the dominant drive is dissolved gas expansion, the rate of production may deliberately be reduced to allow a naturally subordinate (but more efficient) water drive to become dominant". *Id.*

54. *See id.* at 205.

55. *Id.*

> courage exploration and contribute to solving the problem, now referred to as the "energy crisis," of equating supplies of oil and gas with growing demand in the years ahead.[56]

Most importantly, "unitization creates a consolidated private interest that coincides with the public interest in efficient resource use, so that the pursuit of private profit in petroleum extraction becomes an instrument of conservation."[57] Unitization enables the powerful engine of private interest to be harnessed for the overall public interest.[58]

Notwithstanding the substantial efficiency and equity benefits of unitization, state governments, including Texas, have been slow to recognize the value of encouraging unitization. The inefficiencies of a strict free market rule-of-capture regime have long been recognized, and states have taken a variety of measures to ameliorate these inefficiencies. Most of the actions taken, however, are mere bandages upon the symptoms of the problem, rather than cures such as unitization provides. The following section describes the development and present state of state oil conservation regulation.

III. DEVELOPMENT OF POOLING AND UNITIZATION STATUTES

As early as the 1910s, the state legislatures in major oil-producing states recognized the wasteful anarchy produced by the traditional common law rule of capture. These states created regulatory authority governing oil and gas production in order to conserve reserves. State agencies were created to regulate oil production and ration output among competing property owners. Typical statutes regulated the spacing between wells to prevent over-drilling, and a typical rule

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56. Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 312 (1973).

57. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 201-02 (1971); *see also* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843 (1986) (summarizing the rule of capture and noting). "[U]nitization creates a joint interest in developing the unit as efficiently and economically as possible for maximum recovery"); Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 311 (1973). Under unitization, the "pertinent costs to the individual operator, his fixed share of the costs of the reservoir as a whole, no longer deviate from those of society; so the aim of maximizing private profit now becomes consistent with maximizing benefit to society."). *Id.*

58. *See* Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 312 (1973). Unitization "would harness the ingenuity, enterprise, and energy of profit-motivated businessmen in the interest of society as a whole, and would permit the flexible adjustment of current vs. future recovery under changing circumstances". *Id.*

would permit no more than one oil well per forty acres.[59] In 1919, the Texas Railroad Commission adopted its first well spacing rule, prohibiting wells from being drilled less than three hundred feet apart.[60] For some states, a major concern was reducing overall production in order to keep prices from dropping too low. In Texas, the legislature adopted the Anti-Market Demand Prorationing Act in 1931.[61] Among other provisions, this law dictated the spacing of wells, to avoid overproduction, but Texas well spacing regulations had many exceptions and often allowed more drilling than necessary to drain a reservoir efficiently.[62] Although the law also permitted the Texas Railroad Commission to prorate production from wells, thus enabling it to slow production and protect the rights of other parties, judicial interpretation has limited the scope and efficacy of this authority.[63] This law expressly rejected the concept of forced unitization of oil fields.[64]

While the mandatory spacing rules helped protect the goals of energy conservation, the benefits were imperfect. It would be the luckiest of coincidences if the mandatory spacing requirements happened to produce optimum well locations for any given reservoir[65] or even to produce the optimum amount of production. Efficient production depends on the unique conditions of each reservoir,[66] and state spacing

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59. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 254 (1986).

60. 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION: VOLUNTARY—COMPULSORY § 1.01 (2d ed. 1967).

61. For a summary of Texas oil well spacing regulations and their exceptions, see Robbert E. Hardwicke, *Oil-Well Spacing Regulations and Protection of Property Rights in Texas*, 31 TEX. L. REV. 99 (1952).

62. A summary of Texas Rule 37 and its exceptions is found in Robert E. Hardwicke, *Oil-Well Spacing Regulations and Protection of Property Rights in Texas*, 31 TEX. L. REV. 99, 101-05 (1952).

63. *See* Railroad Comm'n v. Woods Exploration and Producing Co., 405 S.W.2d 313 (Tex.), *cert. denied*, 385 U.S. 991 (1966) (holding that commission's proration authority was intended to limit production to marketplace demand when necessary but not to protect rights of other rights owners). In any event, the Commission never showed any great inclination to use its production control proration authority to modify the rule of capture.

64. For a good summary of this Act and its background, see JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 38-60 (1986).

65. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 206 (1971).

66. *See id.* at 183. McDonald notes that "the optimum well density in a reservoir depends upon the unique conditions of that reservoir, notably its depth, recoverable reserves per acre, drive, and other operating characteristics." *Id.*

rules are both uniform and arbitrary. Indeed, an efficient production level is highly unlikely because, with the exception of minimum spacing requirements, oil producers remain subject to the same overproduction pressures of the traditional rule of capture.[67] Differential spacing requirements among states may also distort exploration and production efforts.[68]

In addition to their limited effectiveness, the spacing rules created potential inequity among rights holders. For example, if four landowners each own small ten acre tracts over a single oil reservoir, only one of the four may be able to obtain drilling rights, and that lucky landowner would be able to drain away the oil underlying the other three, while they would be legally precluded from drilling.[69] Such an outcome would inevitably produce enormous costs from rent-seeking behavior as each landowner lobbied to be the one authorized to drill. Any government assignment of such a right would unavoidably appear arbitrary and violate fundamental concept of equity. This obvious problem led to the development of pooling.[70]

Courts soon recognized that individual landowners should not have a right to develop their portion of a common reservoir of oil or gas without regard for the rights of the other owners of the common supply but should be subject to the state's interest in conserving resources

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67. *See id.* at 198:

> [L]egislatures and commissions devise a host of detailed rules which, to be administratively feasible, must have broad applicability throughout a given state and must at least partly disregard the infinite variation of conditions from one reservoir to another. Consequently, the rules may fail to require the optimum well density or rate of extraction or degree of ultimate recovery in any reservoir. Rules designed to cover special cases, to bolster weak economic interests, to protect correlative rights indirectly, or to offset disincentives created by other rules add not only to the complexity and cost of administration but also to the potential for inefficient resource use.

Id.

68. *See id.* at 187.

69. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 21 (1985).

70. Bruce M. Kramer, *Compulsory Pooling and Unitization: State Options in Dealing with Uncooperative Owners*, 7 J. ENERGY L. & POL'Y 255, 258 (1986).

> The concepts of well spacing and pooling go hand in hand. Without well spacing regulation, if only one well were to be drilled on a forty acre tract in which multiple interests existed, disputes would certainly arise as to which mineral owner or mineral lessee would be entitled to that single well. If the well spacing provisions were fixed, the economic necessities of the circumstances would force the owners of the mineral or working interests to reach a private accomodation in order to drill their one well.

Id.

and protecting the just distribution of these resources.[71] The United States Supreme Court eventually reached the issue in *Burford v. Sun Oil Company*.[72] The Supreme Court explained:

> Oil exists in the pores and crevices of rock and sand and moves through these channels. . . . The chief forces causing oil to move are gas and water, and it is essential that the pressures be maintained. . . . As the gas pressure is dissipated, it becomes necessary to put the well "on the pump" at great expense; and the sooner the gas from a field is exhausted, the more oil is irretrievably lost. Since the oil moves through the entire field, one operator can not only draw the oil from under his own surface area, but can also, if he is advantageously located, drain oil from the most distant parts of the reservoir. For these, and many other reasons based on geologic realities, each oil and gas field must be regulated as a unit for conservation purposes.[73]

In 1927, the city of Oxford, Kansas, passed the nation's first compulsory pooling statute for oil and gas, in company with well spacing regulations. The Oxford ordinance prohibited the drilling of more than one well per city block.[74] While granting only one drilling permit per block, Oxford required that the permit grantee must share the royalties from recovered oil with all other owners on the block, prorated by their square footage of ownership.[75] Other non-drilling owners who sought to participate in royalties were required to bear a comparable proportion of the costs of drilling and operating the well.[76] The Oxford ordinance was challenged on constitutional grounds but was sustained by the federal courts.[77]

Following Oxford, most oil-producing states adopted well spacing regulations along with some form of mandatory pooling authority to allocate costs and proceeds of drilling. Texas, however, originally adopted well spacing requirements without mandatory pooling authority.

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71. *See* R. M. Williams, *Compulsory Pooling and Unitization (of Oil and Gas Rights)*, 15 INST. ON OIL & GAS L. & TAX'N 223, 232-35 (1964) (summarizing early oil and gas litigation.)

72. 319 U.S. 315 (1943).

73. *Id.* at 318-19.

74. *See* R. M. Williams, *Compulsory Pooling and Unitization (of Oil and Gas Rights)*, 15 INST. ON OIL & GAS L. TAX'N 223, 240-41 (1964).

75. *Id.* at 241.

76. *Id.*

77. *See* Marrs v. City of Oxford, 24 F.2d 541 (D. Kan. 1928), *aff'd* 32 F.2d 134 (8th Cir.), *cert. denied*, 280 U.S. 573 (1929).

The 1931 act in Texas gave the Texas Railroad Commission some additional powers to prevent the waste of oil and gas. These powers were insufficient, however, as illustrated by the then newly-discovered east Texas field.[78] While the commission had the authority to prorate total oil production, it was not required to do so based upon production efficiency. The railroad commission could, and did, allocate more production to those conducting excessive drilling in east Texas and less to potentially more efficient wells in other parts of the state.[79] The Anti-Market Demand Prorationing Act was aimed at raising oil prices more than at reducing economic waste associated with inefficient production. The Texas legislature passed additional legislation in 1932 and 1933, but these laws were focused upon helping independent producers against the major oil companies and, if anything, yielded greater inefficiency.[80] During this time period, a few localities passed compulsory pooling ordinances for production within the municipality's boundaries.[81]

Rather than opting for forced unitization of reservoirs, which some oilmen considered too socialistic, the government imposed a production control system that offered some promise of higher oil prices. However, not only did this system fail to correct the inefficiencies of the rule of capture, it introduced new inefficiencies into the system, particularly by reducing incentives for exploration. The system capped allowable production without fully accounting for the costs of new exploration. In so doing, it created an incentive to maximize production from known fields, which are relatively less expensive, and a disincentive to do the deep exploratory drilling that was necessary to

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78. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 39 (1986).

