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WATER QUALITY AND WATER RIGHTS IN COLORADO

by

Lawrence J. MacDonnell

July, 1989

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EXECUTIVE SUMMARY

Water quality and water use are intimately related. The quality of water affects its usability. In turn, water use affects water quality.

Colorado water law long has recognized this relationship. In a series of cases culminating in Wilmore v. Chain O'Mines, Colorado courts established the rule that one's use of water may not pollute that water to the injury of another's use.

Water quality protection now is regulated under the federal Clean Water Act and the Colorado Water Quality Control Act. The Colorado act contains a number of provisions aimed at minimizing the effect of water quality regulation on water use pursuant to a water right. Most importantly, Section 104 provides that nothing in the act shall be interpreted so as to supersede, abrogate, or impair water rights or to cause material injury to water rights.

The Colorado Water Quality Control Commission considered the meaning of this provision in establishing policies and procedures for its Section 401 certification process under the federal Clean Water Act and its antidegradation review process. Views expressed before the Commission ranged from, on the one hand, the opinion that any state water quality regulation would impair a water right to, on the other hand, the opinion that a water right is subject to any legitimate water quality regulation that does not prevent its economic use. The Commission has determined that it cannot prohibit a Section 401 certification if, to do so, would violate the intent of Section 104 of the Colorado Water Quality Control Act. However, it deferred more explicit definition of the meaning of Section 104, preferring to leave this to a case-by-case determination.

At the same time, the water courts have been faced with water quality issues in connection with plans for augmentation and exchanges. Under Colorado law, water supplies may be substituted or exchanged subject to the requirement that the replacement water must be of a quality and quantity "so as to meet the requirements for which the water of the senior appropriator has normally been used...." The standard by which adequacy of quality will be established is not yet clear, but it appears that evidence of compliance with point source permit requirements and established water quality standards is not necessarily sufficient. Restrictions on the operation of the substitute supply or exchange have been established in several cases when streamflows go below a specified minimum.

WATER QUALITY AND WATER RIGHTS IN COLORADO

Lawrence J. MacDonnell*

INTRODUCTION

Water use and water quality are intimately related. The quality of water affects its usability. In turn, water use affects water quality. This fundamental link long has been recognized in the common law of water by the rule that one's use of water may not impair water quality to the detriment of another's use.¹

Colorado rejected the common law riparian doctrine as a framework for allocating the right to use water and chose instead an allocation system which came to be known as the prior appropriation doctrine. However, while the allocation rules of riparianism were rejected, the fundamental protection of water quality was maintained.² Now, water quality protection is based primarily on the Clean Water Act.³ There is considerable uncertainty as a matter of law and policy regarding the relationship between federal and state statutory water quality requirements and rights to use water under Colorado water law.

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This report begins with a review of early Colorado water quality law. Then the present state statutory system of water quality protection is summarized. Special attention is given to those provisions of Colorado's water quality law aimed at protecting water rights. The report then addresses several specific issues which involve the relationship between water quality and water use. Finally, recommendations are made for improving Colorado's approach to integrating quality and quantity concerns.

EARLY COLORADO WATER QUALITY LAW

Several early Colorado statutes recognized the need to protect water quality. One approach taken in these statutes was to limit the discharge into streams of certain harmful materials. Thus, in 1868, the Colorado territorial legislature enacted a statute requiring that mine tailings be controlled on the mining property and establishing liability for damages caused by escape of such tailings.⁴ An 1874 statute prohibited the discharge into streams or ditches of "any obnoxious substances, such as refuse matter from slaughterhouse or privy, or slops from eating houses or saloons, or any other fleshy or vegetable matter which is subject to decay in the water...."⁵ An 1889 statute made it a misdemeanor to cause oil, petroleum, or other oleaginous substances to enter waters of the state.⁶

Another approach taken in early Colorado statutes was to provide pollution prevention authority to protect important uses of water such as for drinking water supplies. Thus, a statute originally enacted in 1877, and still in effect in modified form today, empowers municipal authorities to prevent pollution of the stream or watershed from which their water supply is derived.⁷ This statute authorizes cities to regulate activities to prevent pollution in areas along the stream five miles above the point where water is diverted. Use of this authority to enact an ordinance prohibiting construction or use of a pigsty adjacent to the banks of a city's water supply within the five mile area was upheld in City of Durango v. Chapman.⁸ More recently, the Colorado Supreme Court upheld the use of this authority to require anyone seeking to undertake new activities within the designated watershed district of the Town of Crested Butte to obtain a permit from the city.⁹ In 1907, the city of Denver was given special authority to safeguard water quality in the South Platte River, Bear Creek, or any of their tributaries above Clear Creek.¹⁰ In addition to the protection of municipal drinking supplies, the legislature also demonstrated an early concern for protection of fish. A statute originally enacted in 1899 gave the State Game and Fish Commission authority to seek court orders to prevent pollution injurious to fish.¹¹

Western courts early recognized the importance of water quality to the usability of water. In Colorado, as in other

western states, the courts were faced with the task of defining the water quality principles that should apply under the prior appropriation doctrine. The limited water supply argued for the need to protect water quality in order to maximize its usability. Under "natural flow" riparian principles, essentially no pollution to the detriment of other riparian users was permitted. Strict application of these principles to the developing water uses in the West would have limited or curtailed many of these uses.

A principle first established in early California cases and followed in other western states is that the prior appropriator is protected against pollution by a subsequent appropriator.¹² The protection is not against pollution itself but against pollution which measurably or substantially impairs the senior appropriator's use.¹³ Conversely, the protection offered junior appropriators from pollution caused by the senior appropriator is limited: "A prior appropriator must prevent pollution harmful to downstream subsequent appropriators, or to others junior to him, only if it can be practically avoided."¹⁴

Colorado cases differ from these principles in some important respects. Viewed together, these cases suggest much less emphasis on the role of priority and a stricter view of responsibility for pollution. In an 1886 decision, the Colorado Supreme Court noted that the right to divert is a "privilege," qualified by the requirement that an appropriation of water "cannot lessen the

quantity of water, seriously impair its quality, or impede its natural flow, to the detriment of others who have acquired legal rights therein superior to his...."¹⁵ Thus senior rights are protected not only as to quantity of flow but also to its quality. This general principle was repeated in an 1893 decision: "There is no question that ... these prior appropriators of water are entitled to have the St. Vrain creek flow unimpaired in quantity and unpolluted in any permanent and unreasonable way. The law which entitles parties to preserve the purity of the streams whose waters are theirs by purchase or by appropriation is ... thoroughly well settled...."¹⁶ In this case, the court allowed construction of a reservoir in a highly alkaline slough and the flushing of alkaline material into the creek to the clear detriment of downstream senior appropriators. The basis for its decision was a determination that the damage would only occur with the initial flushing of the reservoir and would not continue in a "permanent and unreasonable way." Absent a demonstration of actual and permanent injury, the court was reluctant to prevent this effort to enlarge the usable supply of water.

