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REASONABLE GROUND WATER PUMPING LEVELS

UNDER THE APPROPRIATION DOCTRINE:

LAW, POLICY AND ALTERNATIVES

by

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ABSTRACT

This report investigates what factors should be considered in the setting of reasonable pumping levels in appropriation doctrine states. The introduction covers some elements of groundwater hydrology and describes other groundwater management tools that also affect pumping levels in appropriation doctrine states. The various reasonable pumping level statutes are compared and contrasted. The economic development policy of the appropriation doctrine is examined from a historical perspective, and the possible contribution of modern cost-benefit analysis to the setting of pumping levels is assessed. The need to integrate non-economic or social goals as well is investigated. Finally, several alternatives to the reasonable pumping level approach are evaluated.

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The extent to which well owners should be protected against declining water levels is an enduring issue of ground water law.¹ The nature and treatment of the problem have been shaped over the years by the legal doctrine that a jurisdiction applies to ground water.² In appropriation doctrine states the problem was first prominent as a controversy about whether the principle that priority in time gives priority in right would protect senior appropriators against interference with their historic diversion systems by later wells.³ In most such states, it is now settled that seniors will be protected only in the maintenance of reasonable ground water pumping levels.⁴ Little concrete implementation of the reasonable pumping level concept has occurred, though. A National Water Commission report concluded: "No definitive guidelines exist as to what the measure of reasonableness is or how it will be applied."⁵ Commentary upon the concept has ranged from strong support⁶ to harsh criticism.⁷ Thus, the currently important questions are how to implement the reason-

able pumping level concept and whether it is so defective that it should be scrapped for some other approach.

In 1970 ground water use expressed as a percentage of total water use in the western states ranged from a high of 62% in Arizona to a low of 2% in Montana.⁸ The heavier ground water use and more acute water level problems have tended to occur in nonappropriation doctrine states.⁹ In the future, however, pressure for more intensive ground water management is likely to mount throughout the West. Contributing factors should include: (1) rising water demands associated with population growth, mineral development, instream flow maintenance, and water-based recreation;¹⁰ (2) higher energy costs for ground water pumping;¹¹ and (3) an apparent trend against federal construction of new dams to augment surface water supplies.¹² More intensive management efforts are likely to begin within the framework of existing tools, including in most appropriation doctrine states the reasonable pumping level concept.

The primary objective of this article is to contribute to the need for analysis of the measure of reasonableness.¹³ The introduction describes some hydrologic aspects of the pumping level issue, related ground water management tools, and the diverse factual situations in which pumping level problems can arise.

Key provisions of various reasonable pumping level statutes are then examined. Policies underlying the statutes are analyzed both in historical context and in light of modern resource allocation theory. The article closes with a brief examination of some alternatives to the reasonable pumping level concept, followed by some thoughts on implementing the concept.

I. INTRODUCTION

A. Hydrologic Aspects of the Problem¹⁴

An acquaintance with basic physical aspects of ground water occurrence and withdrawal is needed to understand pumping level problems. Thus, some elements of ground water hydrology and well hydraulics are set forth below.¹⁵

1. Aquifer Structure

Underground formations that will yield ground water in significant quantities are called aquifers.¹⁶ Aquifers are either confined or unconfined. In an unconfined aquifer the water is held merely under atmospheric pressure; in a confined (or artesian) aquifer the water is under greater pressure because an overlying impermeable formation restrains its movement. Water will stand in a well in an unconfined aquifer at

a level corresponding approximately with the upper surface of the part of the ground that is saturated with water.¹⁷ This level is called the water table. Water will rise in a well in a confined aquifer to the level of an imaginary surface called the piezometric surface. This level is a function of the amount of artesian pressure under which the water is confined. If the pressure is great enough, a flowing well results.

2. Operation of Wells

Withdrawing water from a well causes the water table or pressure surface to drop. In an unconfined aquifer, the water table around the well is drawn down in the shape of an inverted cone called a cone of depression. If the capacity of the pump is too great for the depth of its intake and the permeability of the surrounding rock, the tip of the cone is pulled down so far that the well sucks air. In a confined aquifer, the imaginary pressure surface around the well is drawn down in the shape of an inverted cone called a cone of pressure relief. As the pressure surface falls below the overlying impermeable formation, a confined aquifer becomes unconfined.