> The discovery of this gigantic field on October 9, 1930, by an independent wildcatter named Dad Joiner, set off a frenzied drilling spree so that a year later more than 3,000 wells had been completed in the field. The result was a glut of oil on the market and a sharp decline in its price. By May 1, 1931, East Texas was producing more than 1 million barrels of oil per day, one-third of U.S. production, at a price of 10 cents per barrel versus its 1930 price of about $1.00 per barrel. On this date the commission's first proration order for the East Texas field was implemented, but it had no effect on the depressed price of crude oil.

Id.

79. *See id.* at 45.

80. *See id.* at 60-68.

81. *See* Scott Lansdown, *Municipal Ordinances that Compel or Encourage the Pooling or Unitization of Oil and Gas Interests*, *in* 14 OIL, GAS AND MINERAL LAW, STATE BAR SECTION REPORT, 2-3 (1989).

find undiscovered reservoirs. An economic analysis found that "[l]ong-run investment behavior of the domestic oil industry has been markedly distorted by market demand prorationing."[82] Eventually, Texas recognized the limitations of a pure regulatory system of production controls and enabled unitary operation of some reservoirs.

The Texas legislature initially authorized voluntary unitization agreements in gas fields under the 1935 Gas Conservation Act. This law was passed in response to the perceived needs of the large panhandle gas field, and the statute was carefully limited.[83] Indeed, the law did not even authorize the unitization of oil fields in Texas.

The first meaningful provision for oil field unitization in Texas occurred in 1949 with the passage of the Voluntary Unitization Act.[84] The primary purpose of this law was to provide immunity from antitrust laws for voluntary unitization agreements.[85] However, the 1949 Act did relatively little to encourage unitization. For example, the law authorized units only for secondary recovery and gas conservation using some reinjection processes and "clearly [did] not authorize voluntary agreements for exploratory drilling or related exploratory activities,"[86] even though unitization had successfully been used on both private and public lands for exploratory purposes. Professors Smith and Weaver illustrate the potential significance of this limitation of unitization to secondary recovery operations:

Consider the effect of section 101.011's limitations on operators of an oil

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82. Edward W. Erickson, *Crude Oil Prices, Drilling Incentives and the Supply of New Discoveries*, 10 NAT. RES. J. 27, 39 (1970). Erickson elaborated:

> Drilling costs increase exponentially with depth, while allowables do not. Therefore, allowables discourage the exploration of deep horizons. Another way to offset the expense of probing deep formations is to complete several known shallower formations out of the same well that goes on to test a deep formation. To the extent that regulatory agencies have discouraged multiple completions, they have inhibited exploration and caused operators to choose less desirable prospects than they would have in the absence of regulatory constraint.

Id.

83. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 68-74 (1986) (noting that the law was responsive to special needs of independent oil producers in panhandle field). The 1935 legislation "did not deflect significantly from Texas' anti-unitization policy." *Id.*

84. TEX. NAT. RES. CODE ANN. §§ 101.001-101.052 (Vernon 1978) [Voluntary Unitization Act, 51st Leg., R.S., ch. 259 1949 Tex. Gen. Laws 477-83].

85. *See* 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 11.1(c) (1990).

86. *Id.* at § 11.2(A)(1).

> field with a gas-cap drive in a reservoir so shaped that the gas-cap owners have little or no ownership interest in the connected oil zone. Primary production can proceed without unitization under existing conservation statutes as follows: the operators overlying the gas cap may drill wells into the cap and produce that amount of gas [permitted under conservation statutes]. . . . The oil operators may produce their oil within the allowed gas-oil ratios and prorationing schedules. Eventually the gas cap will expand downward, and the oil wells will produce the migrated gas. In this situation, the correlative rights of the gas-cap producers and royalty interest owners are not well protected, nor is the greatest production of oil achieved, because this would require absolutely no production of gas from gas-cap wells. Under these facts, the operators in this field may desire to enter into a unitization agreement whereby the gas-cap owners agree to shut in their wells, or better yet, simply not to drill them, and the oil well owners agree that any gas eventually produced from their oil wells will be allocated to the gas-cap owners. All parties benefit: maximum gas-cap pressure is conserved for oil production, and gas-cap owners do not risk losing their gas to the oil well operators. The unitization agreement is clearly in the public interest of (1) increasing ultimate recovery, (2) reducing drilling costs, and (3) protecting correlative rights. Yet it is extremely doubtful that the Railroad Commission has the authority to approve such an agreement. No injection wells for any sort of cycling or repressuring are contemplated in the agreement. This is not a "secondary recovery" operation under section 101.011's nomenclature, even though it is necessary to increase the ultimate recovery of oil.[87]

The 1949 act authorizes unitization only for certain types of repressuring secondary recovery operations and does not authorize unitization for more advanced techniques, such as in situ combustion or miscible displacement tertiary recovery techniques.[88] Nor does the law provide for unitized agreements for processing or marketing, even though the "substantial cost saving [of joint marketing and processing operations] allows operators to continue to produce the field for a

87. *Id.* at § 11.2(A)(3).

88. *Id.* at § 11.2(A)(4). The Texas Railroad Commission, however, has interpreted the statutory language to permit unitization for at least some tertiary recovery operations. *Id.* at § 11.2(B)(2). The statutory language has compelled the commission to insist that any enhanced recovery operation include at least one injection well, however. As a consequence, one producer was required to construct an unnecessary injection well that "would simply increase the cost of the project by many thousands of dollars without any offsetting gain in the amount of oil recovered," in order to obtain Commission approval for a unitization project in the early 1980s. *Id.*

longer period of time, thereby recovering condensate that otherwise would have been abandoned as uneconomic."[89] The law also required a long series of findings by the railroad commission prior to authorizing a proposed unitization, which made clear a legislative intent "to ensure that unitization agreements are allowed only as a last resort."[90] Moreover, the Texas voluntary unitization law contains a number of limitations on the nature of unitization agreements that "deny to operators in a unitized reservoir the benefits . . . with respect to the optimum rate of production and cooperative marketing, . . . and possibly also those with respect to well spacing, gas-oil ratios, and gas flaring."[91] Since 1949, the act has not been expanded and has seen rather sparing use. Indeed, some have concluded that the law's complications outweigh its protections and have proceeded with voluntary unitization agreements outside the 1949 act's procedures.[92]

Some of the shortcomings of the Texas voluntary unitization statute are illustrated by the substantial Fairway field discovered in east Texas. Rights owners for this reservoir evinced particular cooperation in seeking approval of voluntary unitization starting shortly after the field's discovery.[93] Yet difficulties in negotiating an allocation formula stalled the unitization for five years.[94] This belated agreement was achieved only after the railroad commission fearing a decline in reservoir pressure drastically reduced allowable withdrawals from the field to push the parties into a unitization agreement.[95] Professors Lovejoy and Homan note that while the Fairway field is often "touted as a classic example of good conservation techniques,"

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89. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 85 (1986).

90. 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 11.4(A)(1) (1991). Smith and Weaver also note that the many findings required by the act "are a breeding ground for controversy, contested hearings, lengthy delays in securing approval, and litigation." *Id.* at § 11.4(B)(1). In practice, however, the railroad commission has not faced difficulty in promptly approving most unitization requests. *Id.*

91. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 213 (1971).

92. Scott Lansdown, *Municipal Ordinances that Compel or Encourage the Pooling or Unitization of Oil and Gas Interest, in* 14 OIL, GAS AND MINERAL LAW, STATE BAR SECTION REPORT 3 (1989).

93. *See* WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 81-82 (1967) (citing DALLAS MORNING NEWS on October 20, 1963).

94. *Id.* at 82.

95. *Id.*

it actually "came painfully close to becoming a classic example of the physical and economic waste that can result when an effort at good field development and production practices is crippled by inadequate conservation statutes and regulations."[96] Even when voluntary unitization agreements can be negotiated, the negotiations typically require nearly six years.[97]

During the next two decades, several states recognized the deficiencies of voluntary unitization and passed some form of compulsory unitization law, but Texas rejected all attempts to adopt such legislation to force unitization. In 1965, Texas adopted a compulsory pooling statute in the Mineral Interest Pooling Act (MIPA) to require cooperative development of small areas.[98] This law permits parties to appeal to the railroad commission to compel pooling of oil or gas among several small tracts. While pooling provides some of the benefits of unitization, it is generally inferior, because "[u]nitization for secondary recovery purposes generally results in greater ultimate recovery of oil and gas and longer-lived fields, thus providing additional employment and drilling opportunities, especially in water-flooding operations that use closely spaced injection wells."[99] Pooling covers a much smaller area than unitization (usually only a small part of a reservoir) and therefore offers only a fraction of unitization's efficiency benefits.

In addition to the inherent limitations of pooling, the Texas law has specific shortcomings. MIPA was limited in its scope. The application of MIPA is limited to two or more separately owned tracts, where the reservoir is sufficiently identified that the commission can determine size and shape of proration units, thus excluding exploratory drilling from the pooling act.[100] The law also limits compulsory pooling applications to no more than 160 acres for an oil well or 640 acres for a gas well, thereby precluding the unitization of most reservoirs. Also, state lands cannot be compulsorily pooled in Texas. The administrative requirements of mandatory pooling laws further dis-

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96. *Id.* at 82-83.

97. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 318 (1986) (summarizing results of Texas A&M University study of unitization of seven oil fields).

98. TEX. NAT. RES. CODE ANN. §§ 102.001-.112 (Vernon 1978).

99. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 124-25 (1986).