In the 1897 Suffolk Gold Mining case,¹⁷ the Colorado Court of Appeals essentially adopted the "reasonable use" standard from riparian law and applied it to protect a downstream junior appropriator. Here, the upstream senior used the streamflow to power its stamp mill and to remove the tailings resulting from crushing the ore. The downstream junior diverted water to generate

electricity. Finding extensive damage to its power generating equipment from the tailings in the water, the junior brought suit to require their control. The senior argued that, as the original appropriator on the stream, it had a right to use the stream in this manner and that the junior appropriator had to accept the conditions of the stream as it found them.

The court quite conclusively rejected any notion that the rules of priority carried with them a right to pollute. It noted the qualified nature of a water right and the overriding interest in protecting water quality for use by other appropriators. To this end, it cited with evident approval the riparian principle that an upstream riparian's use of water is limited by the requirement that the water "must remain fit for the use of the lower riparian owner."¹⁸ It then went on to conclude:

Under these circumstances, we are quite of the opinion that the title and rights of the prior appropriating company were not absolute, but conditional, and they were obligated to so use the water that subsequent locators might, like lower riparian owners, receive the balance of the stream unpolluted, and fit for the uses to which they might desire to put it.¹⁹

Thus a senior appropriator does not have an absolute right to use water but rather what the court characterized as a right of "reasonable use." Since in this situation the senior appropriator could reasonably prevent the pollution injuring the junior, it had a duty to do so.

In a 1920 case, the Town of Craig had sought to condemn certain land outside its city limits to construct a channel to carry its untreated sewage into an adjacent stream. The Colorado Supreme Court found that municipal condemnation authority did not allow the taking of such property.²⁰ Nor were municipalities exempt from the limitations on discharging pollutants into the streams of the state. In the words of the court, "[c]ities and towns, in the absence of direct legislative permission to that end, have no right to befoul and contaminate our public streams by discharging raw and unpurified sewage therein."²¹

In Wilmore v. Chain O' Mines,²² the Colorado Supreme Court carried the principles announced in Suffolk Gold Mining one giant step further by forbidding any pollution of water to the injury of another's entitled use of water. This case involved damage to irrigated agricultural lands caused by tailings deposited into Clear Creek by upstream mill operators. The trial court agreed that the tailings were causing severe damage to these lands and enjoined the mills from depositing more than a certain quantity of tailings into the stream -- a quantity which the court found was reasonable in view of likely damage to the land and the cost of control. The supreme court ruled that the "injunction should have been made full and permanent against any and all pollution,...."²³ On rehearing, the court clarified its meaning in the following way:

For the purposes of this case, the word "pollution" means an impairment, with attendant injury, to the use of water that plaintiffs are entitled to make.... In reality, the thing forbidden is the injury. The quantity introduced is immaterial. A primary duty rests upon one introducing such extraneous matter into this stream to prevent damage from arising from [sic] such introduction, either from his acts alone, or in conjunction with those of others.²⁴

Thus, pollution injuring another's water use is prohibited. Such pollution is regarded as per se unreasonable. The cost of control will not determine the right to pollute. Nor do the rights and duties in this regard turn on the priorities of the water users.

In Farmers Irrigation Company v. Game and Fish Commission,²⁵ the Colorado Game and Fish Commission operated a fish hatchery on East Rifle Creek which polluted the water of that stream to the injury of downstream domestic water users. The Colorado Supreme Court found that such pollution may constitute a taking of the plaintiffs' water rights which is actionable in court, both for compensation and for injunctive relief.

To summarize, Colorado's early law reflects a high degree of concern about water quality protection. By statute, the discharge of tailings, refuse, and other potentially injurious substances was prohibited, and cities were given special authority to protect their drinking water sources. Water rights were limited by the courts to uses of water not resulting in pollution injurious to other uses of water. We turn now to a consideration of the general water quality protection program Colorado has established.

THE COLORADO WATER QUALITY CONTROL PROGRAM

Initially established in 1966, Colorado's water quality control program generally parallels the federal Clean Water Act.²⁶ Overall direction of the program, which is housed in the Department of Health, is given to the Colorado Water Quality Control Commission. This nine-member citizen commission is responsible for "develop[ing] and maintain[ing] a comprehensive and effective program for prevention, control, and abatement of water pollution and for water quality protection throughout the entire state...."²⁷ Its duties include the classification of state waters, the promulgation of water quality standards, and the promulgation of regulations governing point source permits. Implementation of the program is the responsibility of the Colorado Water Quality Control Division. The Division's duties include administration of the point source permit system, monitoring of water quality, and enforcement.

Point Source Control

As with the federal act, the major means of protecting water quality is the permit system controlling the discharge of pollutants into state waters from a point source (discrete sources such as pipes from which a pollutant is discharged). Permits restrict discharges to technology-based effluent limitations.

Stricter requirements may be imposed in some circumstances, if necessary, to achieve water quality standards.²⁸

Water Quality Standards

State waters are classified according to their present beneficial uses or for reasonably expected future beneficial uses.²⁹ The types of classes established by the commission include: recreation (class 1 -- primary contact and class 2 -- secondary contact), agriculture, aquatic life (class 1 -- cold water, class 1 -- warm water, and class 2 -- cold and warm water), domestic water supply (class 1 -- uncontaminated groundwater and class 2 -- waters requiring disinfection and/or standard treatment), and existing high quality waters (class 1 and class 2). The commission has promulgated basic water quality standards which apply to all waters of the state.³⁰ In addition, numeric values for specific water quality parameters have been adopted to protect classified uses in specific stream segments in the state.³¹ Salinity standards have been established only for the Colorado River Basin, and no standards have been established for suspended solids.³²

Antidegradation

Following a lengthy review process, the commission revised its antidegradation standard in 1988. EPA regulations require states to include an antidegradation policy in their water quality

programs.³³ This EPA requirement was first formally adopted in 1975 and then revised in 1983. It provides that (1) existing instream uses and water quality necessary to protect such uses be maintained and protected, (2) where the quality of water currently exceeds that necessary to support propagation of fish, shellfish, and wildlife and recreation, such water quality is to be maintained and protected unless, after a public review process, it is determined that allowing lower water quality (down to that necessary to protect existing uses) is necessary to accommodate important economic or social development, and (3) high quality water in parks, refuges, and other special areas be maintained and protected.