Cones of depression and pressure relief are relatively localized phenomena. They are not necessarily permanent conditions either. If a well is shut off,

the water table or the pressure surface may soon return nearly to its original level around the well.

General water table or pressure surface decline can occur if total discharge from the basin exceeds total recharge. Total discharge includes not only withdrawals from wells but natural discharge through springs, flow into streams, evaporation and transpiration. An excess of discharge over recharge might be seasonal, with decline during the irrigation season and recovery later, or cyclical, with decline in dry years and recovery in wet years. Perennial withdrawals in excess of recharge will, of course, result in permanent decline -- often called mining.¹⁸

Interference with an appropriator's means of diversion may be a localized matter involving only a couple wells with overlapping cones of depression or pressure relief. Instead, the interference may involve hundreds of wells and widespread overdraft of an entire basin or large subarea of it.¹⁹ Numerous cases may, of course, fall anywhere between these two extremes.

B. Related Ground Water Management Tools

Reasonable pumping level regulation is not the only mechanism available in appropriation doctrine states to cope with declining ground water levels. Two related tools are discussed below.

1. Well Spacing

Some states also have well spacing statutes.²⁰ Well spacing can prevent pumping level problems due to overlapping cones of depression or pressure relief. Even in this situation, however, a well spacing statute will not necessarily supplant the reasonable pumping level concept. For example, a Wyoming statute gives the state engineer power to regulate "the spacing, distribution and location of wells in critical areas."²¹ To develop spacing regulations, the state engineer would seem to need the guidance of some substantive standard outside the quoted statutory formula. Colorado requires at least 600 feet between wells outside designated ground water areas, unless the circumstances in a particular case warrant an exception.²² Again, the state engineer needs some substantive standard to pass on requests for exceptions. South Dakota requires artesian and shallow wells to be located "in order that the flow of the wells may be properly equalized and least likely to interfere with each other."²³ This statute, too, leaves room for judgment. The underlying substantive standard in all these cases might appropriately be keyed to the state's concept of a reasonable pumping level.

2. Regulation of Mining

The reasonable pumping level statutes could apply to water level decline associated with widespread long-term overdraft. A number of appropriation doctrine states with such statutes also have legislation or case law aimed more specifically at general overdraft, however.²⁴ The two basic approaches are to allow controlled mining and to prohibit mining. Either way, the question arises of whether any role is left for the reasonable pumping level statutes.

The New Mexico case of Mathers v. Texaco, Inc.²⁵ illustrates controlled mining. The court held that a state statute protecting existing water rights against impairment from new wells did not prevent mining two-thirds of the water in a nonrechargeable basin over a 40 year period. Although some of the remaining water could still be economically withdrawn for domestic use and perhaps a few other uses, projections indicated the infeasibility of withdrawing such water for agriculture or most other uses.²⁶ The mining schedule in Mathers appears premised upon a notion of pumping lift protection for existing wells that was considered reasonable in view of the nonrechargeable character of the basin. The lack of recharge required continuing water level decline and a fixed life for most wells if the resource was to be put to maximum beneficial use. The court's notion of reasonable protection was not fundamentally

different from what is embodied in explicit reasonable pumping level statutes found in other states. Thus, much of the discussion to follow of factors bearing on the measure of reasonableness under the pumping level statutes should also apply to controlled mining in situations like Mathers.

Turning now to the prohibition of mining, statutes in some states limit ground water withdrawals to safe sustaining yield,²⁷ the anticipated average rate of future recharge²⁸ or average annual replenishment of supply.²⁹ Most if not all of these statutes could be construed either to prohibit mining absolutely or to impose a flexible prohibition. Under the flexible approach mining would be allowed for a time, after which annual withdrawals would then be curtailed to bring total discharge into equilibrium with recharge. This would make sense if the best use of some storage is withdrawal and consumption on the surface but further depletion of storage would increase pumping and other costs beyond expected benefits. Another possible justification would be that mining the top part of storage may thereafter increase the sustained annual yield of a basin by increasing recharge or decreasing natural discharge.³⁰

