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### A [Very Brief] Primer on Groundwater Law

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**A [VERY BRIEF] PRIMER**

**ON**

**GROUNDWATER LAW**

**Lawrence J. MacDonnell  
Natural Resources Law Center  
University of Colorado School of Law**

**UNCOVERING THE HIDDEN RESOURCE: GROUNDWATER LAW,  
HYDROLOGY AND POLICY IN THE 1990s**

**Natural Resources Law Center  
University of Colorado School of Law  
January 15 - 17, 1992**

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## **A [Very Brief] Primer on Groundwater Law**

### **Summary:**

Groundwater accounts for 95 percent of the fresh water supply in the world (excluding glaciers). Half of the people in the U.S. rely on groundwater for domestic uses. Groundwater also supplies other important uses such as irrigation and industry. Though there are significant areas of localized contamination, the overall quality of groundwater appears to be very good.

In spite of its obvious importance the legal rules governing the allocation, use and protection of groundwater are relatively primitive. As its value increases, and as our understanding and knowledge about it improve, the rules also are improving. In particular we are learning to assess the effects of groundwater pumping--on other pumpers, related surface water flows, and other groundwater-dependent values. We also are learning to assess groundwater contamination and its effects. The "unknown and unknowable" resource is being uncovered.

While a few states cling to the absolute ownership regime first established by English courts in the early 1800s most have moved to some other approach. Perhaps most common in the East is the reasonable use rule. Many western states follow the appropriation approach for groundwater allocation. States are increasingly relying on special management areas to address groundwater use problems (and, to a lesser degree, quality problems).

Several federal statutes relate to protection of groundwater quality but this remains primarily a matter of state and local control. State programs have developed rapidly in the past decade but implementation experience to date is limited. Cleanup of existing contamination is proving to be expensive and difficult.

References:

Allocation

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Quality

Conservation Foundation, Groundwater Protection (1987).

Getches, "Groundwater Quality Protection: Setting a National Goal for Federal and State Programs," 65 Chicago-Kent L. Rev. 387 (1990).

MacDonnell and Guy, "Approaches to Groundwater Quality Protection in the Western United States," 27 Water Resources Research 259 (1991).

## I. Groundwater--Some Background

- A. Groundwater accounts for 95 percent of the world's fresh water supply (excluding glaciers). T. Henderson, S. Trauberman and T. Gallegher, Groundwater: Strategies for State Action 4 (1984).
1. In the U.S. the economically recoverable groundwater resource is estimated to be 17,250 trillion gallons. W. Viessman and C. Welty, Water Management: Technology and Institutions 17 (1985). This is roughly equivalent to the outflow of the Mississippi River over the last 100 years. U.S. Advisory Commission on Intergovernmental Relations, "Coordinating Water Resource in the Federal System: The Groundwater-Surface Water Connection," October 1991 at 24, fn. 3.
- B. Groundwater use in the U.S. is increasing, both in absolute amounts and in relation to surface water uses.
1. Total groundwater withdrawals in 1985 were 73 billion gallons per day, about 20 percent of all fresh water withdrawals. Solley, Merk, and Pierce, "Estimated Use of Water in the United States, 1985" (U.S. Geological Survey, 1988) (hereafter Estimated 1985 Use).
  2. While surface water withdrawals increased about 85 percent between 1950 and 1985, groundwater withdrawals increased 115 percent.
  3. Approximately 50 percent of the U.S. population relies on groundwater as a source of drinking water. U.S. Geological Survey, "National Water Summary 1983 - Hydrologic Events and Issues" (Water Supply Paper 2250, 1983). In 20 states more than 75 percent of the population relies on groundwater for drinking water. Most rural areas rely directly on potable groundwater for their drinking supplies.

4. Groundwater supplies 40 percent of the water used for irrigation. 1983 Water Summary. Groundwater is especially important for this purpose in the states of Arizona, Arkansas, California, Idaho, Kansas, Nebraska and Texas. These seven states account for two-thirds of all groundwater withdrawals in the U.S.
5. Groundwater also provides an important source of supply for industrial use. Nationwide, 15 percent of directly supplied industrial water uses come from groundwater. Estimated 1985 Use at 31.

### C. Groundwater Quality

1. In 1984 the Office of Technology Assessment concluded: "there is a growing consensus that the quality of groundwater is in decline." Protecting the Nation's Groundwater from Contamination at 21. At the time of its study (1983), however, it estimated that only one to two percent of the groundwater supply was contaminated.
2. A 1984 EPA report stated that water in 8,000 private, public, and industrial wells was considered unusable or degraded due to contamination. Ground-Water Protection Strategy at 16.
3. In 1988 the U.S. General Accounting Office reported that the quality of water in 92 percent of the wells sampled exceeded all federal drinking water standards. Groundwater Protection: The Use of Drinking Water Standards by the States at 1.
4. In 1990, EPA released results of a nationwide survey aimed at measuring the extent of pesticide and nitrate contamination in groundwater. Only one to two percent of urban and suburban wells and two to four percent of rural wells tested (1,300 wells nationwide) contained nitrate concentrations above that considered safe; however, nitrates were found in 52 percent of the urban and suburban wells and in 57 percent of rural wells. At least one pesticide was found in 10 percent of the urban and suburban wells and in four percent of the rural wells.
5. The available evidence suggests that groundwater contamination is not widespread. Of course, contamination may be very significant in particular locations.