100. TEX. NAT. RES. CODE ANN. § 102.011 (Vernon 1978).

courage their use.[101]

MIPA also requires that no compulsory pooling order may issue unless the applicant for the order has made a strong effort to obtain a voluntary pooling arrangement and failed. The applicant must show the commission that it has made a "fair and reasonable offer" and been rebuffed. As a consequence, "most pooling in Texas occurs voluntarily, without resort to governmental process."[102] MIPA has been deemed ineffective except as an agency giving approval to agreements voluntary entered into.[103] Nor have pooling efforts fared particularly well at the railroad commission or in the courts. One study found that thirty-six percent of applications to the commission were either dismissed or cancelled, usually over the fair and reasonable offer requirement.[104] Of the remaining applications, twenty-four percent were denied.[105] Of thoce Commission decisions appealed to courts, denials have fared better than approvals.[106] While MIPA has been amended to liberalize mandatory pooling somewhat, the "Railroad Commission's own guide to MIPA warns that the act is not a 'cure-all' because it is so limited in scope and effect."[107] Wyoming's Commissioner of Public Lands has declared that Texas has mandatory pooling only "in form," and that MIPA is not reasonably effective in practice.[108]

The state statute has provided some cooperative actions though,

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101. *See, e.g.*, Oscar E. Swan & Joseph E. Hallock, *The Comparisons, Contrasts, and Effects of Compulsory Pooling Statutes*, 28 ROCKY MTN. MIN. L. INST. 911, 915 (1983):

> most state statutes and procedures, whether by accident or design, have sufficient inherent uncertainty of result so that they should be viewed as the last resort, not the first. We see too many cases where the first step an "owner" takes is to file a forced pooling application. Then he talks to his partners, sometimes. Other times, he waits to conduct his negotiations until the hearing is in progress. This is going at it completely bass-akwards.

Id.

102. 2 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 12.1(B) (1991).

103. *See generally* JAQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS, 131-36 (1986).

104. *Id.*; 3 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 12.1(B) (1991).

105. 3 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GASS § 12.1(B) (1991).

106. *Id.* § 12.1 at 8. (noting that courts have upheld all three denials appealed but only upheld about half of approvals appealed)

107. 3 ERNEST E. SMITH & JACQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 12.1 at 9 (1990).

108. *Id.* § 12.1 at 920.

particularly under its pooling authority. Moreover, the railroad commission and the courts have tacitly recognized the benefits of unitization and have generally sought to employ their powers in a manner to encourage pooling and unitization.[109] However, absent a compulsory unitization statute, the system will fail to provide the necessary unitization of most fields. One commentator summarized:

> Most states, however, have found that a completely voluntary system was not adequate. Units were not being formed, an excessive amount of time was required, or only portions of a field could be unitized so that projects could not be done efficiently. Problems in forming voluntary units were caused from factors such as too many parties involved, a small minority was blocking action, disagreement on participation in the unit, a lack of understanding of technology, et cetera.[110]

Railroad commission efforts to pressure parties into unitization are a poor substitute for a structured, compulsory unitization statute. The railroad commission's manipulation of "production control is a cumbersome and inefficient solution to this type of problem, and one which gives short shrift to protection of property interests, since production penalties are imposed on everyone, regardless of willingness to cooperate."[111]

While Texas has slowly adopted conservation measures to mitigate the inefficiencies of the rule of capture, these statutes and regulations are plainly insufficient and fail to address the root causes of the inefficiency. In addition, the structure of prevailing pooling and unitization in Texas has created additional sources of inefficiency and inequity in oil and gas production, as described in the following section.

IV. PROBLEMS IN POOLING AND UNITIZATION

The Texas oil conservation statutes, including mandatory pooling and voluntary unitization, did not displace the fundamental rule of capture but instead imposed a new regulatory structure on top of the common law rules. As a consequence, inefficiencies of the rule of cap-

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109. *See, e.g.*, JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 315 (1986).

110. Granville Dutton, *A Summary on Unitization in Various States*, THE LANDMAN, June 1985, at 45.

111. WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 82 (1967).

ture remain, to a degree, and the new regulatory structure has created additional sources of inequity and inefficiency. This section considers difficulties resulting from non-consenting owners in pooling arrangements, from the effect of pooling agreements on pre-existing leases, from modern technological developments in oil production that further complicate the efficiencies of production, and from deficiencies in the regulatory process itself.

A. *Non-Consenting Owners*

Any cooperative production arrangement, such as unitization or pooling, must confront the problem of the non-consenting owner who refuses voluntarily to acquiesce to the rules of the group. As a practical matter, a similar problem arises even under mandatory authorization for unitization or pooling. Indeed, compulsory pooling statutes can introduce new sources of inefficiency. Considerable time is required for government approval of compulsory pooling. During this time, other rights owners may wish to proceed with drilling and production. The structure permits the non-consenting owner to do nothing and await the results from the others' production before choosing to join the pool, depending on the results of drilling. The other owners can be forced to carry the non-consenting owner, and he will not have to put up his share of production costs. If the risky exploration activity proves successful, the non-consenting owner can then insist upon being pooled with the other owners and receive the benefits of oil production. The non-consenting owner can thereby obtain the benefits without assuming any of the risks of initial production efforts.[112] This is so because the law permits an owner to reject an offer to pool costs prior to exploratory drilling and then to obtain a compulsory pooling order, if the drilling is successful.[113]

The non-consenting owner can thus escape the costs and risks of unsuccessful drilling—always a great possibility in the oil and gas business. The risk of failure is substantial, as "of every 100 exploratory wells drilled in search of new fields, less than two find enough

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112. *See* Bruce M. Kramer, *Compulsory Pooling and Unitization: State Options in Dealing with Uncooperative Owners*, 7 J. ENERGY L. & POLICY 255, 266 (1986) (describing the nature of these risks. These risks include the possibility of drilling a dry hole and the risk of "encountering unexpected mechanical or geological problems which greatly increase the actual cost of drilling"). *Id.*

113. *See* Granville Dutton, *A Summary on Unitization in Various States*, THE LANDMAN, June 1985, at 45.

petroleum to be commercially successful."[114] If the well is not productive, the producing operator has no means of recouping its drilling costs from the uncooperative non-consenting owner.[115] This system provides a clear incentive for some rights owners not to consent to voluntary pooling. The system may also provide a disincentive for production among other rights owners. As one commentator explained:

> It would not be in the best interest of the working interest owner to buy into an operating agreement and face the dual burden of providing up-front capital for the drilling and also the risk of losing his entire investment in the event of a dry hole. . . . The potential operator will be discouraged from drilling if he knows that he has to carry the full risk of a dry hole and, in addition, share the benefits from a profitable well with those [who] bore none of the usual risk of drilling.[116]

The problem can be demonstrated symbolically. If a single owner were to consider drilling for oil, he or she would base that decision on an analysis of the benefits potentially obtainable versus the costs of drilling, considering the probability of achieving the benefits. In this illustration, B represents the potential benefits from oil production, C represents the costs of production, and P represents the probability that the exploratory efforts will succeed in finding oil and achieving B. The owner would go forward with exploration if $PB > PC + (1\text{-}P)C$. This same standard would apply for two equal, cooperative rights owners, where each would use a standard of $P(.5B) > P(.5C) + (1\text{-}P)(.5C)$. Consider what happens when one owner refuses to consent, however, and forces the other to go it alone in exploration and production. The non-consenting owner knows that mandatory pooling statutes will compel the first operator to share the benefits of an oil strike. With some simplification, the operator now must bear all the costs in the first instance, while it will still be required to share the benefits. This operator will go forward only where $P(.5B) > P(.5C) + (1\text{-}P)C$. The addition of $(1\text{-}P)(.5C)$ to the cost side of the equation is sure to deter some operators from exploratory drilling when an efficient allocation of costs would dictate drilling. Consequently, the law would have the perverse effect of discouraging efficient risk-taking be-

114. Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis*, 27 U. FLA. L. REV. 198 (1974).

115. *Id.* at 262.

116. *Id.* at 264.

havior in oil exploration. Moreover, the law will particularly discourage particularly costly new forms of oil exploration, such as horizontal drilling,[117] even though these new methods may yield greater benefits.

Some states have "free ride" pooling statutes that permit non-consenting owners to escape the risk entirely, just as described above, without bearing further costs or losing any share of successful production.[118] Most states, including Texas, have sought to address the problem by using some form of "risk penalty" statute to penalize non-consenting owners seeking a free ride.[119] This risk penalty involves some amount of money charged to non-consenting owners (or deducted from their recovery) to compensate for the risk that others in the pool took in the exploratory drilling. Some states provide specific non-discretionary risk penalties that must be borne by non-consenting owners,[120] but Texas gives the railroad commission the authority and responsibility to establish the most appropriate risk penalty, so long as it does not exceed one hundred percent of the drilling and completion costs.[121] The commission must impose some risk penalty on all non-consenting parties.[122]

Although the assessment of an accurate risk penalty can avert the inequity and incentive not to cooperate described above, current Texas law often does not yield the proper risk penalty. Indeed, it appears that Texas law provides risk penalties that tend to be too low, thereby producing a somewhat milder version of the inefficient scenario described above, where a non-consenting owner may take a free ride on the risk-taking of others. The "one hundred percent of costs" ceiling created by Texas law will be too low to fully reflect the appropriate risk penalty for especially risky operations. Given the extremely low probability of finding commercially profitable new oil

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117. *See* discussion *infra* at pt. IV.C.1.

118. Eleven states have such free-ride statutes. *See* ALA. CODE § 9-17-13 (1980); ALASKA STAT. § 31.05.100(c) (1979); ARIZ. REV. STAT. ANN. § 27-505(A) (1976); FLA. STAT. ANN. § 377.27 (West 1974); IND. CODE ANN. § 13-4-7-14 (Burns 1981); IOWA CODE ANN. § 84.8(2) (West 1984); MO. ANN. STAT. § 259.110 (Vernon Supp. 1985); MONT. CODE ANN. § 82-11-202(2) (1983); NEV. REV. STAT. § 522.060(3) (1983); N.C. GEN. STAT. § 113-393 (1983); N.D. CENT. CODE § 38-08-08 (Supp. 1985).

119. *See* TEX. NAT. RES. CODE ANN. § 102.052 (Vernon 1978).

120. *See* Bruce M. Kramer, *Compulsory Pooling and Unitization: State Options in Dealing with Uncooperative Owners*, 7 J. ENERGY L. & POL'Y 255, 264-65 (1986).