The present question is whether such statutes leave any role for the reasonable ground water pumping level concept, outside of localized well interference

cases. In theory, an absolute prohibition of mining would not. Water level decline due to general overdraft would be taken care of by a rule of no overdraft. As a practical matter, however, proof of mining may entail an expensive and uncertain contest between expert witnesses regarding total recharge and discharge.³¹ A senior appropriator seeking pumping level protection might well find a less expensive, speedier, and more certain remedy under a reasonable pumping level theory. Especially is this true if the pumping level statute has been implemented by detailed administrative regulations and if ground water aquifer modeling has not yet produced uncontrovertible data regarding mining, i.e., long run total recharge and discharge figures for the particular area. If a flexible prohibition of mining were adopted instead of an absolute prohibition, it would then be necessary to determine how much depletion to allow before the ban on mining becomes operative. This determination ought to be influenced at least in part by what a reasonable pumping level is thought to be. Thus, the reasonable pumping level concept may be significant under both an absolute and a flexible prohibition of mining.

C. Social and Economic Variables

The fact settings in which the reasonable ground water pumping level statutes must operate are diverse.

The senior appropriator, who might benefit from pumping level protection, could be a small domestic user. One example would be a family farmer who receives irrigation water from an irrigation district, but because of the poor quality of that water has a small domestic well. Another would be a widow with six children who has a few acres on the outskirts of town where she pastures a milk cow and grows vegetables to feed her family, with water to irrigate the pasture and garden and supply household needs coming from a shallow well. Instead of a domestic user, the senior appropriator might be an agricultural, municipal, industrial, recreational, or other type user of varying size and economic capability.

The junior appropriator, who might oppose pumping level protection for the senior, could be either a single small user whose well is simply too close or a large operator using the water for anything from municipal needs to energy production. Instead of a single junior appropriator, a number of junior wells in the aggregate may cause or threaten water level decline.

In an extreme case, a senior appropriator might be unable to afford additional ground water extraction costs and be facing cessation of water use if not loss of occupancy of the land. Perhaps at the other extreme, junior and senior well owners might operate competing profitable businesses and be fighting over comparative economic advantage in production costs.

Which, if any, of these social and economic factors should be taken into account in setting reasonable ground water pumping levels and how should they be weighed? A logical starting point in the search for answers is an analysis of the language of the present pumping level statutes.

II. EXISTING STATUTES

A. States with the Reasonable Pumping Level Approach

The appropriation doctrine governs both underground streams and percolating ground water in Alaska, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.³² All but New Mexico and Utah have some variety of reasonable pumping level statute.³³

Even New Mexico and Utah probably could employ the reasonable pumping level concept, if desired, without new legislation specifically authorizing it. A New Mexico statute prohibits the impairment of existing water rights within basins declared by the state engineer to have reasonably ascertainable boundaries.³⁴ Although this statute has been construed to allow controlled mining in a nonrechargeable basin,³⁵ it could equally well function as a reasonable pumping level statute in an appropriate case.³⁶ Traditionally,

Utah has protected a senior appropriator's means of diversion without regard to its reasonableness,³⁷ but the Utah court may now be moving toward of a reasonable means of diversion approach.³⁸

B. Artesian Pressure

Some of the reasonable pumping level statutes are silent about artesian pressure.³⁹ This should not necessarily foreclose legal protection of diversion systems using a combination of artesian pressure and pumping to lift ground water to the surface. A couple of those statutes are phrased to protect only reasonable pumping levels, however;⁴⁰ and arguably they imply that a means of diversion consisting wholly of artesian pressure, i.e., a flowing artesian well, is per se unreasonable.⁴¹

Other statutes do expressly mention artesian pressure.⁴² They stop short of guaranteeing that the owners of flowing wells will never have to install pumps, however.⁴³ The best that can be said for flowing artesian wells, under the most favorable of the statutes, is that in unique circumstances such a means of diversion might qualify as reasonable.⁴⁴ In the main, however, the statutes seem to contemplate the use of pumps, either exclusively or in conjunction with artesian pressure.