The new Colorado standard provides that there shall be no degradation of waters designated as high quality 1, that degradation of other high quality waters may occur only if determined to be necessary to accommodate important economic or social development, and that no surface waters may be degraded below that quality necessary to protect existing classified uses.³⁴ High quality 1 waters are those determined to constitute an "outstanding State or national resource."³⁵ A special review procedure is established for "regulated activities" with water quality effects causing possible degradation of "reviewable waters."³⁶ The Water Quality Control Division first determines if the activity will cause a "significant" degradation of reviewable waters. If such significant degradation is found, then the

division must consider whether this degradation is necessary to accommodate important economic or social development. The division's decisions may be reviewed on a de novo basis by the Water Quality Control Commission.

Quality Protection and Streamflows

Effluent limitations established in point source permits must protect the water quality standards of the receiving stream. In recognition of the effect the variability of streamflows has on quality, water quality standards will not apply when the flow level goes below certain low flows.³⁷ The commission has adopted the "mixing zone" concept by which water quality standards do not apply directly at the point of discharge so there is some opportunity for dilution.³⁸

Control Regulations

The Colorado Water Quality Control Act authorizes the commission to promulgate "control regulations" for such purposes as placing limitations on particular pollutants or wastes which may be discharged, establishing "precautionary measures" for activities which cause pollution, and adopting toxic effluent standards and special pretreatment standards.³⁹ Control regulations establish enforceable requirements. The statute requires the commission to consider a number of factors in formulating control regulations.⁴⁰

Nonpoint Source Control

Nonpoint source pollution results from diffuse sources not regulated as point sources and is normally associated with agricultural, silvacultural, and urban runoff. Colorado law provides for regional wastewater management plans, corresponding to the provisions in Section 208 of the federal Clean Water Act.⁴¹ Such plans are developed by designated planning agencies and must be approved by the commission. There are fourteen approved regional wastewater management plans--one for each district.⁴² Those covering rural districts are fairly general; those governing urban areas are more detailed. Common provisions include pollutant standards for individual streams; assessment of stream quality, including a list of "impaired" streams; and recommendations for upgrading treatment facilities. Some nonpoint pollution regulations are also included, although this subject is treated more extensively in the nonpoint program.

In the Water Quality Act of 1987, Congress amended the legislative policy statement of the Clean Water Act to state: "It is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution."⁴³ Congress also added Section 319 which amends the nonpoint source

management program and requires the states to prepare assessment reports identifying waters requiring control of nonpoint sources of pollution to achieve and maintain applicable water quality standards and to implement management programs including "best management practices and measures which will be undertaken to reduce pollutant loadings, resulting from each category, subcategory, or particular nonpoint source...."⁴⁴ Colorado has submitted both its assessment report and its implementation report to EPA.⁴⁵

401 Certification

Section 401 of the Clean Water Act requires an applicant for a federal license or permit involving an activity which will make a discharge into water to obtain a certification from the state that such discharge will meet state water quality requirements.⁴⁶ In January 1989, the commission adopted rules directing the division to review 401 certification requests and setting out conditions which may be required as a part of such certification.⁴⁷ Certification may be granted unconditionally or conditionally, or it may be denied. For approval, the activity must comply with applicable effluent limitations, water quality classifications and standards, and other water quality control requirements either with or without conditions. Compliance is defined as "not causing significant impairment of a classified use by exceedence of water quality standards, taking into account the averaging period and

frequency of exceedence criteria established in the Basic Standards and Methodologies for Surface Water, and not violating any applicable effluent limitations or other water quality control requirements."⁴⁸ A number of management practices, monitoring requirements, and mitigation requirements are listed which the division may require, if necessary, to protect water quality. Conditions may be imposed to address both direct and indirect adverse water quality impacts resulting from the discharge.⁴⁹

RELATIONSHIP OF THE WATER QUALITY PROGRAM TO WATER RIGHTS

Statutory Provisions

The legislative declaration prefacing the Colorado Water Quality Control Act indicates a dominant concern with water development and use and a somewhat secondary interest in water quality:

it is declared to be the policy of this state to prevent injury to beneficial uses made of state waters, to maximize the beneficial uses of water, and to develop waters to which Colorado and its citizens are entitled, and, within this context, to achieve the maximum practical degree of water quality in the waters of the state consistent with the welfare of the state.⁵⁰

Thus, a primary purpose of the water quality program is to control pollution so as to maximize beneficial uses of water. The program is to "protect, maintain, and improve, where necessary and reasonable, the quality [of state waters] for public water

supplies, for protection and propagation of wildlife and aquatic life, for domestic, agricultural, industrial, and recreational uses, and for other beneficial uses, taking into consideration the requirements of such uses;...."⁵¹ The breadth of the list indicates a legislative recognition that protected beneficial uses of water are not limited to those for which water rights have been established.

In Section 104 of the Colorado Water Quality Control Act, the legislature explicitly sought to protect water rights:

No provision of this article shall be interpreted so as to supersede, abrogate, or impair rights to divert water and apply water to beneficial uses in accordance with [Colorado law]. Nothing in this article shall be construed, enforced, or applied so as to cause or result in material injury to water rights.⁵²

The legislature recognized that compliance with the Water Quality Act might lead dischargers to use consumptive types of treatment techniques rather than treating effluent to remove pollutants prior to its return to a stream.⁵³ Because this approach would cause some reduction in streamflows, the discharger is made responsible for remedying any resultant material injury to water rights. Questions of material injury in such cases are to be considered by the water court. Point source permits required to protect public health are not to be barred by this section.

Senate Bill 181, enacted by the legislature in its 1989

session, added a list of "criteria" to be considered in any decision of the Water Quality Control Commission or by a court reviewing any such decision.⁵⁴ Included among these criteria is the fact that a water right may include the right to divert water. The Water Quality Control Commission and Water Quality Control Division are specifically prohibited from requiring an instream flow. And, in questions concerning potential injury to water rights the commission and the division are to consult with the State Engineer and the Colorado Water Conservation Board.

