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LEGAL DEVICES FOR ENHANCING WATER DIVERSION
OPPORTUNITIES WITHIN THE APPROPRIATION SYSTEM

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Moving the West's Water to New Uses:
Winners and Losers

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I. INTRODUCTION

Water availability is constrained in the western United States, particularly in areas of concentrated municipal and agricultural development. Developing additional water supplies for new uses requires increasing creativity in the reallocation of existing diversion entitlements to create legally reliable new supplies. Also, to maximize benefits of the conjunctive use of surface and ground waters and thereby create more reliable supplies, the use of ground water should be integrated into the legal framework governing appropriative water rights.

"Structural" solutions to meet new water demands, such as reservoir construction, are increasingly impeded by environmental regulations. Moreover, building water facilities often is a costly alternative to manipulating diversion entitlements to reallocate water supplies.

Several methods are legally recognized which facilitate the reallocation of existing appropriative rights to new uses through legally approved arrangements designed to protect the existing water rights regimen. The change of an appropriative water right to new uses is the most obvious method for reallocating supplies. Methods such as water exchanges, plans for augmentation, and reuse plans are also being implemented as additional ways to accomplish water reallocation. Finally, the importance of underground water storage has been recognized, and the concept is being implemented to enhance conjunctive use.

The methods discussed below are constrained by the appropriation doctrine's protection of water rights. Implementation of these methods raises difficult technical issues related to quantitative and qualitative effects on the water sources. Nevertheless, they can offer creative solutions to development of new supplies in a cost effective and environmentally sensitive manner.

11. PROBLEM CONTEXT: DEVELOPING ADDITIONAL WATER SUPPLIES CONSISTENT WITH PROTECTION OF EXISTING WATER RIGHTS, THE NATURAL ENVIRONMENT, AND FINANCIAL CONSTRAINTS

A. Inadequate Supplies to Meet Concentrations of Need

Estimates of future water requirements for areas such as Southern California, metropolitan Arizona, and the Colorado front range exceed the yield of existing supplies and implicate serious decisions about developing additional supplies and modifying water use practices. Water needs arise from human concentrations of municipal and industrial activity. Those concentrations are intensifying in the West, with the result that "local" water supplies are being fully tapped or committed and new supplies necessarily require movement of water from distant locations. For example, while 75 percent of California's precipitation occurs north of Sacramento, about 75 percent of California's water needs occur south of that city. Argent, Banking for the Future: Conjunctive Use of California's Surface and Ground Water, Western Water, March/April 1990, at 4.

Movement of water can be accomplished by adjusting water rights to concentrate diversion entitlements on supplies located closer to the demands. Alternatively, movement also may involve and require physical capture and transport of water by conveyance facilities to the concentrations of

demand. Diversion and storage of water affect the natural environment by both creating new environment and diminishing existing environment. Physical solutions generally are more costly and environmentally damaging than solutions which reallocate water by the adjustment of diversion entitlements.

B. Appropriation System as Developmental Constraint

1. Right as Protected Property. The appropriative water right is a property right. See, e.g., Comstock v. Olney Springs Drainage District, 97 Colo. 416, 50 P.2d 531 (1935). The appropriative water right is constitutionally based. Colo. Const. art. XVI, §§ 5, 6. Therefore, appropriative rights are protected by state and federal constitutional provisions for protection of property. Laitos, Constitutional Limits on Police Power Regulations Affecting the Exercise of Water Rights, 16 Colo. Law. 1626 (1987). State statutes have codified protections of appropriative rights. See, e.g., Colo. Rev. Stat. § 37-92-305(3) (Supp. 1989).

2. Absolute Entitlement to Exercise the Right. The "direct flow" appropriative right entitles its owner to a priority to divert a maximum rate to the extent that and during the time when the water can be applied to beneficial use. A storage

right similarly entitles its owner to a priority annually to store a maximum volume of water to be applied to beneficial use later. Laitos, supra, at 1626 n.5. See also Colo. Rev. Stat. §§ 37-92-103(3), (4), (12) (1973 & Supp. 1989).

a. Priority to divert or store water is based upon the appropriation date and, in Colorado, upon the date of judicial recognition of the right. Colo. Rev. Stat. § 37-92-306 (1973).

b. Appropriation doctrine does not provide for rationing among users when the supply is insufficient for the needs of all. Rather, those with senior priorities may take the entire river flow if required for immediate beneficial use in the exercise of a direct flow right or if required to fill reservoir capacity for a storage right.