C. Water Level and Pumping Lift

Some of the statutes refer to water level in the ground,⁴⁵ while others focus more upon pumping lift to the surface.⁴⁶ For example, a Kansas statute authorizes "a reasonable . . . lowering of the static water level,"⁴⁷ while a Washington statute is worded to protect "a reasonable or feasible pumping lift."⁴⁸ Any thought that the Washington language might indicate more concern about the economics of lifting water to the surface is dispelled, however, by the further direction in the Kansas statute that the state engineer must consider the economics of pumping ground water for the uses involved when he determines reasonable static water levels. Furthermore, even though the Washington statute speaks of pump lift rather than static water level, administrative regulations issued for at least one ground water management subarea in Washington are worded in terms of static water level.⁴⁹

The water level approach may be less complex, or at any rate less ambiguous, than the pumping lift approach in one respect. In determining the pumping lift of an existing well, what are the beginning and ending points of the measurement? Should the beginning point be affected by whether a well is located on a hill in a valley? What if the well is situated below the high point of land to be irrigated and additional surface pumping is needed to get the water to part of

the land? How far down should the measurement go -- to the static water table, to the bottom of the cone of depression, or to some other point? If the measurement includes the drawdown caused by operation of a pump, decision would be required about permissible well efficiency because the drawdown of a well is in part a function of its efficiency. Also localized differences in transmissibility within an aquifer can produce significant variations in drawdown. To what extent should that be taken into account? In contrast, a statute worded in terms of water level, especially static water level, may more readily invite simpler calculation based on a ground water level unaffected by recent pumping.⁵⁰

D. Modification of Protected Pumping Levels

The reasonable pumping level statutes tend to be silent about modification of levels over time. The Idaho court has said in dictum, though, that the state pumping level legislation implicitly contemplates modification to conform to changing circumstances.⁵¹ The court's position seems sensible and may become a standard approach.

Coping with change in the pumping level context has a parallel in existing nonconforming uses under zoning law. In both cases the existing use, e.g., the uncommonly shallow well and the plumbing supply shop in a residential neighborhood, may be disharmonious if not

totally incompatible with the plan for the area. The zoning law technique of amortization allows an inappropriate land use to continue without change for a fixed period, such as five years, after which it must terminate and the use must thereafter conform to the zoning for the area.⁵² This gives the landowner time to recoup on his investment in existing facilities and to prepare for the change. The strongly prevailing modern view is that zoning amortization provisions are valid if reasonable.⁵³

The zoning amortization analogy has its limitations, however. First, so many variables affect the question of reasonableness⁵⁴ that predicting results in specific fact situations from prior case law is difficult. Second, appropriation doctrine states commonly allow a change in the point of diversion, place of use, or purpose of use of a water right only so far as other appropriators will not be injured.⁵⁵ Suppose that after the amortization period for a shallow well passes, its owner cannot afford to pump from the new, lower water level for the same use as before. In addition, assume that any economically feasible change in point of diversion, place of use, or purpose of use will injure nearby wells or that the cost of gathering data to prove no injury would be prohibitive. Though appropriation doctrine water rights are subject to police power regulation, they are generally regarded as proper-

ty that cannot be taken without just compensation.⁵⁶
Has a vested water right been taken by the pumping
level amortization?⁵⁷

A rough parallel in zoning law would be the phase out of a nonconforming building that cannot economically be moved or remodeled to conform. The zoning cases involving substantial structures -- rather than mere nonconforming use of unimproved land, outdoor advertising signs, junkyards, and the like -- generally have required a fairly long amortization period to withstand constitutional challenge.⁵⁸ Thus, if a water right at a shallow well cannot readily be changed in point of diversion, place of use, or purpose of use to enable continued exercise of it, a short amortization period may be constitutionally suspect.

A recent trial court decision from Montana took an approach akin to amortization, although no future period of use was involved. The court held a junior appropriator liable for causing increased pumping costs at two senior wells. The owner of a third senior well using what the court called a cement well pit was denied damages for the cost of a new well and pump, however, because that well was more than thirty years old and the "evidence indicates that wells of this type are depreciated out by this time."⁵⁹

E. Factors Bearing on Reasonableness

Perhaps the most striking common feature of the reasonable pumping level statutes is their lack of specific guidance regarding the measure of reasonableness. The little express statutory guidance available is analyzed below.