121. TEX. NAT. RES. CODE ANN. § 102.052(a) (Vernon 1978).

122. *Id.*

fields,[123] the penalty should be far greater than a mere doubling of out-of-pocket costs, as other states' statutes have recognized. Four states automatically provide for a two hundred percent risk penalty, and two other states provide for presumptive penalties of up to one hundred, fifty percent.[124] Even these high levels are "less severe than the penalties knowledgeable operators agree to voluntarily for similar ventures."[125]

Individual cases also demonstrate the inadequacy of risk penalties allowed by Texas law. For example, a New Mexico order, upheld by the courts of that state, found that a two hundred percent risk penalty was most appropriate in one case[126] and an Oklahoma court affirmed a two hundred, fifty percent risk penalty in another.[127] In another case from South Dakota, the operator sought a two hundred, fifty percent risk penalty, and the non-consenting party itself agreed in private negotiations that a one hundred, fifty percent risk penalty would be reasonable.[128] This case also described another reservoir where voluntary negotiations between the parties resulted in agreement on a two hundred, fifty percent risk penalty for the non-consentor.[129] Testimony presented to one court indicated that the "risk compensation used in voluntary pooling agreements has ranged from 50% to 300%."[130] The Texas Railroad Commission has no authority to impose such high penalties, even though they may be warranted. A recent seminar concluded that the "100% statutory maximum risk penalty no longer reflects the customary non-consent penalties found in [voluntarily negotiated] operating agreements currently in use."[131] If the risk penalty is too small, efficient production will not occur. At

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123. *See* Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis?*, 27 U. FLA. L. REV. 196, 198 (1974).

124. Oscar E. Swan & Joseph E. Hallock, *The Comparisons, Contrasts, and Effects of Compulsory Pooling Statutes*, ROCKY MTN. MIN. L. INST. 911, 940 (1983). Colorado, Nebraska, New Mexico and Wyoming provide for 200% risk penalty, Illinois provides for 150% penalty, and Utah provides for 120% or 150% penalty, depending upon whether field is proven. *Id.*

125. *Id.* at 941.

126. Viking Petroleum, Inc. v. Oil Conservation Comm'n, 672 P.2d 280, 284 (N.M. 1983).

127. Holmes v. Corporation Comm'n, 466 P.2d 630, 633 (Okla. 1970).

128. *See* Application of Kohlman, 263 N.W.2d 674, 678-79 (S.D. 1978) (conservation commission chose to apply only 100% risk penalty).

129. *Id.* at 677.

130. Application of Kohlman, 263 N.W.2d 674, 678 (S.D. 1978).

131. *See* Frank Douglass and H. Philip Whitworth, Jr. Mineral Interest Pooling Act and

least one decision found that "due to the estimated time required to recover the costs of drilling, completing and operating the well, the venture would be economically unfeasible if the bonus-penalty were not set at an amount larger than 150%."[132]

In addition, when assessing the amount of a fair risk penalty within the one hundred percent ceiling, the railroad commission has not fully considered the costs that a non-consenting owner should bear. Costs considered in a risk penalty include the drilling and completion costs of unit wells but do not include the costs of lease acquisition, regulatory expense, or dry holes.[133] These costs must be solely borne by the initial producer. Such costs provide a further incentive to refuse to pool voluntarily and to wait until a profitable well is assured. Not only does the non-cooperative party avoid risk, it also avoids all legal costs of pooling. In short, the statutory provision for a risk penalty ameliorates the bias for non-consenting owners but remains insufficient to correct the problem.

B. *Excluded Acreage*

The superimposition of pooling authority atop existing free market arrangements has created another source of inequity and possible inefficiency. This situation is generally known as the "excluded acreage" problem and arises out of the following circumstances. Suppose that a landowner leases his entire tract of, say, three hundred acres to an operator to produce oil or gas and to pay the landowner a royalty. The duration of such leases is typically from one to five years.[134] The operator then joins part of the tract into a pool, which contains producing wells on other property. This part may be a relatively small portion of the land, say, thirty acres. The operator never drills for oil on the landowner's tract during the duration of the lease.

Given the above circumstances, one might expect the landowner to refuse to renew the lease and seek another operator who would do more to find oil. Typical leases, however, contain something known

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Forced Pooling 64 (May 14-15, 1990) (unpublished manuscript, on file with the St. Mary's Law Journal).

132. *Holmes*, 466 P.2d at 633.

133. *See* Frank Douglass and H. Philip Whitworth, Jr. Mineral Interest Pooling Act and Forced Pooling 64 (May 14-15, 1990) (unpublished manuscript, on file with the St. Mary's Law Journal).

134. Allen L. Handlan & Kevin L. Sykes, *Pooling and Unitization: Legal and Ethical Considerations*, 19 TULSA L.J. 309, 323 n.66 (1984).

as a habendum clause.[135] The habendum clause automatically extends the operator's lease, so long as the operator has drilled for oil on the landowner's property. In our above example, the operator had not expended resources to find oil on the landowner's property, but the operator did join a fragment of the property to a pool that was producing some oil or gas. Most courts have held that the pooling of a portion of the landowner's tract is sufficient to extend the lease indefinitely under the habendum clause.[136] Texas law apparently follows this majority rule.[137] This allows the operator lessee to hold large tracts of land beyond the primary lease term, without drilling or paying royalties on that portion to the landowner. The excluded acreage (that owned by the landowner but outside the pool) is unproductive and, more significantly, beyond the reach of other potential lessees who may want to develop the acreage. The landowner's only recourse is to sue for a breach of the lease's implied covenant of reasonable development, but such an action is expensive and presents "almost insurmountable" problems of proof for the landowner.[138]

Some knowledgeable landowners have modified lease terms to attempt to free the excluded acreage, through a provision commonly known as a Pugh clause.[139] Although the language of the Pugh clause is typically straightforward, some courts have refused to give effect to the clause, finding it to be contradictory to the state compulsory pooling statute.[140] Other courts have employed technical inter-

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135. *See, e.g.*, Paul A. Morris, Note, *Production from Compulsory Pooled Unit Extends Lease on Outside Acreage?*, 33 ROCKY MTN. MIN. L. REV. 184, 184 (1961); John R. Rebman, Comment, *Continuation of the Oil and Gas Lease on Outside Acreage by Production Within the Unit*, 35 TEX. L. REV. 833, 834 (1957). The operator-lessee generally supplies the landowner with a form lease agreement, usually one known as the "Producer's 88 Lease." R. HEMINGWAY, THE LAW OF OIL AND GAS § 6.2 (1983).

136. *See* Jones v. Bronco Oil & Gas Co., 446 So. 2d 611 (Ala. 1984); Delatte v. Woods, 94 So. 2d 281 (La. 1957); Gray v. Cameron, 234 S.W.2d 769 (Ark. 1950); Clovis v. Pacific Northwest Pipeline Co., 345 P.2d 729 (Colo. 1959); Somers v. Harris Trust & Sav. Bank, 566 P.2d 775 (Kan. 1977).

137. *See* Buchanan v. Sinclair Oil & Gas Co., 218 F.2d 436 (5th Cir. 1955) (applying Texas law).

138. *See*, Paul A. Morris, Comment, *Production from Compulsorily Pooled Unit*, 33 ROCKY MTN. L. REV. 184, 192 (1961). For example, such an action requires "the use of expert opinion on subsurface conditions, adequacy of the lessee's development program as compared with other operators, cost of additoinal wells and what they would produce and numerous other items all of highly nebulous character." *Id.*

139. *See* Shown v. Getty Oil Co., 645 S.W. 2d 555, 560 (Tex. Civ. App.—San Antonio 1982).

140. *See* Allen L. Handlan & Kevin L. Sykes, *Pooling and Unitization: Legal and Ethical*

pretive principles to avoid giving effect to a Pugh clause.[141]

The current state of the law is inequitable to landowners.[142] The landowner did agree to the habendum clause, of course, and arguably should be bound by this arms-length transaction. Rigorous reliance on freedom of contract in this circumstance, however, would be misguided given the inequality of bargaining power in the lease transaction. Most landowners, many of which are agricultural producers, are unfamiliar with the oil industry and are often not represented by counsel.[143] These landowners are unaware of the implications of the habendum clause, especially since the lease language "is often not so clear that [even] a reasonably prudent landowner could be expected to understand the effect of [the] clause."[144] The unfairness was acknowledged in a Mississippi decision that departed from the majority rule on excluded acreage:

> Our conservation laws were enacted to be fair and reasonable and to do justice and equity to all parties concerned, and we think that it was not contemplated under the statutes authorizing the establishment of drilling units and the compulsory pooling resulting therefrom that the establishment of the unit and the production from a well on land therein other than the leased land should affect the leased land without the unit.[145]

Also, the Oklahoma legislature recognizing this inequity created something of a statutory Pugh clause.[146]

In addition to the inequity of the majority rule on the excluded acreage problem, this rule also yields inefficiency and underproduction. A lease-holding operator can retain rights on future oil in virtual perpetuity, without trying to find the oil. One could defend this situation by suggesting that the operator has no incentive not to drill for oil, if circumstances were promising for finding valuable resources.

Considerations, 19 TULSA L. J. 328-29 (1984); Bibler Bros. Timber Corp. v. Tojac Minerals, Inc., 664 S.W.2d 472, 474 (Ark. 1984) (finding Pugh Clause inoperative where Commissioner of Conservation has established a compulsary unit).

141. *See* Mesa Petroleum Co. v. Scheib, 726 F.2d 614, 616 (10th Cir. 1984) (noting that Pugh clause was contrary to previous applications of habendum clause in compulsory pooling and that such clause must be particularly explicit) *See generally*, Mathis v. Texas Int'l Petroleum Corp., 627 F. Supp. 759 (W.D. Tex. 1986).

142. *See, e.g.*, 6 H. WILLIAMS & C. MEYERS, OIL AND GAS LAW § 721 (1989).

143. R. HEMINGWAY, THE LAW OF OIL AND GAS, § 6.2.

144. 6 H. WILLIAMS & C. MEYERS, OIL AND GAS LAW, § 722.