In addition to this general provision aimed at protecting water rights, the Water Quality Control Act contains a number of other more specific provisions with a similar objective. In the section of the act dealing with classification of waters, the commission is directed to consider a number of things, including "the need to minimize negative impacts on water rights;...."⁵⁵ Water in ditches and other man-made conveyance structures is not to be classified. Water quality standards are not to be applied to such waters.⁵⁶ In promulgating water quality standards, the commission is to consider, among other things, "the impact of treatment requirements upon water quantity;...."⁵⁷ Water quality standards may only apply to discharges from water diversion, carriage, exchange, or to storage or release of water in the exercise of water rights if control regulations have been established for that purpose.⁵⁸

Specifically excluded from point source regulation are "[a]ctivities such as diversion, carriage, and exchange of water from or into streams, lakes, reservoirs, or conveyance structures, or storage of water in or the release of water from lakes, reservoirs, or conveyance structures, in the exercise of water rights...."⁵⁹ The act specifies that "no person shall discharge into a ditch or man-made conveyance for the purpose of evading the requirement to obtain a permit under this article."⁶⁰ Although water quality standards are not to be applied to ditches, permits regulating point source discharges into ditches

shall contain such provisions as are necessary for the protection of agricultural, domestic, industrial, and municipal beneficial uses made of the waters of the ditch or other man-made conveyance structures, which use or uses were decreed and in existence prior to the inception of the discharge.⁶¹

Thus existing consumptive uses are protected, but new uses following issuance of the permit are not. Flows or return flows of irrigation water are not to be subject to a permit "except as may be required by the federal act or regulations."⁶²

Regarding nonpoint source regulations, the commission adopted a policy in 1981 which states that use classifications and water quality standards are not to be applied to nonpoint source activities until and unless control regulations are adopted for this specific purpose.⁶³ Later that year, the legislature provided that the commission was not to adopt control regulations requiring

agricultural nonpoint source discharges "to utilize treatment techniques which require additional consumptive or evaporative use which would cause material injury to water rights."⁶⁴ In 1988, the legislature provided further guidance to the commission concerning the agricultural nonpoint source issue. Control of such pollution is to be pursued through "incentive, grant, and cooperative programs in preference to the promulgation of control regulations."⁶⁵ Only if such voluntary programs are found by the commission to be inadequate to meet state or federal law shall regulations be established.

Interpretation and Implementation

Events in the last several years have caused the commission to wrestle with the meaning of some of these provisions, especially Section 104. The driving force has been the Section 404 review process under the Clean Water Act for the proposed Two Forks project. Commission authority to consider the water quality effects associated with this project arose indirectly in the Section 208 planning process and directly in the implementation of its 401 certification authority and its antidegradation policy.

The Northwest Colorado Council of Governments, the designated planning agency for Eagle, Grand, Jackson, Pitkin, Routt, and Summit counties in the headwaters area of the Colorado River, submitted a Section 208 areawide water quality management plan for

approval by the Colorado Water Quality Control Commission which concluded that hydrologic modifications such as dams and other diversion works were the most serious water quality problem in their region.⁶⁶ This plan noted that, as of 1985, 20 percent of the water yield from the six counties was being diverted across the continental divide to the Front Range of Colorado and, by 1995, this figure is expected to rise to 36 percent. Among other impacts, it noted the loss of dilution, impacts on fish, and effects on recreation associated with this reduction in available water. It requested the commission to adopt a number of policy objectives aimed at minimizing or offsetting the adverse environmental effects of these water diversion activities.⁶⁷ In 1987, the commission conditionally approved a modified version of this plan which included as an objective ensuring that "water development activities do not have a significant adverse effect upon the Region's water resources such as increasing pollutant concentrations...."⁶⁸ While there is no direct regulatory effect associated with these 208 plans, they may provide a basis for subsequent actions either under Section 319 or in other contexts.

The Section 401 certification process provides the commission with an opportunity to review water projects involving a Section 404 dredge or fill permit.⁶⁹ The manner in which the commission may regulate a water-rights-based diversion and storage project was at the heart of the considerable controversy which surrounded the commission's efforts to redefine its certification process. The

major issues resolved were that the division is to consider both the direct and indirect adverse water quality impacts resulting from the federally permitted activity, that a broad range of conditions may be imposed if necessary to protect state water quality control requirements, and that these conditions must be consistent with Section 104 of the Colorado Water Quality Control Act. Unresolved is the major question of how consistency with this provision is to be determined, although requiring specific releases of water or restricting the quantity of water withdrawn are cited as examples of conditions prohibited by Section 104. The division is directed to consult with the State Engineer and the Attorney General for assistance in determining consistency.

The relationship between water quality protection and water use was addressed by the commission in 1988 in connection with Cheraw Lake in the lower Arkansas River valley. Cheraw Lake is a highly saline (17,000 mg/l total dissolved solids in the upper layer and 60,000 mg/l at the bottom) waterbody. The salinity apparently results from alkaline soils in the area, return flows from irrigation, and concentration by evaporation. Normally, little if any surface water moves out of the lake, but greater than normal water supplies in the Arkansas River during the preceding several years had raised concerns that the highly saline water would spill into Horse Creek, damaging downstream users.

In early 1988, the commission adopted an emergency control

regulation prohibiting any release of water from Cheraw Lake into Horse Creek as of March 1990 and restricting releases prior to that time to water with a salinity content of 5270 parts per million or less.⁷⁰ Also by March 1990, no water from irrigation water collection systems was to be released into Cheraw Lake. The final control regulation adopted later that year limited releases of water from Cheraw Lake to water with a salinity content of no more than 4,300 parts per million.⁷¹ It also removed the prohibition on water releases into the lake.

Apparently there are no existing water rights for the water in Cheraw Lake. However, plans were underway to take some of this water, dilute it with winter flows, and store it in John Martin Reservoir for subsequent release. Presumably, these plans now have been dropped in the face of the commission's control regulation.

WATER RIGHTS DETERMINATIONS AND WATER QUALITY

Water quality is a consideration in a few types of water rights determinations in Colorado. In this section, the statutory requirements involving water quality are presented. Then the limited but growing body of judicial interpretation is discussed.