1. Economics

A number of the reasonable pumping level statutes mention economics.⁶⁰ The economic concerns fall into two categories: (1) protecting senior appropriators against water level decline beyond their economic capacity to continue to pump and (2) achieving overall economic development of the ground water resource. These concerns are likely to be important regardless of whether a particular pumping level statute mentions both, one, or neither them.

For example, the Alaska pumping level statute,⁶¹ which has been copied almost verbatim in Montana and North Dakota,⁶² permits the lowering of artesian pressure if prior appropriators can "reasonably" acquire their water under the changed conditions. Although the statute does not delineate factors bearing on reasonableness, commentary on it by its principal draftsman indicates an economic aspect to the standard: "'Unreasonable' changes in water conditions seem to be

those in which later appropriators with superior economic capacity such as power companies or cities impose costs 'beyond the economic reach' of smaller appropriators such as irrigators."⁶³ Another Alaska statute invites consideration of overall economic development by declaring a policy of managing water "to enhance . . . the overall economic . . . well-being" of Alaskans.⁶⁴ Even without this latter statute, the same policy may well be implicit in the appropriation doctrine in view of its historic function of promoting economic development.⁶⁵

The two kinds of economic concerns stated above were evident in a recent trial court decision from Montana. The judge decided that the defendant's junior well affected "some of the senior appropriators to the extent that it is not economical, practical or convenient for . . . [them to pay added ground water withdrawal costs] considering their historical means of appropriation."⁶⁶ In an accompanying opinion, the judge referred to a general Montana statute declaring a policy of encouraging the development and conservation of the waters of the state for the maximum benefit of its people.⁶⁷ Thus, he seemed concerned with both the economic capacity of individual senior appropriators and overall development of water.

The Colorado and Idaho pumping level statutes, in closely similar language, recognize potential tension

between protecting the diversion systems of senior appropriators and overall economic development of ground water.⁶⁸ The Idaho statute provides: "While the doctrine of 'first in time is first in right' is recognized, a reasonable exercise of this right shall not block full economic development of underground water resources, but early appropriators shall be protected in the maintenance of reasonable ground water pumping levels. . . ." Although this tension is not expressly recognized by statute in many states, it is often likely to be at the heart of pumping level issues regardless of the specific statutory structure in a given jurisdiction.

The tension cannot be resolved without determining how subjectively the economic limits of senior appropriators should be judged. The more subjectively the economic limit criterion is applied, the greater is the potential impediment to aggregate economic development of ground water. A common law appropriation doctrine case from Colorado illustrates the problem. In City of Colorado Springs v. Bender,⁶⁹ the plaintiffs irrigated about fifty acres of pasture and cultivated land under a senior ground water right. They sought to enjoin junior appropriators from lowering the water table below the intake of their pumping facilities. The state supreme court held that priority of appropriation does not give a right to an inefficient means of diver-

sion, and it remanded the case for determination of the level at which each junior appropriator must cease diverting water to meet the demands of a senior appropriator. It instructed the trial court that:

the conditions surrounding the diversion by the senior appropriator must be examined as to whether he has created a means of diversion from the aquifer which is reasonably adequate for the use to which he has historically put the water of his appropriation . . . [Senior appropriators] cannot be required to improve their extraction facilities beyond their economic reach, upon⁷⁰ consideration of all the factors involved.

The supreme court did not list the factors involved, but the plaintiffs' historical use of water seems to be one of them. Query, however, whether their historical use was irrigation or small scale irrigation? In other words, if economies of scale would enable a 400 acre irrigator to pump from a much greater depth than a fifty acre irrigator, is it relevant that the plaintiffs historically were fifty acre irrigators?