C. Environmental Protection as Developmental Constraint

1. Appropriative Instream Flow Rights.

In Colorado rights to minimum instream flows and lake levels to protect the natural environment can be appropriated and acquire a priority to ensure the required flow or level. Colo. Rev. Stat. § 37-92-102(3) (Supp. 1989).

2. "Public Trust" Concept. In California, the effects of existing diversions on water available

to the natural environment may be limited by imposing restrictions on senior diversions to preserve a "public trust" in the resource. See, e.g., National Audubon Society v. Superior Court, 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346 (1983), cert. denied, 464 U.S. 977 (1983) ("Mono Lake").

3. Environmental Permitting of Water Project Facilities. Construction of new facilities such as diversion headgates and instream reservoirs can require analyses of potential environmental effects and may result in denial of the right to construct or serious limitations on the operation of the facilities. The specifics of such permitting impediments are beyond the scope of this paper.

D. Facilities Cost as Developmental Impediment

Finally, while "money flows uphill towards money" remains an apt adage for western water reallocation, with costs per acre foot for developing new supplies by constructing new surface storage approaching and exceeding five figures, less costly alternatives should be maximized.

III. SUMMARY OF LEGAL DEVICES/SOLUTIONS

A. Major Objectives

1. Acquire the reliable legal right and physical capability to use additional water at location and in time of need.

2. Decrease costs of (1) capture and conveyance facilities, (2) difficult environmental permitting procedures, and (3) possible condemnation of rights for "lower preference" uses.

3. Extend the lives of depletable supplies such as "mined" nontributary ground water.

4. Minimize the effects of water supply development on the natural environment.

5. Minimize the effects of water supply development on agricultural and recreational economies.

B. Principal Devices

1. Exchange of water by taking of water at location of need in exchange for water delivered to river system from source located at a different location.

2. Augmentation of river flows to replace the depletive effects of new use as required to satisfy senior users.

3. Reuse of return flows from initial use

to decrease the gross amount of diversion needed for new demands.

4. Underground storage of water not required for immediate use into a depleted aquifer for subsequent withdrawal and use.

IV. EXCHANGES OF WATER

A. History and Definition

Exchange of water represents the earliest of the legal devices addressed in this discussion. An exchange is designed to permit the taking of water at a new location without affecting existing rights. An exchange represents an appropriative right to take a specific amount of water at specific locations predicated upon the simultaneous delivery to the affected river systems of the amount so taken.

Exchanges were first operated by agreement among miners and among agricultural users to provide for the better utilization of scarce supplies. The right to exchange water has been recognized by Colorado statute since 1897. See Colo. Rev. Stat. § 37-83-104 (1973) (1897 Colo. Sess. Laws p. 177, § 4); Colo. Rev. Stat. § 37-83-105 (1973) (1899 Colo. Sess. Laws p. 236, § 3).

The yield of the exchange often is referred to as the "exchange potential," a concept which represents the amount of water which can be taken in

priority (quantitative) and the time when the taking can be effected (temporal).

B. Legal Requirements

1. Appropriative Intent. The appropriative exchange, like a traditional water appropriation, requires a fixed intention to take a specific amount of water from an identified source for identified beneficial uses. See Hallford, Water Reuse and Exchange Plans, 17 Colo. Law. 1083, 1084 (1988). Moreover, the uses of water taken by the appropriative exchange must be nonspeculative. Colo. Rev. Stat. § 37-92-103(3)(a) (1973). C.f. Colorado River Water Conservation District v. Vidler Tunnel Water Company, 197 Colo. 413, 594 P.2d 566 (1979) (the appropriator must be the actual user of the water or be in privity with the actual users by agency, contract, or governmental supply obligation).

2. Character of Exchange Water. The exchange water delivered to the river system must be sufficient to meet the requirements of senior users in location, quantity, time, and quality. Colo. Rev. Stat. § 37-80-120(3) (1973). Delivery of clear water to senior irrigators in substituteion for silt-laden water which formerly sealed ditches and reduced ditch losses is not an impairment of quality. A-B Cattle Co. v. United States, 589 P.2d 57 (Colo. 1979).