Statutory Requirements

In 1965, the Colorado legislature established a special

statutory scheme for allocating rights to water in designated groundwater basins.⁷² Known as the Colorado Ground Water Management Act, this legislation created a commission with authority to determine boundaries for designated basins and to issue permits for the development of groundwater within such basins. In considering whether to issue a requested permit, the commission must determine whether there is sufficient unappropriated water available in the basin and whether the proposed appropriation would "unreasonably impair existing water rights from such source, or would create unreasonable waste...."⁷³ Impairment of existing uses is defined to include "the unreasonable deterioration of water quality...."⁷⁴

In 1969, the legislature authorized the involuntary substitution of one water supply for another more senior right so long as the substituted supply is "of a quality and continuity to meet the requirements of use to which the senior appropriation has normally been put."⁷⁵ Such substitute supply plans must be approved either by the state engineer or by the water court. This provision has been used extensively to allow continued pumping by junior wells drawing tributary groundwater which might otherwise be out-of-priority. Depletions from this pumping are replaced by providing substituted supplies.⁷⁶

Also in 1969, the legislature initiated a new kind of water right called a plan for augmentation. Broadly defined as "a detailed program to increase the supply of water available for

beneficial use..." a plan for augmentation may include substitute supplies, exchanges, or "any other appropriate means."⁷⁷ Under a plan for augmentation "including exchange," "[a]ny substituted water shall be of a quality and quantity so as to meet the requirements for which the water of the senior appropriator has normally been used...."⁷⁸ Exchanges are separately authorized⁷⁹ and involve voluntary arrangements allowing a user to divert water at a point where he has no diversion right by providing water at another point in the stream usable by the person with whom the exchange is made.⁸⁰

Judicial Interpretation

The only Colorado Supreme Court decision that considers any of these statutory provisions is A-B Cattle Company v. U.S.⁸¹ In this case, the construction of Pueblo Dam and Reservoir as a part of the Bureau of Reclamation's Frying Pan-Arkansas project resulted in the inundation of the headgate for the Bessemer ditch. The water subsequently supplied to the ditch came from the reservoir rather than from the natural flow of the Arkansas River. The stored water did not contain the silt previously available to Bessemer, and Bessemer sued the U.S. for damages caused by the loss of the silt. The silt's value was in helping to seal the ditches, thereby reducing loss of water in transit and reducing the growth of phreatophytes, and in causing the irrigation water to cover more area.

Legally, this action involved a substitution of water which requires that the substituted water be of a quality to meet the requirements of use to which the senior appropriation has normally been put. The supreme court considered whether Bessemer's right to receive water of a quality historically available included the silt content of the water and held that it did not. According to the court, "[t]he 'quality' requirement of the statute is not violated when a person slows down the movement of water, resulting in the settling of silt to the bottom and leaving only clear water for the senior appropriator."⁸² The water right does not include the right to continue to receive silt.

Two augmentation plans filed in Division One have been challenged on the basis that the substituted water would not be of adequate quality. The City of Golden sought an augmentation plan to divert up to twenty cubic feet per second out-of-priority from Clear Creek and replace this water with substitute supplies including treated effluent based on nontributary groundwater and transmountain diversions.⁸³ Downstream users, including the cities of Thornton and Westminster, objected that the effluent would not be of a quality that meets their requirements of use. Golden argued that its effluent discharges would fully comply with the point source permit requirements of the Colorado Water Quality Control Division, that these requirements are based on protection of existing water quality standards for Clear Creek, and that the

segment of Clear Creek involved is classified for aquatic, drinking water, agricultural, and recreational uses.

The Division One Water Court initially ruled that the effluent was not of adequate quality because of evidence of increased risk of cancer and other diseases as well as increased algae in Standley Reservoir affecting recreational uses and treatment costs for drinking water.⁸⁴ Subsequently, the augmentation plan was approved following a settlement among the parties. The settlement included agreement to discharge the effluent into Clear Creek below the Croke Canal which leads to Standley Lake from which drinking water supplies for the objector cities are obtained. Exchanges are to be used to obtain the substituted water needed to allow the out-of-priority diversion to occur.⁸⁵

The second case involved Mission Viejo which sought a decree for an augmentation plan and other water rights in connection with its Highland Ranch development. Under the plan, out-of-priority diversions from the South Platte River would be taken in exchange for treated effluent from use of nontributary groundwater. The City of Thornton and the Farmers Reservoir and Irrigation Company (FRICO), both downstream diverters, objected that the effluent supplies would cause an impairment of water quality and would not meet their requirements of use. Mission Viejo argued that the effluent would be discharged subject to a permit issued by the Water Quality Control Division with limitations imposed to protect

the classified uses of the South Platte River in this segment which include drinking water supply, agricultural, recreational class 1, and cold water class 1 fishery uses. Furthermore, it noted that the downstream segment from which Thornton and FRICO divert is protected by less stringent standards.

A settlement among the parties allowed approval of the augmentation plan.⁸⁶ To meet Thornton's concerns, Mission Viejo agreed to limit its use of effluent to replace out-of-priority diversions or storage so that it will not exceed the amount by which the flows of the South Platte River at the area of discharge exceed the Q7-10 flows specified in the discharge permit.⁸⁷ The period for reconsideration by the water court on the matter of water quality-related injury was set at five years. The only basis for reconsideration is whether a substance discharged in the effluent and identified by a specially established monitoring program is creating an unacceptable risk to human or animal health.

The City of Pueblo sought a decree for an exchange plan under which it was diverting and storing native flows of Arkansas River water in an upstream reservoir in exchange for releases of treated effluent from use of transmountain imports to users downstream from its treatment facility. The Division Two water court found that the substituted water was of a quality and continuity to meet the requirements of downstream senior appropriators.⁸⁸

However, the court also found that the effect of the exchange was to decrease streamflows between the points of storage upstream and the points of release downstream below Pueblo with a consequent decrease in water quality, especially related to salinity. It found that if the exchange reduced flows below the Q7-10 level, this reduction would require the treatment facilities for the cities of Florence and Canon City, which are situated along this section of the Arkansas, to incur "substantial" additional expense to meet more stringent discharge requirements.⁸⁹ Therefore, the court required that the exchange be operated so as to insure that it will not cause flows to go below a specified minimum.⁹⁰

Summary

Water quality is becoming an important consideration in certain kinds of water rights decisions in Colorado. Colorado law encourages maximum utilization of its limited water resources by allowing new, out-of-priority uses to occur so long as there is no injury to existing rights. It explicitly requires that any exchanges or substituted supplies be of a quality that will meet the requirements of the senior user. Determination of the adequacy of the quality is to be made by the water court. The basis for determining the adequacy of the quality is not yet clear. The City of Golden case indicates that the court will not necessarily assume that permitted discharges of effluent are satisfactory.

Also unresolved at this point is whether the depletive effects of the new water use must be considered in determining adequacy of the quality. Mission Viejo argued that its plan for augmentation would not increase the total quantity of pollutants discharged into the South Platte since it had adequate water rights to operate its treatment facility at full capacity even without the proposed exchanges. Its only water quality effect would be to increase the concentration of pollutants because of the reduction in flows caused by the upstream diversions. Because a settlement was reached by the parties this issue did not go to trial.