A few years after the Bender decision, Colorado enacted its present legislation calling for full economic development of designated ground water but also protecting senior appropriators against the lowering of water levels below reasonable economic limits of withdrawal.⁷¹ While the ground water in Bender probably would not have constituted designated ground water under the subsequent legislation, the parallel between the statutory concern with economic limits of withdrawal and the economic reach language of Bender is

obvious.⁷² Arguably, however, the legislation fore-closes as subjective a view of a senior appropriator's situation as the Bender language might allow.⁷³ The legislation states it shall not "be construed as entitling any prior designated ground water appropriator to the maintenance of the historic water level or any other level below which water still can be economically extracted when the total economic pattern of the particular designated ground water basin is considered."⁷⁴ If a fifty acre irrigator does not fit the total economic pattern of the basin, apparently his inherent economic limitations on depth of withdrawal due to the size of his operation should not count for much.⁷⁵ Kansas and Nevada have similar statutory provisions tending to preclude a highly subjective approach.⁷⁶

Variations in statutory language could affect the weight of the competing concerns of protecting early appropriators in their investments and overall development of ground water. As noted earlier, the Alaska pumping level statute focuses on assuring that senior appropriators will be able reasonably to continue to withdraw water, although Alaska also has a more general statutory policy of enhancing the overall economic well-being of Alaskans.⁷⁷ The Wyoming pumping level statute, in contrast, focuses on managing water levels to achieve "maximum beneficial use of the water in the source of supply."⁷⁸ While the phrase "maximum bene-

ficial use" may be somewhat flexible,⁷⁹ the traditional understanding of beneficial use⁸⁰ leaves doubt that the statutory language would include the pump lift benefits to senior appropriators from leaving more water in the ground. At any rate, the pumping level statute itself does not express concern about continued operation by senior appropriators with a shallow economic reach. Arguably such concern is implicit, to a degree at least, from the appropriation doctrine tradition of fostering economic development by affording security of investment in water facilities.⁸¹

In sum, the Alaska pumping level statute focuses upon reasonable protection for senior appropriators, with probably some interplay from a more general statutory declaration of a policy of overall economic development. The Wyoming pumping level statute focuses upon maximum beneficial use of ground water, with perhaps some interplay from the appropriation doctrine tradition of affording security of investment to early appropriators. Whether these variations in statutory pattern will in fact produce differing results in similar cases, though, remains to be seen.

Another factor may affect the tension between recognizing the economic limits of senior appropriators and overall economic development. Although the prior-

ity principle is fundamental to the appropriation doctrine,⁸² not all states with that doctrine are equally committed to it. To the extent that concern about the economic limits of senior appropriators derives from the notion that priority in time should give special right or status,⁸³ the weaker a state's commitment to the priority principle is in other aspects of ground water management, the less may be the expected protection of small senior appropriators in their diversion systems.

Wyoming, for example, seems to have a relatively weak commitment to the priority principle for ground water. One statute authorizes the state engineer to cope with insufficiency of supply in ground water control areas⁸⁴ through a system of rotation if "cessation or reduction of withdrawals by junior appropriators will not result in proportionate benefits to senior appropriators."⁸⁵ Depending upon the interpretation given "proportionate benefits," this statute could produce results differing significantly from strict adherence to the rule that priority in time gives priority in right.⁸⁶ Another statute declares that domestic and stock use wells "shall have a preferred right over rights for all other uses, regardless of their dates of priority, subject to the provisions of section [41-3-911]. . . ." ⁸⁷ Section 41-3-911 then provides in part:

Whenever a well withdrawing water for beneficial purposes shall interfere unreasonably with an adequate well developed solely for domestic or stock uses . . . the state engineer may, on the complaint of the operator of the stock or domestic well, order the interfering appropriator to cease or reduce withdrawals of ground water, unless such appropriator shall furnish at his own expense sufficient water at the former place of use to meet the need for domestic or stock use. In case of interference between two wells utilizing water for stock or domestic use . . . the appropriation with the earliest [sic] priority shall have the better right.

Returning to some of the fact situations mentioned earlier,⁸⁸ the family farmer and the widow with domestic wells should continue to receive water so long as each has "an adequate well," despite withdrawals by larger appropriators. If they fare well, however, it is not because of their priority in time, but because of the nature of their uses. A small irrigator with a senior ground water appropriation would seem not to fare as well.

A number of other states also have statutes that depart from the priority principle.⁸⁹ The most common departure is a preference for domestic or certain other uses.