3. Retained Jurisdiction. Colorado law requires that a decree approving a change of water right or plan for augmentation must include a "retained jurisdiction" provision permitting the court to reconsider whether injury will be caused to other water rights by the change or plan. See, Colo. Rev. Stat. § 37-92-304(6). Imposition of a retained jurisdiction provision in a decree confirming an exchange is not expressly mandated or permitted by statute. A case presently before the Colorado Supreme Court involves the issue whether a decreed exchange must be subject to a retained jurisdiction provision. See City of Florence, et al. v. Board of Water Works of City of Pueblo, No. 88SA117, Colorado Supreme Court.

4. Exchange Priority. Colorado law distinguishes in the priority which may be recognized for decreed exchanges between "existing" exchanges, which have been perfected by actual use of water by exchange, and "proposed" exchanges, which represent prospective plans to exchange water.

a. An exchange which has been perfected by use, an "existing" exchange, may acquire its "true" date of appropriation, the date when intent to exchange and adequate notice of that intention both existed. See, Colo. Rev. Stat. § 37-92-305(10). Thus, existing exchanges are not

subject to the "postponement" doctrine presently codified in Colo. Rev. Stat. § 37-92-306 which applies in the adjudication of other appropriative rights.

b. There is no express statutory waiver of the postponement doctrine for "proposed" exchanges; consequently, statutory interpretation requires that such an exchange take an effective priority based upon the date of appropriation and the date of adjudication. See, Colo. Rev. Stat. § 37-92-305(1) and -306.

C. Methods and Sources of Exchange Water

From a purely technical view, the methods of providing exchange water may be viewed as "direct" or "indirect," with the distinction resting on the relative ease of assessing the quantitative and temporal adequacy of the source.

1. Direct sources of exchange water include reservoir releases, discharges to the stream from ground water wells, or surface discharges from wastewater treatment facilities. The amount, location, and timing of contributions to the stream from such sources can be determined with relative ease.

2. A hybrid source, between a pure "direct" and pure "indirect" source, would be water available for diversion or storage under a senior

water right which is relinquished to the stream in the amount, at the location, and at the time of diversion entitlement. The availability of water to the exchanged senior right, in quantity and time, requires an analysis of the historical or contemplated use of the right, that is, the amount and time of past use in the case of "absolute" right already perfected by actual use or of contemplated use in the case of a conditional right unperfected by actual use.

3. Indirect exchange water sources include streamflow accruals from irrigation return flows, deep percolation from land applied sewage effluent, and percolation from wastewater infiltration ponds. Proving actual contribution to streamflow from such sources in quantity and time often is a difficult engineering exercise.

V. AUGMENTATION PLANS

A. History and Definition

1. The augmentation plan originated in Colorado with enactment of the Water Right Determination and Administration Act of 1969, Colo. Rev. Stat. §§ 37-92-101 to -602 (1973 & Supp. 1989) (the so-called "69 Act"), to facilitate integration of tributary ground water use into the appropriation system and enhance conjunctive use of surface and ground

waters. Colo. Rev. Stat. § 37-92-102(1) (Supp. 1989).

2. The statutory augmentation plan concept built upon the authority of the State Engineer to approve temporary exchanges or "loans" of water. Colo. Rev. Stat. § 37-83-104 (1973).

3. An augmentation plan essentially constitutes a judicially approved plan to increase the supply of water available for beneficial use in priority by the provision of new or substitute supplies. C.R.S., § 37-92-103(9) (Supp. 1989).

B. Legal Requirements

1. The plan is predicated upon development of additional diversions, pooling of water supplies, exchanges of water, or the introduction of new or substitute supplies of water into stream systems. Colo. Rev. Stat. § 37-92-103(9) (Supp. 1989).

2. The eradication of phreatophytes does not create a legally recognizable new or substitute supply. Colo. Rev. Stat. § 37-92-103(9) (Supp. 1989); Giffen v. State, 690 P.2d 1244 (Colo. 1984). C.f. Southeastern Colorado Water Conservancy District v. Shelton Farms, Inc., 187 Colo. 181, 529 P.2d 1321 (1974) (eradication of phreatophytes does not create water available for a new water right appropriation).

3. The concentration of surface runoff from paved areas also does not create an augmentation supply. Colo. Rev. Stat. § 37-92-103(9) (Supp. 1989).