However, in the Pueblo exchange case, the court required that the exchange be operated in a manner that would not adversely affect intermediate water users. The explicit issue in this aspect of the case was the adverse effect caused by a reduction in flows. No appeal was taken on this part of the ruling so supreme court consideration of this issue will have to await another case.

SUMMARY AND CONCLUSION

The use of water pursuant to a water right in Colorado is conditioned by the requirement that this use may not cause pollution to the injury of another's right to use water. By statute, exchanges and substitute supplies must be of a quality that will meet the requirements of the original water user. In these respects, Colorado law clearly limits water rights to protect

water quality.

At the same time, considerable effort has been expended to insulate the use of water pursuant to a water right from regulation under the general water quality program. In addition to a number of provisions specifically exempting such water use from regulation, there is a separate section declaring that no material injury to water rights shall result from water quality regulation. An active debate has ensued regarding the effect of this provision. On the one hand it is argued that water quality regulation may not in any way affect the privately made decisions about establishing and using a water right including the point of diversion, the type of diversion, the place of use, or the manner of use. These decisions and the subsequent activities pursuant to them are constitutionally protected from any regulation under the Water Quality Act. Water quality regulation is limited only to the addition of pollutants resulting from water use under a water right.⁹¹ On the other hand, it is argued that water rights are property rights subject to reasonable police power-based regulation just as are other property rights and that regulation of the right for legitimate water quality objectives is acceptable so long as economic use of the right may still be made.⁹²

The Water Quality Control Commission has moved rather cautiously in this area. The commission's 401 certification process asserts the right to consider both the direct and indirect

water quality effects of the proposed activity but limits any conditions it may impose to those permitted by the Section 104 requirement that there not be material injury to the water right. In the Cheraw Lake case, the commission used its control regulation authority to address a specific water quality problem where other uses of water were threatened. As additional issues arise concerning water use and water quality, the reach of commission authority will become better defined.

The debate concerning how to reconcile our system of allocating and using water in Colorado with our desires to improve and protect water quality is an active one. These are by no means mutually exclusive interests since protecting water quality benefits both existing uses and possible future uses. Protecting water quality does, however, mean that business as usual in developing and using water is no longer acceptable. The federal Clean Water Act has elevated fishable/swimmable water quality to a national goal. It is not a matter of whether water use and water quality should be integrated but how that integration should occur. An especially difficult problem is how to address the depletive effects associated with water diversion and use which result in water quality impairment. Recent cases involving exchanges and plans for augmentation illustrate negotiated resolutions including extensive water quality monitoring and, sometimes, agreement not to take or use water when flows drop below a specified minimum. As we seek to make more intensive use of our already highly

developed water supplies we will need to face this issue on a broader basis.

NOTES

1. The common law principle is that one's property should be used in a manner as to not injure that of another. See, e.g., Evans v. Reading Chemical and Fertilizer Co., 160 Pa. 209, 214-15, 28 A. 702, 705 (1894) (per curiam). Riparian uses of water must be reasonable. In Parker v. American Globe Woollen Co., 195 Mass. 591, 600, 81 N.E. 468, 469 (1907) the court stated: "We regard it however as settled that no riparian proprietor has the right to use the waters of a natural stream for such purposes or in such a manner as will materially corrupt it to the substantial injury of a lower proprietor, or to cast or discharge into it noxious or deleterious substances which will tend to defile the water and make it unfit for use."
2. See notes 4-25 infra and accompanying text.
3. 33 U.S.C.A. §1252 et. seq. (1986).
4. Rev. Stat. of Colo., ch. 62, §8 (1868) (currently codified as Colo. Rev. Stat. §34-48-103 (1984 Repl.)).
5. Gen. Laws of Colo., ch. 24, §165 (1877); repealed by Act of April 27, 1967, ch. 217, §16(2), 1967 Colo. Sess. Laws 339,345. The constitutionality of this statute as a valid exercise of the state's police power was upheld in People v. Hupp, 53 Colo. 80, 123 P. 651 (1912). This case involved an action under the statute which had been filed to prevent the operation of a hotel in Estes Park from using the Big Thompson River to dispose of various kinds of refuse.
6. Rev. Stat. of Colo., ch. 35, §211 (1908); repealed by Act of April 27, 1967, ch. 217 §16(2), 1967 Colo. Sess. Laws 339,345.
7. Gen. Laws of Colo., ch. 100, §14 (1877) (currently codified as Colo. Rev. Stat. §31-15-707(1)(b) (1986 Repl.)).
8. 27 Colo. 169, 60 P. 635 (1900).
9. Mt. Emmons Mining Co. v. Town of Crested Butte, 690 P.2d 231 (Colo. 1984).
10. Rev. Stat. of Colo., ch. 38, §§4-5 (1908); repealed by Act of April 27, 1967, ch. 217, §16(1), 1967 Colo. Sess. Laws 339,345. See also City and County of Denver v. District Court, 140 Colo. 1, 342 P.2d 648 (1959).

11. Rev. Stat. of Colo., ch. 58 §§98-99 (1908); repealed by Act of May 11, 1984, ch. 245, 1984 Colo. Sess. Laws 848.

12. Hill v. King, 8 Cal. 336 (1857); Cushman v. Highland Ditch Co., 3 Colo. App. 437, 33 P. 344 (1893). For a general discussion see 3 Waters and Water Rights 91-95 (R. Clark ed. 1967).

13. The U.S. Supreme Court provided the following statement of this principle in Atchison v. Peterson, 87 U.S. (20 Wall.) 507, 514-515 (1874):

What diminution of quantity, or deterioration in quality, will constitute an invasion of the rights of the first appropriator will depend upon the special circumstances of each case, considered with reference to the uses to which the water is applied. A slight deterioration in quality might render the water unfit for drink or domestic purposes, whilst it would not sensibly impair its value for mining and irrigation. In all controversies, therefore, between him and parties subsequently claiming the water, the question for determination is necessarily whether his use and enjoyment of the water to the extent of his original appropriation have been impaired by the action of the defendant.