In addition to departing from the priority principle, preferred status for some water uses may affect the tension between protecting early appropriators and overall economic development in another way. For example, Oregon empowers its water resources director to designate preferred uses in certain areas and to deny or limit permits for new wells that would cause "undue

interference" with existing wells.⁹⁰ Where domestic use has been designated for preferred status, arguably the economic reach of domestic users should be highly significant in deciding what constitutes undue interference in those areas.⁹¹ Nevada has a similar statutory scheme,⁹² but adds an apparently unique provision to minimize the impediment to further ground water development due to preferred status for domestic wells. The state engineer is authorized to prohibit new domestic wells in areas where water can be furnished by an entity such as a water district or a municipality.⁹³

2. Other Factors

The reasonable pumping level statutes contain few references to factors other than economics that should affect pumping levels. A few mention water quality,⁹⁴ but more generally applicable water quality statutes may require or at least authorize consideration of this factor anyway.⁹⁵ An occasional statute indicates that pumping level regulation should take into account the effect upon senior surface water rights.⁹⁶ Again, the same may arguably be compelled or authorized by more general law in some states regarding coordinated management of surface and ground water.⁹⁷ Finally, as already noted, some western water codes state preferences for domestic and other uses.

3. Summary

An administrative agency or a court undertaking to make decisions under a reasonable pumping level statute must know what factors to consider and how to weigh them. The existing pumping level statutes vary in the express guidance they give. A number of them refer to economic factors. Some declare a policy of full economic development; some express concern about the economic limitations of senior appropriators. A couple recognize potential conflict between the two types of economic concerns. Some states have water quality, water administration, or use preference statutes that might figure into pumping level decisions. Overall, however, the existing pumping level statutes are incomplete in listing factors, weighting them, or declaring policy with specificity. If other guidance is to be found, it must come from probing more deeply.

III. UNDERLYING GOALS

In an effort to fill gaps in express statutory directives, general goals implicit in the reasonable pumping level statutes and related features of appropriation doctrine law are explored below. Variations exist among the states, of course, and identifying a

particular theme in some states is no guarantee that the theme holds in yet another state. The purpose is to illuminate possible goals to facilitate asking the right questions in any particular jurisdiction.

Water or natural resource statutes in some states distinguish between economic and social goals in resource management.⁹⁸ That distinction is a useful organizing principle for the discussion below.

A. Economic Goals

1. A Historical Perspective

a. Preventing or Curtailing Overdevelopment

The western water law doctrine of prior appropriation began in the mid-nineteenth century as a means of allocating rights in surface streams.⁹⁹ Although it was soon applied to underground streams,¹⁰⁰ no strong movement to extend the doctrine to other ground water, called percolating water,¹⁰¹ emerged until the second quarter of the twentieth century.¹⁰² Before that, percolating water was governed by several systems, namely, the absolute ownership doctrine, the rule of reasonable use, and the correlative rights doctrine.¹⁰³

In many western states a major factor in the extension of the appropriation doctrine to percolating water was a desire to regulate overdevelopment of such water.¹⁰⁴ The principle that priority in time gives priority of right can prevent overdevelopment when

supplemented by a permit system under which new permits are denied once a desired level of development is reached. Where overdevelopment has already occurred, the priority principle can curtail it by forcing closure of wells in inverse order of priority until the desired reduction is reached.¹⁰⁵ Whether the objective is preventing overdevelopment or cutting back on it, however, some standard is needed to determine when overdevelopment occurs. Unless a senior appropriator is guaranteed not only the right to a given quantity of water but also his historic means of diverting it, the priority principle alone cannot define when overdevelopment occurs.

The protection of means of diversion issue has arisen on surface streams as well as with ground water,¹⁰⁶ but there drawing the line on development is often simply resolved by the physical impossibility of diverting more water than is flowing in a stream in a given year. Ground water aquifers, in contrast, typically contain large quantities of storage accumulated over many years. This storage feature eliminates the possibility of a simple physical limit on withdrawals in a given year.¹⁰⁷ The reasonable pumping level statutes make sense as a legislative effort to state a standard for ground water, albeit of uncertain contour, regarding the line between permissible development and overdevelopment¹⁰⁸ -- a standard which can then be implemented through the priority principle.