## **II. Groundwater Allocation Law**

### **A. Overlying Landownership**

The predominant basis for establishing rights to use groundwater derives from ownership of overlying land. There are several approaches for defining the development rights of overlying landowners: absolute ownership, reasonable use, and correlative rights.

- 1. Absolute ownership**
  - a. The pumper may withdraw an unlimited quantity of groundwater.**
  - b. There is no liability for any adverse effects on others in the absence of malicious or negligent actions.**
  - c. There is no limitation on the manner in which the groundwater may be used, including the place of use of the water.**
- 2. Reasonable use**
  - a. The quantity of water withdrawn must be reasonably necessary for the use to which it is put.**
  - b. Otherwise there is no limitation on withdrawals and water may be drained from beneath adjacent land without liability.**
  - c. Transport of water for use in another location may be limited in some way.**
- 3. Correlative rights**
  - a. This is a rule of equitable sharing of the resource among overlying landowners within a groundwater basin or aquifer.**
  - b. Nonoverlying areas may be permitted to withdraw and transport water under some circumstances.**
  - c. Only California follows this rule.**

### **B. Appropriation**

- 1. Most western states use appropriation as the rule for allocating groundwater.**

2. Nevertheless, in many of these states groundwater permits are handled separate from appropriations for surface water.
3. As with surface water appropriations the permit specifies the rate of withdrawal, the well location, and the purpose and place of use.

#### C. Groundwater Management Areas

1. 27 states now provide for the creation of groundwater management areas. Bowman, "Groundwater Management Areas in the United States," J. of Water Resources Planning and Management, (1990)
2. Withdrawals of groundwater within these areas are subjected to special requirements, most commonly aimed at limiting the quantities of water that may be pumped and the number and location of wells.
3. In some cases management areas are now also being used to address water quality problems. Getches, MacDonnell & Rice, Controlling Water Use, pp 112-115 (Natural Resources Law Center, 1991).

#### D. Legally Distinctive Categories of Groundwater

1. Legal analysis of groundwater issues has been complicated by confusion in the nature of the resource.
2. The land ownership-based rules for groundwater regarded all "percolating" groundwater as the property of the land owner. No distinction is made for water in aquifers.
3. Separate rules may apply for groundwater found in "underground streams." Though relatively rare geologically, courts have found the existence of such underground streams in a surprisingly large number of cases.
4. Groundwater located within the boundaries of a special management area is subject to the legal rules established for that area.
5. Colorado distinguishes between "tributary" groundwater (water in the unconsolidated alluvial aquifer of sand, gravel, and other

sedimentary materials and all other water hydrologically connected thereto which can influence the rate or direction of movement of the water in that alluvial aquifer or natural stream), and "nontributary" groundwater (the withdrawal of which will not, within 100 years, deplete the flow of a natural stream at an annual rate greater than 1/10 of one percent of the annual rate of withdrawal).

### III. Groundwater Quality Law

- A. Federal law related to groundwater quality protection is piecemeal, aimed at particular problems rather than comprehensive protection of the resource.
1. The Safe Drinking Water Act addresses the quality of public drinking water supplies through the establishment of health-based "maximum contaminant levels." Groundwater used as public drinking water must meet these standards. This law also established a program subjecting the injection of contaminants into underground formations to a permit requirement.
  2. The Resource Conservation and Recovery Act protects groundwater by regulating the disposal of solid and hazardous wastes.
  3. The Comprehensive Environmental Response, Compensation, and Liability Act provides for the cleanup of already contaminated areas that may be harming groundwater quality.
- B. Congress has considered legislation to establish a federal groundwater quality protection program but support for such an approach has never been strong. The Environmental Protection Agency has concluded that states should take the lead in developing groundwater quality programs. Ground-water Protection Strategy (Aug. 1984).
- C. States have, in fact, made quite dramatic progress in developing and strengthening their planning, information gathering, and regulation programs related to groundwater quality in recent years. For a survey of developments in the western states see MacDonnell and Guy, "Approaches

to Groundwater Quality Protection in the Western United States," Water Resources Research (1991). Generally their programs classify groundwater according to its use and establish standards to protect that use (or uses). Activities potentially impairing these uses are subject to regulation. Special management areas are utilized in some states to deal with areas with particular water quality problems.

#### IV. Some Issues in Groundwater Management

##### A. Groundwater tables

1. The mining of groundwater (withdrawals in excess of recharge) is a widespread problem in the West. Declining groundwater levels require wells to be deepened, pumps to be lowered, and cause pumping costs to increase.
2. Lowering of near surface groundwater tables can affect wetlands, vegetation, and surface water flows.
3. Groundwater withdrawals can interfere with pumping from other wells.
4. Declining groundwater levels can cause land subsidence problems.
5. Artificial recharge of aquifers is becoming increasingly important.

##### B. Groundwater quality

1. Highly permeable, near surface aquifers are at substantial risk from inadequate management of a variety of hazardous and toxic substances.
2. Prevention of contamination is important because clean up of groundwater is expensive.
3. Groundwater pumping can itself create contamination problems as, for example, by salt water intrusion in coastal areas and by inducing migration of contaminants into other parts of an aquifer.

**C. Increased demand**

1. The primary demand for new consumptive water use is for urban water supply. Groundwater is often especially well suited for this use.
2. The growing interest in protecting surface flows for recreational, environmental, and aesthetic purposes further encourages use of groundwater.

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