14. Clark, supra note 12 at 104.

15. Larimer County Reservoir Co. v. People ex rel. Luthe, 8 Colo. 614, 615, 9 P. 794, 796 (1886).

16. Cushman v. Highland Ditch Co., 3 Colo. App. 437, 439, 33 P. 344, 345.

17. Suffolk Gold Mining & Milling Co. v. San Miguel Consol. Mining & Milling Co., 9 Colo. App. 407, 48 P. 828 (1897).

18. Id. at 415, 48 P. at 831. The court reasoned:

since his title is a modified one, and his rights are, under some circumstances, subject to limitation and conditions with respect to prior and subsequent appropriators, we see no reason why some of the principles which have been thoroughly settled in many jurisdictions respecting riparian rights may not be applied to the determination of the relative rights of appropriators along the line of the streams in Colorado.

19. Id. at 417, 48 P. at 832.

20. Mack v. Town of Craig, 68 Colo. 337, 191 P. 101 (1920).

21. Id. at 343, 191 P. at 103. See also City and County of Denver v. Dist. Ct., 140 Colo. 1, 342 P.2d 648 (1959) (Glendale Water and Sanitation District not permitted to condemn either the waters or the bed and channel of Cherry Creek, a public stream, for the purpose of carrying sewage away).

22. 96 Colo. 319, 44 P.2d 1024 (1935).

23. Id. at 327, 44 P.2d at 1027.

24. Id. at 331, 44 P.2d at 1029.

25. 149 Colo. 318, 369 P.2d 557 (1962).

26. The original program was established under the Colorado Water Pollution Control Act of 1966. Act of March 9, 1966, ch. 44, 1966 Colo. Sess. Laws 199. This law was substantially revised by the Colorado Water Quality Control Act in 1973. Colorado Water Quality Control Act, ch. 210, 1973 Colo. Sess. Laws 709. Major amendments were enacted under Senate Bill 10 in 1981. Colorado Water Quality Control Act, ch. 324, 1981 Colo. Sess. Laws 1310. Colo. Rev. Stat. §§25-8-101 to 25-8-703 (1982 Repl. and 1988 Supp.).

27. Colo. Rev. Stat. §25-8-202(1)(1982 Repl.).

28. The division is to make the determination based on whether the water quality standard-based effluent limitations are "reasonably related to the economic, environmental, public health, and energy impact to the public and affected persons,...." Colo. Rev. Stat. §25-8-503(8)(1988 Supp.).

29. 5 Colo. Code Regs. §1002-8, Rule 3.1.6(1)(e) (1988).

According to commission regulations:

Classifications should be for the highest water quality attainable. Attainability is to be judged by whether or not the use classification can be attained in approximately twenty (20) years by any recognized control techniques that are environmentally, economically, and socially acceptable as determined by the Commission after public hearings.

30. 5 Colo. Code Regs. §1002-8, Rule 3.1.11 (1988). As stated in EPA regulations, "a water quality standard defines the water quality goals of a water body, or portion thereof, by designating use or uses to be made of the water and by setting criteria necessary to protect the uses." 40 C.F.R. §131.2 (1988).

31. 5 Colo. Code Regs. §1002-8, Rule 3.8.8(V) (1981). Numeric standards set specific limits for chemical constituents and other water quality parameters necessary to adequately protect the

classified uses in specific stream segments. The commission has classified uses for stream segments in each of the state's river basins and established specific numeric standards in connection with these classified uses.

32. 5 Colo. Code Regs. §1002-8, Rule 3.1.12 (1988).

33. 40 C.F.R. §131.12 (1988).

34. 5 Colo. Code Regs. §1002-8, Rule 3.1.8(1)(a) (1988).

35. Id. at Rule 3.1.8(2)(a).

36. Id. at Rule 3.1.8 (3). Reviewable waters include those designated as high quality 2 as well as those classified cold water aquatic life class 1, warm water aquatic life class 1, and recreation class 1. Regulated activities are those requiring a discharge permit or water quality certification under federal or state law, or which are subject to state control regulations specifying that the antidegradation review process is applicable.

37. 5 Colo. Code Regs. §1002-8, Rule 3.1.9(1) (1988). This low flow is based on the "average 30-day low flow with an average 1-in-3-year recurrence interval for chronic (30-day) standards or the empirically based 1-day low flow with an average 1-in-3-year recurrence interval for acute (1-day) standards, or the equivalent statistically-based flow."

38. 5 Colo. Code Regs. §1002-8, Rule 3.1.9(3) (1988). In the recently enacted Senate Bill 181, the legislature amended the Water Quality Act to specifically provide for the use of mixing zones "so long as water rights are not materially injured."

39. Colo. Rev. Stat. §25-8-205 (1982 Repl. & 1988 Supp.)

40. Colo. Rev. Stat. §25-8-205(2) (1982 Repl.). The commission must consider: (a) the need for regulations controlling specified pollutants that are the subject of water quality standards for the receiving state waters, (b) the need for regulations specifying treatment requirements for various types of discharges, (c) the degree to which any particular type of discharge is subject to treatment; the availability, practicality, and technical or economic feasibility of treatment techniques, and the significance of the discharge, (d) federal pollution control requirements, (e) whether the discharge to be controlled is continuous, intermittent, or seasonal, (f) whether a regulation of discharges into flowing water should be based on the volume of flow of the receiving water or the extent to which the discharge is diluted therein, or the capacity of the receiving water to assimilate the discharge, and (g) the need for specification of safety precautions to protect water quality.

41. Colo. Rev. Stat. §25-8-105 (1982 Repl. 1988 Supp.). Under the federal act, these plans are to include (1) the identification of the treatment works necessary to meet municipal and industrial waste treatment needs for twenty years; (2) identification of the means necessary to implement the plan; (3) a process to identify all nonpoint source problems; and (4) procedures and methods to control nonpoint sources. 33 U.S.C. §§1288(b)(2)(A) -(K) (1986).

42. Telephone interview with Bill McKee of the Colorado Water Quality Control Division (June 5, 1989).

43. 33 U.S.C.A. §1251(a)(7) (1989 Supp.).

44. 33 U.S.C.A. §1329(b)(2)(A) (1989).

45. Colorado Water Quality Control Division, Colorado Nonpoint Assessment Report (Apr. 1988). Among the major findings of this report are that at least 3,300 miles of the state's streams are "impacted" by nonpoint source pollution and that the major pollutants are sediment (2,154 miles), salinity (1,533 miles), and heavy metals (1,313 miles).

Colorado Water Quality Control Division, Colorado Nonpoint Source Management Program (Jan. 1989). This report describes the management approach established in Colorado to address nonpoint source problems and describes projects to address problems in the areas of agriculture, mining, and urban runoff. It also briefly discusses best management practices which may be applicable.

46. 33 U.S.C. §1341(a)(1) (1986).

47. 5 Colo. Code Reg. §1002-18, Rule 2.4 (1989).