145. Texas Gulf Prod. Co. v. Griffith, 65 So. 2d 447, 452 (Miss. 1953).

146. OKLA STAT. ANN. tit. 52, § 87.1(b) (West 1991).

The operator, after all, would profit from such exploratory activities. The efficiency problem arises because the excluded acreage rules serve to lock up this acreage in the hands of a given operator. Any single operator may fail to drill for oil, even when it would be efficient and profitable to do so. A particular operator may, for example, be unusually risk averse. Alternatively, the operator may have a capital shortage that prevents drilling, which it someday hopes to remedy. An operator might even use the control as leverage in other dealings with the landowner. There are doubtless other explanations as well. Efficiency dictates that the excluded acreage be opened up for a free market transaction, to be bid upon by the current operator as well as any others who feel the tract is promising.[147]

As societal welfare suffers from the inefficiency, potentially valuable oil resources are not found and exploited. The excluded acreage rules hinder the development of new energy resources that may be crucial to national energy sufficiency.[148] The excluded acreage is by its very nature proximate to an existing field and therefore a probable candidate for successful exploration yet remains unexplored.

C. *Modern Technological Developments*

As the technology of oil production advances, unitization of reservoirs becomes even more important. Various developing technologies promise to extract additional oil from previously depleted fields and can produce this oil efficiently. Lack of unitization impairs implementation of these advanced technologies, because free riding rights owners can seize the oil recovery benefits from producers who adopted the advances. Because these new developments tend to be relatively costly, the free rider problem can be especially pronounced. Only unitization can cure the underlying deterrent to employing new recovery technologies. This section discusses two such categories of new technology: the growing use of horizontal drilling technology and advanced recovery methods.

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147. The market can thus check for the efficiency of drilling. If the excluded acreage is indeed not promising, no other operators will seek the lease, and the pre-existing operator presumably will continue its lease. If some other operators consider the acreage promising, however, they should be given the opportunity to invest.

148. *See* William G. Somerville III, Comment, *Pooling and the Excluded Acreage Situation: Toward a More Equitable Rule*, 37 ALA. L. REV. 119, 136-38 (1985).

1. Horizontal Drilling

The development and certain growth of horizontal drilling technology complicates traditional methods of production allocation, including voluntary unitization and pooling structures. Yet, this new drilling technique offers great benefits for enhanced production of oil and natural gas. Existing legal structures are ill-suited, however, for apportioning production from horizontal wells.

The term horizontal drilling is quite descriptive. The traditional well used to find or produce oil and gas consisted of a drill penetrating the earth in a straight line that was at least roughly perpendicular to the land's surface. Horizontal drilling differs in that the drill penetrates perpendicularly for a distance and then curves, to drill through the earth roughly parallel to the surface. The horizontal portion of the well may stretch for thousands of feet.[149]

Horizontal drilling is on the rise. In the early 1980s, the industry drilled only one horizontal well per year.[150] This rate increased to over twenty-eight horizontal wells per year in 1986 and 1987, and sixty-three such wells were drilled in 1988.[151] Worldwide, about two hundred horizontal wells were drilled in 1988.[152] Horizontal drilling remains more costly than vertical drilling and is therefore limited by prevailing oil prices.[153]

Horizontal drilling offers considerable benefits to oil producers. Natural vertical fractures containing oil or natural gas, difficult to find through traditional vertical drilling, are identified and captured much more easily with horizontal drilling. Horizontal drilling makes it easier to control the invasion of water and other unwanted fluids in oil

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149. Olivier de Montigny & Jean Combe, *Hole Benefits, Reservoir Types Key to Profit*, OIL & GAS J., April 11, 1988, at 50, 54.

150. Guntis Moritis, *Worldwide Horizontal Drilling Surges*, OIL & GAS J., Feb. 27, 1989, at 53, 54.

151. *Id.*

152. Haraldur Karlsson & Ron Bitto, *Worldwide Experience Shows Horizontal Well Success*, WORLD OIL, March 1989, at 51.

153. *See* G. Allen Petzet, *Operators Make Wider Use of Horizontal Drilling Technology*, OIL & GAS J., Apr. 11, 1988, at 15 (initial costs are twice that of vertical wells); *see also id.* at 16 (noting that $16 per barrel price limits use of horizontal drilling); *see also* Thomas C. Hayes, *Horizontal Drilling, or How to Revive Oilfields*, N.Y. TIMES, July 4, 1990, at 27 (national edition) (noting that horizontal drilling costs have declined but are still twice that of a vertical well).

fields.[154] Horizontal drilling also enables much greater recovery from at least some fields.[155] As recently explained in a trade journal:

> Horizontal drilling's magic has included making commercial an otherwise unproducible field, turning dry holes and marginal wells into commercial producers, and eliminating other operating problems. Higher production rates and perhaps higher ultimate recovery may result from having several hundred to several thousand feet of reservoir exposed to a horizontal wellbore. In a vertical well, the length of reservoir open to the wellbore is limited to the thickness of the producing formation.[156]

The benefit of enhanced recovery from horizontal drilling is strikingly demonstrated by wells drilled in the Austin chalk formation of south central Texas. This area was originally drilled with vertical holes, which initially produced oil at a rate of thirty to thirty-five barrels per day but quickly declined to only a few barrels per day.[157] After being redrilled horizontally, recovery has exceeded one-hundred fifty barrels per day.[158]

Horizontal drilling technology can thus make enormous amounts of additional oil available. Production rates from horizontal wells may be four or five times as great as from traditional wells.[159] The overall increase in recoverable oil is, at minimum, five percent of the country's total theoretically recoverable reserves, or about thirty-five billion barrels of oil.[160] This represents more than a doubling of our proved reserves.[161] Moreover, while producers have conducted relatively little horizontal drilling for natural gas, "the production improvement provided by horizontal wells is higher for gas than for

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154. *See* Jacques C. Bosio, *Horizontal Wells Prove Their Worth*, PETROLEUM ENG'R INT'L, Feb. 1988, at 18.

155. B.J. Mahony, *Horizontal Drilling Use on the Rise: Why and How*, WORLD OIL, Oct. 1988, at 46. "Recovering 60% to 80% of hydrocarbons in place in a reservoir can be the norm, rather than the exception, if horizontal techniques are used". *Id.*

156. G. Allen Petzet, OPERATORS MAKE WIDER USE OF HORIZONTAL DRILLING TECHNOLOGY, OIL & GAS J., Apr. 11, 1988, at 15.

157. Ray H. Holifield & Bill Rehm, *Recompletion by Horizontal Drilling Pays Off*, WORLD OIL, Mar. 1989, at 43.

158. *Id.*

159. *See* Thomas C. Hayes, *Horizontal Drilling, or How to Revive Oilfields*, N.Y. TIMES, July 4, 1990, at 27.

160. Philip C. Crouse, *Reserve Potential Due to Horizontal Drilling Is Substantial*, WORLD OIL, Oct. 1989, at 47.

161. *Id.*

oil."[162]

While horizontal drilling offers great promise for future recovery of oil and gas, the present legal structures of pooling and the free market rule of capture complicate horizontal drilling programs. Each surface owner under whose land the horizontal drilling passes has a common law claim to any oil produced from under the surface owner's property. If the producing operator cannot distinguish the source of the oil produced with reasonable certainty, the operator will owe the value of the entire recovery to each individual landowner under which the well passed.[163] Hence, "it is very possible that the operator would be required to account to the owners in each tract penetrated as if one hundred percent (100%) of the production had come from each tract."[164] This obviously creates a great risk for producers and an associated incentive to reach a pooling agreement to apportion any production from a horizontal well.

Moreover, horizontal drilling could entirely undermine well spacing requirements as a tool for conservation. When wells were drilled vertically, spacing requirements could contribute to limiting overproduction from a given reservoir. With horizontal drilling, wells may be placed artificially far apart, but any number of these wells may reach the same small pool of oil and gas. Thus, horizontal drilling may circumvent well spacing requirements.

In addition, the pooling rules are ill-suited to horizontal wells. Unit size in pooling is ordinarily limited to 160 or 640 acres, but the length of a horizontal well can far exceed this size. The railroad commission could adopt a larger unit size when necessary to accommodate situations such as horizontal drilling. Regular reliance on railroad commission exceptions, however, is highly inefficient, because of the costs and uncertainty of the regulatory process and because the commission's judgment will be inferior to a market test.

2. Secondary and Enhanced Recovery

Greater use of secondary and enhanced (or tertiary) recovery oper-

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162. Jean-Francois Giannesini, *Horizontal Drilling Is Becoming Commonplace: Here's How It's Done*, WORLD OIL, March 1989, at 36.

163. *See* Humble Oil & Refining Co. v. West, 508 S.W.2d 812 (Tex. 1974) (placing the burden on producing party to demonstrate source of oil or gas with reasonable certainty).

164. James N. Cowden, Spacing and Pooling Considerations for Horizontal Wells 94 (May 14-15, 1990) (unpublished manuscript on file with the St. Mary's Law Journal).

ations in oil fields is vital to the nation's energy future. We have discovered over four hundred, fifty million barrels of oil in the United States, but only thirty-one percent of this oil will actually be extracted under current operating methods.[165] Moreover, most of this extractable oil has already been produced. One hundred, thirty billion barrels have been produced, twenty-eight billion additional barrels are probably recoverable, and three hundred, twenty-three billion barrels will not be produced through primary methods.[166] For some reservoirs, only ten to twenty-five percent of the oil will be recovered through primary production measures.[167] This is partially due to inefficient primary production methods, as described above, but largely due to the failure to employ advanced recovery methods, such as those that repressurize oil fields and permit greater recovery. Use of techniques such as secondary recovery and tertiary recovery can substantially increase the amount of oil successfully extracted from a reservoir. Indeed, the National Petroleum Council estimates that tertiary recovery can increase our oil reserves by twice as much as all future discoveries of oil.[168]

For the above reasons, enhanced recovery is of great value. The need for such improved recovery is particularly important now, because much of the oil available to primary production has already been produced. Nationwide, only about thirty billion barrels will be produced in the future by primary methods.[169] The Texas Conservation Committee for Unitization has observed that of the "remaining 111 billion barrels [of oil found in Texas], only 13 billion will be recovered under present economic and technological conditions."[170] Enhanced recovery can produce much of the remaining ninety-eight billion barrels still in the ground.