4. The plan must not cause injury to vested water rights or decreed conditional water rights, and any such injury must be eliminated by the imposition of decreed terms and conditions. Colo. Rev. Stat. §§ 37-92-305(3), (4) (1973 & Supp. 1989). See generally Pratt, Conditions in a Water Rights Augmentation Plan or Change Case, 13 Colo. Law. 2039 (1984).

a. The noninjury criterion for such a plan is the same as for a change of water right. Weibert v. Rothe Bros., Inc., 200 Colo. 310, 618 P.2d 1367 (1980).

b. An appropriator has a vested right in the continuation of stream conditions as they existed at the time of his appropriation. Orr v. Arapahoe Water and Sanitation Dist., 753 P.2d 1217 (Colo. 1988).

c. But the senior right must be exercised by an efficient diversion. City of Colorado Springs v. Bender, 148 Colo. 458, 366 P.2d 552 (1961); Colo. Rev. Stat. § 37-92-102(2)(b) (1973). And the senior user has no right as against the

junior to waste water. In Re Rominieki v. McIntyre Livestock Corp., 633 P.2d 1064 (Colo. 1981).

5. Return flows from the augmented use must be considered in determining the extent of augmentation requirement. Cache La Poudre Water Users Ass'n v. Glacier View Meadows, 191 Colo. 53, 550 P.2d 288 (1976); Kelly Ranch v. Southeastern Colorado Water Conservancy Dist., 191 Colo. 65, 550 P.2d 297 (1976).

6. The plan must provide water of sufficient quantity and quality to meet the needs of senior users. Colo. Rev. Stat. § 37-92-305(5), (8) (1973 & Supp. 1989).

7. The plan must be subject to retained jurisdiction for judicial reconsideration of injury. Colo. Rev. Stat. § 37-92-304(6) (Supp. 1989). This requirement permits re-examination of a decreed plan after actual operation has revealed whether effects predicted at the time of decree are materially different in actual practice.

C. Methods and Sources for Providing Augmentation Water

1. The sources of augmentation water are as varied as exchange water sources. The distinction between an exchange plan and augmentation plan is often subtle. Indeed, by statutory definition an

augmentation plan may include an exchange. Both plans are predicated upon providing different water to senior users to facilitate the taking of water by the new user. An exchange is predicated upon delivering to the stream the amount of water taken by exchange contemporaneous with the exchange taking. The augmentation plan focuses upon alleviating the depletive effects of the new taking by replacing to the stream the amount of water required at any given time in excess of the return flows then accruing from the new use. Since augmentation and exchange seek to achieve the same object, when successfully implemented they do constitute legal theories with little practical distinction.

2. Sources of augmentation water include reservoir releases, well discharges, wastewater discharges or percolation, irrigation return flows, and water previously consumed in the exercise of a senior water right.

3. Nontributary water and water imported to the basin represent "new" water. Colo. Rev. Stat. § 37-82-106 (Supp. 1989); City and County of Denver v. Fulton Irrigating Ditch Co., 179 Colo. 47, 506 P.2d 144 (1972). It is suggested by some that a "nonrenewable" source of water like nontributary ground water should not be legally sufficient as an

augmentation source. That issue may well be litigated in the near future.

4. Augmentation water from a tributary water source must constitute water previously entirely consumed in the exercise of a senior water right or water imported from another drainage basin as "foreign water." This conclusion follows from the rules that a tributary water right requires its owner to return the unused water to the stream for use by others, Pulaski Irrigating Ditch Co. v. City of Trinidad, 70 Colo. 565, 203 P. 681 (1922), and that a right to reuse tributary water within its basin of origin requires a decreed plan for reuse. Water Supply and Storage Co. v. Curtis, 733 P.2d 680 (Colo. 1988). Use of "consumptive use" water in an augmentation plan effects a retirement of the original senior use and a substitution of that use for the new use, i.e., a substitute supply. Likewise, introduction of tributary water from another basin creates a new supply.

5. An augmentation plan is often coupled with a change in the manner and place of use of a senior water right, often an irrigation water right, and use of the water previously consumed by the senior right to replace the depletions caused by the new use. Such planning must relate the amount, location, and timing of the new water depletions with

the amount, location, and timing of the availability of "consumptive use" water which can be relinquished to the stream from the senior right. The change of an appropriative water right is limited by the quantity and time of the historical use. Weibert, supra; Orr, supra. Therefore, problems arise when a seasonably available source is relied upon to augment a new year around use. It is often necessary to store senior water during the irrigation season for use in augmenting the nonirrigation season municipal depletions. Other issues, such as maintenance of return flows attributable to the historical exercise of the senior right, also must be addressed. See, generally, Pratt, supra.