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165. Granville Dutton, *A Summary on Unitization in Various States*, THE LANDMAN, June 1985, at 43.

166. NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 9 (1984).

167. *See* R. V. Smith, *Enhanced Oil Recovery Update: Part 1 — Improvement of Sweep Efficiency*, PETROLEUM ENG'R INT'L Nov. 1988 at 29.

168. Granville Dutton, *A Summary on Unitization in Various States*, THE LANDMAN, June 1985, at 43.

169. TEXAS MID-CONTINENT OIL AND GAS ASSOCIATION, FIELDWIDE UNITIZATION: VITAL TO THE FUTURE OF TEXAS 8 (1973).

170. Texas Conservation Committee for Unitization, *More Oil for Texas*, (1973) at 1; *see also* TEXAS MID-CONTINENT OIL & GAS ASSOCIATION, *Texas Energy Recovery Measure* (1973) at 2 ("Of the 145 billion barrels of oil discovered to date, 99 billion barrels will not be recovered under current conditions.")

Various methods are available to reinvigorate old fields and enhance recovery. Secondary recovery, for example, involves the injection of water, steam, or gas back into the reservoir to create new pressure for the extraction of remaining oil.[171] Secondary recovery techniques are well established and have been demonstrated to be effective. While primary production from an oil field may recover as little as ten percent of the total oil in the ground, "secondary recovery methods will usually increase primary recovery by thirty to sixty percent and sometimes by over one hundred percent."[172] However, for some reservoirs, secondary recovery will still leave considerable oil in the ground.[173]

Advancing technology has provided other methods for improving recovery from oil fields. Where repressurization through secondary recovery is insufficient to produce additional oil, other enhanced recovery processes offer potential recovery of an additional fourteen and a half[174] to fifty-two billion barrels.[175] Enhanced recovery can be obtained through chemical methods, such as polymer flooding (addition of polymers to reinjection water to increase oil mobility); surfactant flooding (addition of surface active chemicals to reinjection water to increase oil mobility); and alkaline flooding (addition of alkaline chemicals to reinjection water to increase oil mobility).[176] These methods offer recovery of an additional 2.5 billion barrels of oil that otherwise would be lost.[177] Other methods include miscible flooding through the injection of carbon dioxide to reduce oil trapped in the ground.[178] Miscible methods can recover up to 5.5 billion barrels of oil.[179] In situ combustion (igniting heavy, sticky oil in reservoirs to

171. See *generally* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 21-22 (1971).

172. John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 844 (1986).

173. *See* NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 10 (1984). "Certain reservoir types, such as those with very viscous crude oils and some low-permeability carbonate . . . reservoirs, respond poorly to conventional secondary recovery techniques". *Id.*

174. *See* R. V. Smith, *Enhanced Oil Recovery Update: Part 4—Surfactant and Alkaline Flooding, and EOR's Future*, 61 PETROLEUM ENG'R INT'L 44, 46 (1989).

175. V. A. Kuuskraa, *Current and Future Economics of Enhanced Oil Recovery, in* INSTITUTE FOR THE STUDY OF EARTH AND MAN, ENHANCED OIL RECOVERY FOR THE INDEPENDENT PRODUCER 261, 264 (1984).

176. *See* NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 12-16 (1984).

177. *See id.* at 61.

178. *See id.* at 16.

179. *See id.* at 61.

enhance pressure)[180] can provide recovery of up to eighty percent of the oil in a reservoir.[181] Where enhanced recovery operations have been undertaken in Texas, they have yielded substantial amounts of oil.[182] Future technological developments in enhanced recovery promise additional billions of barrels of oil production.[183]

Unitization is essential for maximum efficient use of enhanced recovery operations. In the absence of unitization, free-rider problems preclude commencement of enhanced recovery. Reinjection can be a relatively expensive operation. Once a single party bears all the reinjection costs, however, anyone overlying the reservoir may take advantage of the newly-created pressure to produce oil or gas. Again, the present system creates a substantial disincentive for action and an incentive to take advantage of the production actions of others. Indeed, free riders could be so parasitical as to withdraw the reinjected gas itself and still be within the bounds of the law. Alternatively, with unitization, other rights owners may be able to sue the operator conducting secondary recovery operations for trespass or other torts.[184]

Unitization is critical to enhanced recovery for other, noneconomic reasons as well. For example, for reinjection to function efficiently, the injection must occur at specific sites in a reservoir. These optimum sites may be outside the control of the party willing to undertake the costs of reinjection operations. Because, "the location of these wells must be altered by surface property lines to avoid drainage and protect correlative rights, the profitability of such [secondary re-

180. *See* 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION: VOLUNTARY COMPULSORY § 2.05 (2d ed. 1967). Some "oil in its natural state will not flow through the oil sands" and that in situ combustion can "heat the oil in the horizon to increase its mobility by decreasing its viscosity". *Id.*; *see also* NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 18 (1984).

181. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 22 (1971).

182. *See* TEXAS MID-CONTINENT OIL & GAS ASS'N, *Unitization: Key to Future Energy Supplies* (1973) at 11-12. The benefits from unitization are applicable to a number of Texas reservoirs, including the Kelly-Snyder field (water injection increased recoverable reserves by 932 million barrels), the Wasson field (offering increased recovery of 562 million barrels with increasing production from 27,000 barrels per day to 81,000 barrels per day), the Fullerton field (with increased recovery of 159 million barrels), and other reservoirs. *Id.*

183. *See* 1989 IOCC ANNUAL REPORT at 38 ("arguing that evolving production technologies not allow recovery of presently unproducible domestic oil").

184. *See* 2 BRUCE M. KRAMER & PATRICK H. MARTIN, THE LAW OF POOLING AND UNITIZATION § 22.01 (2d ed. 1957).

covery] projects may dwindle or even vanish."[185] Unitization also can "result in improved recovery techniques based on more adequate knowledge of reservoir characteristics."[186] Early unitization permits enhanced recovery to occur at the time that is optimum for maximum recovery and avoids waste throughout the production cycle of a field.[187]

Unitization alone could avoid the deterrents to enhanced recovery and promote efficient operations by aligning private interests with that of society as a whole. In the process, substantially greater amounts of oil and gas will be produced.[188] The Texas Conservation Committee for Unitization has estimated that "[b]y unitizing these fields and producing oil from wells that will yield the most oil, ultimate recovery can often be doubled or tripled."[189] In one Florida field, projections indicated that "without unitization only seventeen per cent of the oil in place (120 million barrels) would be recovered, while under a unitized operation ultimate recovery will almost triple to slightly less than fifty percent of the oil in place (approximately 337 million barrels)."[190]

Without unitization, however, relatively little enhanced recovery can profitably occur. An American Bar Association committee report found:

> It is only through unit operation that the logical and complete application of present technical knowledge of oil and gas conservation can be accomplished. It is only through unit operation of a common source of supply that individual property rights can be fully protected. It is only through unit operation that the maximum recovery can be achieved and

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185. WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 199 (1967).

186. TEXAS MID-CONTINENT OIL & GAS ASSOCIATION, *Fieldwide Unitization: Vital to the Future of Texas* 11 (1973). Describing the benefits of pooling individual operator information on "geologic conditions, reservoir thickness, continuity, permeability, porosity and texture, water, oil and gas content throughout the reservoir, subsurface pressures, and well produceability". *Id.*

187. *Id.*; *see also* 2 ERNEST E. SMITH & JAQUELINE L. WEAVER, TEXAS LAW OF OIL AND GAS § 8.2(D) (3d ed. 1990).

188. *See* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 844 (secondary recovery methods and fieldwide unitization can increase production to over one hundred percent).

189. *Texas Conservation Committee for Unitization*, MORE OIL FOR TEXAS (1973) at 1.

190. Robert L.Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis?*, 27 U. FLA. L. REV. 196, 206 (1974).

the maximum rate of daily production maintained.[191]

A treatise on oil and gas law stressed that only a "limited and inefficient water flood program may be carried on without unitization" and "it is practically impossible to carry on an extensive gas injection project without unitization."[192] Indeed, at the present time only six percent of the nation's oil production comes from enhanced recovery methods.[193] Increased unitization is essential to the maximum efficient use of enhanced recovery procedures. Conducting a secondary recovery operation on a field without unitization may even make an operator liable to other rights owners overlying a reservoir.[194]

Unitization alone is insufficient to provide the tens of billions of barrels available from enhanced recovery procedures. These methods are expensive and their promise will depend upon oil price levels.[195] At any given price level, however, the efficiencies of unitization will permit considerably more enhanced recovery to occur and to profit operators. This in turn offers considerable societal benefits, including reduced levels of oil imports, ripple-out benefits to related industries, and increased government revenues.[196] In addition, the National Petroleum Council has suggested that "[d]evelopment of [enhanced oil recovery] provides more time for transition from oil and gas to alternate energy sources."[197]

D. *Regulatory Inefficiencies*

In the absence of unitization, the state of Texas has established a convoluted, Rube Goldberg-type machine for petroleum and natural gas conservation. The railroad commission has a variety of tools in its

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191. A.B.A. ASS'N COMM. OF THE SECTION OF MINERAL LAW, quoted in Myers.

192. RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION § 206 (6) (1st. ed. 1967). Myers explained further:

> The input and production wells must be located in accordance with the best engineering practice and the field operated as a whole. If not, the location of an input well on one tract would displace wet gas on a neighboring tract and an offset producing well would drain from the tract with resulting damages and litigation.

Id.

193. *See* NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 3 (1984).

194. *See* Amoco Prod. Co. v. Alexander, 622 S.W.2d 563, 568 (Tex. 1981) (lessors successfully sued lessee where injections produced drainage of oil from under lessors' property)

195. *See* NATIONAL PETROLEUM COUNCIL, ENHANCED OIL RECOVERY 66-71 (discussing the sensitivity of various methods to oil price).

196. *See id.* at 94.

197. *Id.*

possession for facilitating efficient conservation, but none of these tools addresses the root causes of the inefficiencies of the unregulated market. The commission may tinker with proration formulae and other controls to try to encourage efficient behavior, but these methods are imprecise and create their own sources of inefficiency.