VI. REUSE

A. History and Definition

1. All water ultimately is reused. Reuse of sewage for irrigation has been practiced for more than 2,000 years and has been used world wide. Kerr, Pollution or Resources Out-of-Place--Reclaiming Municipal Wastewater for Agricultural Use, 53 Colo. L. Rev. 559, 563 (1982).

2. Reuse of municipal effluent for agricultural irrigation and for industrial applications in power plant cooling and in some manufacturing processes is recognized as a feasible method of supple-

menting water supplies in a manner which is more cost effective and environmentally appropriate than the use of potable water. Crook and Okun, supra, at 32-39.

3. In contrast to agricultural and industrial reuse of a sewage effluent, potable reuse of urban wastewater involves difficult technical problems which currently impede potable reuse on a large scale. Crook and Okun, The Place of Nonpotable Reuse in Water Management, J. Water Pollution Control Fed'n, May 1987, at 32, 33. Moreover, the cost of treating wastewater for direct potable reuse can substantially exceed the cost of treating fresh water, as demonstrated by the experience with Denver's potable water reuse demonstration plant. Marcus, Recycled Waste Water: Denver's Scheme, 231 Popular Science 44 (1988).

4. Reuse constitutes application of water which is not consumed by and is remaining after initial use of water to an additional use. The Colorado Supreme Court has refined the concept of reuse by drawing distinctions among "reuse," "successive use," and the "right of disposition" in Fulton Irrigating Ditch Co., 506 P.2d 144, as follows:

a. Reuse. Application of return flow to the same beneficial use as the initial use (e.g., capture of irrigation return flows for additional irrigation).

b. Successive Use. Application of return flows to beneficial use different from the initial use (e.g., capture of municipal sewage effluent for nonpotable irrigation).

c. Disposition. Sale or lease of return flows from initial use for use by others.

5. The pure form of reuse requires the physical capture and reuse of the actual return flows from the initial use. This is possible when the return flows are generated from a discreet source such as a wastewater treatment plant discharge. Often, however, the actual molecules of water constituting return flow from an initial use such as irrigation cannot be captured. Such return flows may percolate into ground water aquifers or return to surface streams by surface runoff. In such instances, reuse can be accomplished by an exchange of water if the requirements for an exchange can be met. See generally Hallford, supra.

B. Legal Requirements

1. A supply of reusable water is required. The discussion above about water that

legally can be used for augmentation is directly relevant. Generally, only return flows from use of "consumptive use" water or "foreign" water (nontributary or transbasin) can be reused because appropriators are entitled to receive and use return flows from use of in-basin tributary water. See generally Hallford, supra.

2. Reuse within the constraints of the appropriation systems implicates the time when reuse is possible and the quantity and quality of water which can be reused. The reuser must demonstrate control of the reusable return flows. Colo. Rev. Stat. § 37-82-106 (Supp. 1989). Colorado's statute requires the reusing appropriator to distinguish the volume of his reusable water from the volume of the natural stream flow. As a practical matter, this requires an identification of the amount, location, and timing of the accrual of reusable return flows.

VII. UNDERGROUND STORAGE

A. Background

Injection of water into aquifers has been utilized for many years to control salt water intrusion into fresh water aquifers along the coasts of the United States. Today, attention is increasingly directed at the use of storage capacity in the depleted ground water aquifers to store fresh water

supplies not needed for immediate use. Underground storage of excess water generally is less environmentally damaging than construction of additional surface storage and eliminates much evaporation loss. Underground storage can be integrated into the appropriation system to both conserve water and develop additional supplies.

B. Legal Requirements

1. Laws concerning appropriative underground storage rights are in the early stages of development. Arizona has codified somewhat detailed provisions concerning underground storage of water. Ariz. Rev. Stat. Ann. §§ 45-801 to - 818 (Supp. 1989) Arizona has created a permit system for "underground storage and recovery projects" requiring detailed proof about the feasibility and effects of the proposed project. Ariz. Rev. Stat. Ann. § 45-104, 105 (Supp. 1989).

2. Colorado has provided by statute for the judicial adjudication of an underground storage right, Colo. Rev. Stat. § 37-92-305(9)(c) (Supp. 1989), but has not provided the detail of the Arizona permit system. California also recognizes underground storage of water as a beneficial use. Cal. Water Code § 1242 (West 1971).

3. The Colorado definition concerning underground storage requires "impoundment, possession, and control" of the water and introduction of the water into the aquifer by "other than natural means" by a person who has a decreed right. Colo. Rev. Stat. § 37-92-103(10.5) (Supp. 1989). Those requirements are consistent with the requirements for "control" of reuse water discussed above. Therefore, under the Colorado approach the user of an underground storage concept should demonstrate the amount and location of the introduction of water into the aquifer and the amount, location, and timing of the migration of water in the aquifer so that recovery will not affect existing rights in the aquifer and hydraulically connected surface streams.

4. Introduction of water, particularly effluent, into underground aquifers is controlled under both state and federal regulations and statutes, including significantly the federal Safe Drinking Water Act and Resource Conservation Recovery Act. Kerr, supra, at 578-581. Environmentally oriented regulation of underground water injection presently is more detailed than statutes which regulate underground storage as a water right.

A. Limitations of Appropriation on System

The appropriation system and its protections of existing diversion rights from injury in water reallocation restricts flexibility in reallocating water supplies to new locations. At the same time, the appropriation system provides a context for changes of property rights in water, including the legal devices discussed above, and provides a somewhat rational framework for reallocation of water supplies.

The mechanisms discussed above all essentially constitute legal mechanisms to reallocate existing water rights to supply new uses. When an existing water right is used to support a new use in an exchange or augmentation plan, reallocation of use is the direct result. Only when new sources such as nontributary ground water or water developed by a new tributary water right appropriation, either trans-basin or inbasin, are used to support the new use is reallocation not the essence of the mechanisms.

Likewise, reuse of return flows can operate as a reallocation of uses because the benefit of the reused return flows may be denied to downstream users who previously may have relied upon the return flows.

B. Technical Difficulties and Issues

The legal devices discussed above often involve difficult technical issues.

1. Water rights administration and accounting difficulties arise from all of these devices. Exchanges, augmentation plans, and reuse plans are most useful in areas of concentrated water demand. Therefore, the implementation of numerous exchanges and/or plans in an integrated river administration can become quite complex, requiring telemetered water availability determinations and computerized water rights administration.

2. Plans for reuse of irrigation or percolated return flows and underground storage plans are complicated by the need to make determinations based upon geology and other engineering disciplines regarding the movement of water in area, location, and time. A large scale plan for reuse of lawn irrigation return flows, for example, may require very complicated monitoring.

3. Historically, the quantitative effects of water right and water use reallocation have been the major concerns which arise in changes of water rights and the legal mechanisms discussed here. As water use becomes more geographically concentrated, water quality considerations are increasingly becoming as important as quantitative considerations in

reallocation. Legal requirements for the sufficiency of exchanges and augmentation plans address both the quantitative and qualitative sufficiency of water substituted to senior users. Many of these quality issues are resolved by state and federal water quality regulations and discharge permits. But the introduction of these issues into the water rights forum may raise considerations separate from traditional water quality regulations as quality is assessed in relation to effects on particular senior water users.

C. Policy Considerations: Encouraging Innovation

Like water efficiency and conservation, creative implementation of legal mechanisms to extend water supplies can be hindered or promoted by the policies expressed in legal framework.

1. Reuse can be encouraged or even mandated by statute. For example, in California the use of potable domestic water to irrigate greenbelts is deemed wasteful and unreasonable when a source of reasonable cost "reclaimed" water is available and the reuse will not injure water rights, degrade water quality, or injure plaintiff. Cal. Water Code § 13550 (West 1971). Reuse in lieu of a potable quality ground water extraction is considered an

exercise of the ground water right. Cal. Water Code § 13551 (West 1971).

2. Stringent environmental regulations concerning sewage treatment and discharge provide an increasing incentive for direct reuse of effluent in industry. Rich, Water Treatment, Chemical Week (Feb. 12, 1986) 37. And irrigation land application of municipal effluent is a very attractive alternative to advanced wastewater treatment processes. 564-568. Kerr, supra, at 564-568.

3. Integration of ground water use into the appropriation system by mechanisms such as augmentation plans also can be statutorily encouraged. Such integration is designed to achieve maximum beneficial use of water a the policy objective of Colorado's 1969 Act. See Colo. Rev. Stat. § 37-92-102(1)(a) (1973). The movement toward statutory recognition and refinement of rights in underground storage should provide greater certainty about such projects and foster greater implementation.