Perhaps one of the greatest benefits of unitization is the extent to which it obviates the need for much of the regulatory structure currently used in oil and gas law. Some of the existing regulation may distort efficient operations, even as it seeks to encourage them. For example, regulators may limit the ratio of gas to oil produced from a well, in an attempt to preserve reservoir pressure and enhance ultimate recovery, or to prohibit the flaring of gas in the absence of secondary recovery operations. Yet when regulators seek to force secondary recovery, they may actually increase economic inefficiency by forcing distorted production patterns.[198] Through the marketplace, individual operators can choose those secondary recovery operations that are economically efficient and, with unitization, the operators can choose those that are also for society.

In addition, regulation inevitably involves costs to the government and the public. Under current laws, "the dockets of the regulatory authorities are filled with hundreds of cases, many of which are litigated in the courts, and the costs are eventually paid by the public."[199] The regulation of oil-gas ratios alone "imposes significant testing and administrative costs on operators and on the commission because of the large number of existing wells."[200] Unitization, by invoking private interest for overall societal benefit, can avoid the need for so much regulatory attention to oil and gas production from individual fields. For example, "[u]nitization obviates the necessity for a regulatory authority to restrict the rate of output from a reservoir and to allocate the reservoir allowable among operators, thus in another

198. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 204 (1971). McDonald observes that "regulation as practiced regarding associated gas may at best reduce the wastes of free competitive extraction without eliminating them altogether (as with volumetrically equal withdrawal of gas and oil), and at worst actually create wastes that are greater than those averted (as with forced uneconomical reinjection." *Id.*

199. RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION 208 (1st ed. 1967).

200. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 331 (1986).

way saving administrative and compliance costs."[201]

V. THE STATUS OF UNITIZATION IN TEXAS

Notwithstanding the considerable economic, psychological, and legal obstacles to unitization in Texas, considerable unitization of oil fields has somehow occurred. While precise data is unavailable, thousands of fields have been unitized, and it appears that at least forty-eight percent of Texas oil production comes from unitized operations.[202] As a consequence the "percentage of oil produced from secondary recovery operations in Texas has steadily increased from about 25 percent in 1960 to 53 percent in 1970, to about 60 percent in 1976 through 1979."[203] Unitization agreements have provided an additional seventeen billion barrels of recoverable oil.[204] Most large oil fields in the state have been unitized.[205]

This extent of unitization should not make one sanguine, however, about the present state of Texas law. Significant problems remain. First, the rate of new unitization has begun to decline.[206] Second, unitization has proved difficult in relatively smaller fields that could be profitably unitized.[207] Third, much of the unitization is only partial, rather than fieldwide,[208] and partial unitization "is not as efficient as fieldwide unitization in reducing drilling and operating costs, nor as productive in terms of increasing ultimate recovery."[209] Fourth, the unitization that has occurred has not been timely and has taken years to adopt.[210]

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201. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 208 (1971).

202. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 316 (1986).

203. *Id.* at 317.

204. *Id.*

205. Of the 207 largest oil fields in the state, 117 have unitized secondary recovery operations. *See id.* at 322.

206. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 322 (1986).

207. *See id.* at 324.

208. *See id.* at 319 (finding that out of all Texas oil production, merely 20 percent comes from fieldwide units). One single field is divided into 25 separate units. *Id.*

209. *Id.* Partial unitization also "brings with it additional administrative, legal, and operating costs to the unit, as well as an increased administrative burden on the commission to resolve conflicts between those inside and those outside the unit." *Id.* at 329.

210. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 318 (1986).

In addition, Texas unitization suffers from a more serious legal problem. The reason for the substantial number of unitization projects is that the railroad commission has adopted a form of quasi-compulsory unitization. The commission has employed those compulsory conservation powers that it does possess in order to pressure parties into "voluntary" unitization. Thus, the commission has proved "willing and able to arm-twist operators into cooperating through show-cause hearings, no-flare orders, reduced gas-oil ratios, and lower field MERs."[211] For example, the commission will offer an enhanced MER or an improved gas-oil ratio if parties agree to unitize a reservoir.

The railroad commission's unofficial "backdoor" pressure on private parties to unitize voluntarily represents a poor compromise. The commission's actions are legally questionable so long as the state legislature has rejected a compulsory unitization statute. Professor Weaver, a noted authority, has described the prevailing policy as "precariously perched" and "legally tenuous."[212] Whatever the efficiency benefits of unitization, democratic values demand that it be conducted honestly and openly and subject to constitutional checks and balances.

In addition, the commission's quasi-compulsory unitization is a very inefficient, awkward method for providing the benefits of unitized operations. The unofficial and unsystematic manner of quasi-compulsory unitization introduces new costs and delays. Such actions tend to produce "less-efficient and less-productive partial unitization" and still yield the "expense and delay of negotiating voluntary agreements."[213] The commission's "arm-twisting" produced a unitization agreement for the Bryan (Woodbine) field, but only after years of excessive drilling and waste of ultimate recovery.[214] Moreover, the unofficial forcing of unitization will yield a less than equitable distribution of benefits among rights owners.[215] Finally, the commission's ability to pressure parties to unitize may decline as its various regulatory tools offer less power over operators in the

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211. *Id.* at 336.

212. *Id.* at 341.

213. *Id.* at 323.

214. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 326 (1986).

215. *See id.* at 333.

future.[216]

VI. STRUCTURING A TEXAS COMPULSORY UNITIZATION STATUTE

Given the substantial benefits of unitization and the failure of existing legal structures to provide for sufficient unitization, the adoption of a compulsory unitization statute is the only logical action. Merely adopting a statute labelled "compulsory unitization," however, will no more guarantee necessary unitization than did the War on Poverty eliminate poverty. This section addresses the principles that should be incorporated into an effective compulsory unitization statute.

A. *The Importance of Properly Structured Statutory Authority*

Experience in other states reveals the potential inadequacies of theoretically compulsory unitization statutes. Oklahoma has had a compulsory unitization statute since 1945, but Texas has a higher percentage of unitized reservoirs and more secondary recovery operations than does Oklahoma.[217] Mississippi has a compulsory unitization statute but it "has been singularly unsuccessful, as evidenced by the fact that it was utilized only once between 1964 and 1972."[218] Florida has had a compulsory unitization statute since 1945, but due to lack of enforcement only two oil fields in Florida have been unitized.[219]

The relative failure of many compulsory unitization statutes can be traced to their language. Many such laws place procedural roadblocks on the path to unitization and fail to provide for the full range of benefits offered by unitized operation. Most compulsory unitiza-

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216. *See id.* at 347.

> The problem is, however, that the commission's bag of tools is no longer as useful as it once was. With most fields at 100% MERs, the commission cannot promise increased "carrots" to operators as a reward for unitization without injuring the field. Discovery allowables, capacity allowables for water flooding, and increases in a field's MER no longer can function as incentives to channel private investment decisions into desirable types of activity.

Id.

217. *See id.* at 316.

218. *See* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 843 (1986) (summarizing the rule of capture).

219. *See* Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis*, 27 U. FLA. L. REV. 196, 206 (1974).

tion statutes suffer from a fundamental conceptual flaw. These statutes provide for unitization to preserve ultimate recovery or to conduct secondary recovery but do not enable other efficient uses of unitization, such as for reduced drilling costs.[220] Such "[u]nnecessary restriction of the legitimate purposes of unitization unnecessarily limits the growth of unitization and consequent benefits."[221]

Compulsory unitization statutes in most states also contain a variety of substantive and procedural prerequisites to unitization that unduly delay unitized operations or preclude them altogether. In many states, unitization can be compelled only after a majority of rights owners petition for such action. Indeed, some states require approval by seventy-five percent, or more, of the owners overlying a reservoir.[222] While obtaining seventy-five percent approval to petition for compulsory unitization is more simple than obtaining the one hundred percent approval that may be necessary for voluntary unitization, uncooperative landowners still have the power to stall the compulsory process.[223] A recent review of state compulsory unitization laws has found that obtaining consent is impeded by "logistical problems of identifying the parties who need to consent and then physically obtaining that consent."[224] Risk averse parties may also decline the consent required in compulsory unitization statutes.[225] Determining the existence of the required approval percentage may

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220. *See*, JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 338 (1986) (noting that few states authorize forming of exploratory units to save drilling expenses"). Unitization states "anticipate only one type of benefit: increased ultimate recovery" and do not consider such benefits as "saving of well and equipment expense, optimizing the time-distribution of recovery, facilitating waste disposal, obviating the necessity for certain detailed regulations." STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 226 (1971).

221. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 226 (1971).

222. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 338 (1986).

223. John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843, 843 (1986). "While it certainly is easier to obtain consent of between sixty and eighty percent of the parties involved than it is to obtain 100% consent, there are still many difficulties involved in obtaining consent"); Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis*, 27 U. FLA. L. REV. 196, 202 (1974) "Experience has proved that the complexity of such an agreement ensures that unanimity, and in many cases, mere substantial agreement, will not result".

224. *See* John C. LaMaster, *Consent Requirements in Compulsory Fieldwide Unitization*, 46 LA. L. REV. 843 (1986) (summarizing the rule of capture).

225. *See id.* at 867.

itself be confounded by different methods of measuring ownership percentages, title disputes, encumbrances, and other features.[226]

In addition to requiring majority consent for unitization, most statutes also require a showing that unitization would produce a substantially increased recovery, or proof of the exact amount of efficiency benefits from unitization, or proof of that unitization is cost beneficial.[227] Burdens of proof are placed upon the proponents of compelled unitization. Because of all these requirements, the "unitization process in states with compulsory laws often is marked by long delays and still results in less-than-fieldwide units."[228] Some state commissions lack any authority to initiate compulsory unitization processes and placing the "burden of initiative and persuasion on private operators" involves time and expense that "at best delays and at worst prohibits desirable unitization projects."[229] In a major Florida field, a small minority (three percent of working interest owners and sixteen percent of royalty owners' interests) blocked unitization for so long that they "placed the recovery of nearly 200 million barrels of oil in danger because of decreasing reservoir pressures."[230]

In short, many compulsory unitization laws provide for little actual unitization. The best of the current state laws appears to be that of Louisiana, which can serve as a point of departure in our search for the optimal compulsory unitization legislation.[231] In 1940, Louisiana enacted a law permitting the state commissioner to compel unitization for secondary recovery.[232] This law contained no minimum consent requirement for compulsory unitization. In 1960, Louisiana expanded upon the law to provide for compulsory unitization for primary recovery, though this amendment contained a seventy-five percent consent requirement.[233] The Louisiana law has only a partial

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226. *See id.* at 851-62.

227. *See generally id.* at 847-49 (summarizing the requirements of most compulsory unitization statutes).

228. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 338 (1986).

229. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 226 (1971).

230. Robert L. Mellen III, Note, *Compulsory Unitization in Florida: A New Emphasis in the Energy Crisis?*, 27 U. FLA. L. REV. 196, 209 (1974).

231. *See* WALLACE F. LOVEJOY & PAUL T. HOMAN, ECONOMIC ASPECTS OF OIL CONSERVATION REGULATION 272 (1967) (citing Louisiana as state most favorable to unitization).

232. LA. REV. STAT. ANN. § 30:5(B) (West 1989).

233. LA. REV. STAT. ANN. § 30:5(C) (West 1989).

consent requirement and is unique among states in permitting unitization for prevention of economic waste from excessive drilling, in addition to physical waste from loss of pressurization.[234]

The theoretical superiority of the Louisiana compulsory unitization law has produced effective results in practical application as well. In 1982, sixty-four percent of Louisiana's production of oil came from unitized fields, as opposed to approximately forty-eight percent of Texas oil production.[235] Louisiana's oil wells are, on average, one third more productive than those of Texas.[236] A substantial percentage (sixty-seven percent) of Louisiana's oil fields are unitized early, for primary recovery.[237] Following the passage of the 1940 compulsory unitization law, Louisiana's total crude oil production increased far more rapidly than in any other major producing state.[238] Following passage of the 1960 compulsory unitization amendments, Louisiana's production again increased far faster than in other states.[239] Prior to the 1960 amendments, only four secondary recovery operations existed in Louisiana, "but once the bill became effective activity increased rapidly to over 100 injection projects per year."[240]

1. No Prerequisite Showings for Unitization

Because the present Texas system contains a presumption against unitization, most unitization statutes require a set of prerequisite showings by a party before unitization can be compelled. These statutes generally require a regulatory finding that unitization is "reasonably necessary" to achieve some legitimate statutory purpose, that the planned operation is "feasible," that unitization "will result in additional production exceeding in value the estimated additional cost of

234. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 226 (1971).

235. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 315-16 (1986).

236. *Id.* at 316.

237. *Id.* at 318.

238. *See* 1988 Energy Statistics Sourcebook at 79 (from 1940-1949, Louisiana production increased over 85%, Texas and California production increased by approximately 50%, Oklahoma production declined by 3%).

239. *See id.* at 81 (from 1960-1969, Louisiana production increased by 110%, Texas production increased by about 20%, Oklahoma production increased by nearly 15%, and California production increased by almost 25%).

240. Granville Dutton, *A Summary on Unitization in Various States*, THE LANDMAN, June 1985, at 45.

unitization," and that the operation is "for the common good and is fair and equitable."[241] Even the Interstate Oil Compact Commission model statute retains two of these findings.[242] While such showings are usually possible, they inevitably require costly legal work, expert witnesses, time, and other resources.[243] Although unitization hearings are often rather brief, this is primarily because "the unit proponents have spent many months, and often many years, securing near-unanimity."[244]

Most of the showings required by the existing unitization statutes are either unjustified or obviously unnecessary. The free market can take care of most concerns. Parties involved in unitization have no incentive to undertake projects, such as secondary recovery, that are not "reasonably necessary" or that are not "feasible." Nor would such parties undertake operations that are not cost beneficial. The free market is surely a better long-run judge of reasonable necessity and feasibility than is a government commission. In addition, as previously discussed, the unitized operations will ordinarily be more efficient and productive than non-unitized operations. Rather than requiring such showings before unitization, the law should require special showings for non-unitized production.

There remains a legitimate fairness concern. The free market cannot be counted upon to ensure that a unitization plan is equitable. Yet even superficial fairness should not be a prerequisite to unitization. First, unitization inherently allows greater fairness than nonunitization, which permits structurally advantaged parties to take the oil of their neighbors. Second, even if a unitization plan is structured unfairly, this inequity can be corrected retroactively at a later date. The existence of unitized efficiencies should not await the ideal plan, for even greater and less remediable unfairness will result during that wait.

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241. 6 H. WILLIAMS & C. MEYERS, OIL AND GAS LAW § 111 (1989).

242. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 17-18 (1986).

243. Presenting a unitization proposal typically requires at least the detailed testimony of a geologist, a petroleum engineer, a landman or an attorney, as well as the attendant prepared materials and legal filings. *See* 1 RAYMOND M. MYERS, THE LAW OF POOLING AND UNITIZATION 242-47 (2d ed. 1967) (discussing the Oklahoma statute).

244. JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 329 (1986).

2. Promote Early Unitization

An effective compulsory unitization statute should be structured so as to encourage unitization as early in a reservoir's productive life as possible. Unitization traditionally has been perceived as useful primarily for secondary recovery operations. Yet the earlier the implementation of unitization, the less waste in drilling costs, the less reduction of ultimate production, and the greater protection of correlative rights results.[245] Early unitization also can enable optimum production rates from an early stage in the reservoir.[246]

Early unitization requires that the commission be authorized to initiate unitization even in the absence of an application from the parties. Soon after notification of any new discovery, the commission should prepare unitization. Professor McDonald has suggested that "[s]tatutes and regulations should go beyond mere encouragement and facilitation; they should require unitization of every oil reservoir within a reasonable time following discovery."[247] Louisiana provides this authority in some circumstances.[248] Unitization must await some definition of reservoir size, but this need not be done precisely. Again, any errors in the original assignment of reservoir scope can be corrected in some subsequent damages hearing.

3. Require Fieldwide Unitization

The essential benefit from unitization requires that an entire reservoir be operated cooperatively. At the present time, much unitization in Texas is less than fieldwide, which loses much of the efficiency benefit of the procedure.[249] Other state's statutes also provide for less than full unitization.[250] Less than fieldwide unitization produces "additional administrative, legal, and operating costs to the unit as well as an increased administrative burden on the commission to resolve

245. *See* 6 H. WILLIAMS & C. MEYERS, OIL AND GAS LAW § 438 (1989).

246. *See* STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 205-06 (1971).

247. Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305 (1973).

248. LA. REV. STAT. ANN. §§ 30:128, 129 (West 1989).

249. *See* JACQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 319 (1986).

250. *See* 6 H. WILLIAMS & C. MEYERS, OIL AND GAS LAW § 122.4-122.5 (1989).

conflicts between those inside and those outside the unit."[251] While partial unitization is preferable to none, there remains an inefficient production incentive between those within and those outside the unit. Partial unitization also may injure correlative rights.[252] Nor is there any rational economic basis for less than fieldwide unitization. Commission-compelled unitization as soon as the scope of the reservoir is defined should force fieldwide units. Elimination of the consent requirement will go far toward eliminating the source of partial unitizations.

4. Release from Production Regulations

Another important component of a compulsory unitization law would be to release the participants from most other state production restrictions, including well spacing rules, production ratios and MER limits. Implementation of these regulations costs government and private resources and introduces some inefficiencies into efficient market production. With unitization, the restrictions become unnecessary, because the producing unit no longer has an economic incentive to over-produce. Unitization is a solution to the rule of capture, and "private pursuit of profit under unitization *substitutes* for regulation in all respects except that pertaining to external damages."[253] Elimination of these other regulatory inhibitions should also help encourage participation in unitization.

VII. CONCLUSION

Compulsory unitization has been vigorously resisted by various sectors of the oil production industry. This resistance has been particularly pronounced in Texas. The basis for much of this resistance appears to be a sense that compelled unitization is a "socialistic" intrusion upon free enterprise. This is ironic because compulsory unitization is the sort of government action that actually enhances free market efficiency and is far more efficient and market-oriented than the set of production regulations imposed upon the oil business to

251. JAQUELINE L. WEAVER, UNITIZATION OF OIL AND GAS FIELDS IN TEXAS 329 (1986).

252. *See* Maurice H. Merrill, *Implied Covenants, Conservation and Unitization*, 2 OKLA. L. REV. 469, 480 (1949) (suggesting that a unit should contain "all land overlying the common reservoir" and that this may be required by state constitutions on fairness grounds).

253. STEPHEN L. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES: AN ECONOMIC ANALYSIS 226 (1971).

prevent waste. While unitization forces cooperation among producers, it permits those groups of producers greater freedom in exploration and production decisions.

Compulsory unitization is a rare example of a government action that will enhance both efficiency and equity. In so doing, unitization offers considerable societal benefits as well. Professor McDonald summarized these advantages, writing:

> [Compulsory unitization] would harness the ingenuity, enterprise, and energy of profit-motivated businessmen in the interest of society as a whole, and would permit the flexible adjustment of current vs. future recovery under changing circumstances. Second, by holding out to explorers the prospect of being able to develop and produce new discoveries on the most economical terms, it would encourage exploration and contribute to solving the problem, now referred to as the "energy crisis," of equating supplies of oil and gas with growing demand in the years ahead. Third, it would result in true protection of correlative rights. And fourth, it would allow us to dispense with all of the elaborate and expensive machinery of present detailed regulation except that necessary to restrain drilling and production in the preunitization period of information-gathering and to protect the environment from drilling and producing activities.[254]

Society has foregone many of these benefits for decades. As recoverable oil and gas supplies dwindle, however, the benefits of unitization become more vital for the welfare of the nation and of the state. Adoption of a strong and effective compulsory unitization statute is increasingly essential.

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254. Stephen L. McDonald, *Unit Operation of Oil Reservoirs as an Instrument of Conservation*, 49 NOTRE DAME LAW. 305, 312 (1973).