48. Id. at Rule 2.4.3(4).

49. Id. at Rule 2.4.5(21).

50. Colo. Rev. Stat. §25-8-102(1) (1982 Repl.). This policy section contains some other interesting language. Instead of the "no discharge of pollutants" goal contained in the federal act it provides that "no pollutant be released into any state waters without first receiving the treatment or other corrective action necessary to reasonably protect the legitimate and beneficial uses of such waters;...." Colo. Rev. Stat. §25-8-102(2)(1982 Repl.). Moreover, it subjects the water quality program to an "economic reasonableness" requirement:

It is further declared that the general assembly intend that this article shall be construed to require the development of a water quality program in which the water quality benefits of the pollution control measures utilized have a reasonable relationship to the economic,

environmental, energy, and public health costs and impacts of such measures, and that before any federal action is taken, with the exception of any enforcement action, consideration is given to the economic reasonableness of the action. Colo. Rev. Stat. §25-8-102(5)(1982 Repl.).

51. Colo. Rev. Stat. §25-8-102(2)(1982 Repl.).

52. Colo. Rev. Stat. §25-8-104 (1982 Repl.).

53. In *Pulaski Irr. Ditch Co. v. City of Trinidad*, 70 Colo. 565, 203 P. 681 (1922), the Colorado Supreme Court ruled that municipal effluent must be returned to the stream. Since downstream users are entitled to rely on these returned waters, evaporative treatment techniques reducing available supplies would cause injury in fully appropriated stream systems. Thus, the Water Quality Control Act provides for consideration of such injury resulting from discharge limits reducing historically available flows of water. Colo. Rev. Stat. §25-8-205(4)(b) (1982 Repl. Vol.).

54. Senate Bill 181, §1, 1989 (amending Colo. Rev. Stat. §25-8-104).

55. Colo. Rev. Stat. §25-8-203(2)(e)(1982 Repl. or 1988 Supp.).

56. Colo. Rev. Stat. §25-8-203(2)(f)(1982 Repl.). This provision goes on to state that standards may be utilized for purposes of discharge permits. For a discussion of this issue see Hughes, Amendments to the Colorado Water Quality Control Act, 10 Colo. Lawyer 2758, 2269-70(1982).

57. Colo. Rev. Stat. §205-8-204(4)(b)(1982 Repl.).

58. Colo. Rev. Stat. §25-8-503(5) (1982 Repl.).

59. Colo. Rev. Stat. §25-8-503(5)(1982 Repl.). See also Colo. Rev. Stat. §25-8-504(3)(1982 Repl.). This exclusion does not apply to "any point source discharger which generates wastewater effluent...." Colo. Rev. Stat. §25-8-503(6)(1982 Repl.).

60. Colo. Rev. Stat. §25-8-501(1)(1982 Repl.).

61. Colo. Rev. Stat. §25-8-503(6)(1982 Repl.).

62. Colo. Rev. Stat. §25-8-504(1)(1982 Repl.).

63. Colorado Water Quality Control Commission, Policy on Water Quality/Water Quantity Issues, January 5, 1981. However, the policy statement then suggested that any such control regulations applied to nonpoint source activities may contravene Colorado water rights law.

64. Colo. Rev. Stat. §25-8-205(5) (1982 Repl. & 1988 Supp.).
65. Colo. Rev. Stat. §25-8-205(5) (1988 Supp.).
66. Northwest Colorado Council of Governments, Areawide Water Quality Management Plan for Eagle, Grant, Jackson, Pitkin, Routt, and Summit Counties, Colorado (Revised June 1985).
67. Requested policy objectives included (1) minimizing the adverse environmental impact of water diversion storage and conveyance structures and facilities; (2) ensuring that future diversions and ancillary activities do not cause a significant deterioration in water quality conditions or impair the current or designated uses of the region's water; (3) ensuring through participation in the planning, design, and operation of reservoirs that the quality of impounded water will be suitable on a permanent basis for its intended use and that discharges downstream will not significantly degrade water quality; (4) ensuring that additional costs for advanced wastewater treatment directly caused by future hydrologic modifications are equitably shared by the proponent of those modifications; and (5) ensuring that development of water resources within the region for out of basin use is compatible with water quality objectives and will not increase the cost of meeting clean water goals for water users within the region. Id. at 13.
68. Northwest Council of Governments, Areawide Water Quality Management Plan for Region Twelve, 25, Policy #2 (approved Feb. 26, 1987 by NWCOG; conditionally approved Aug. 19, 1987 by Water Quality Control Division). The conditions were that its approval was not to be interpreted in a manner inconsistent with Colorado water law or the Water Quality Control Act and nor as taking any position concerning the scope of local authority to regulate water development projects relating to water quality. Laitos, Assault on the Citadel, Part I: Water Quality Laws and the Exercise of Water Rights, 17 Colo. Law. 1305, 1307 (1988).
69. Activities qualifying for a general or nationwide 404 permit must be certified without the imposition of any conditions. Colo. Rev. Stat. 25-8-302(1)(f) (1988 Supp.).
70. Colo. Code Regs. §1002-23 (1988) (superseded by Colo. Code Regs. §1002-23 (1988)).
71. 5 Colo. Code Regs. §1002-23, Rule 4.4.2 (1989).
72. Colorado Ground Water Management Act, ch. 319, 1965 Colo. Sess. Laws 1246 or Colo. Rev. Stat. §§37-90-101 et. seq. (1973).
73. Colo. Rev. Stat. §37-90-107(4) (1973).
74. Colo. Rev. Stat. §37-90-107(5) (1973).

75. Colo. Rev. Stat. §37-80-120(3)(1973) (emphasis added).
76. For a discussion of these activities see MacDonnell, Colorado's Law of "Underground Water": A Look at the South Platte Basin and Beyond, 59 U. Colo. Law Rev. 579 (1988).
77. Colo. Rev. Stat. §37-92-103(9) (Supp. 1988).
78. Colo. Rev. Stat. §37-92-305(5)(1973) (emphasis added).
79. Colo. Rev. Stat. §37-83-104 (1973).
80. See Hallford, Water Reuse and Exchange Plans, 17 Colo. Law. 1083 (1988).
81. 196 Colo. 539, 589 P.2d 57 (1979).
82. Id. at 543, 589 P.2d at 59-60.
83. Porzak, Innovative Transfers and Exchange Plans, in Tradition, Innovation and Conflict: Perspectives on Colorado Water Law 201-02 (L. MacDonnell ed. 1987).
84. Application for Water Rights of the City of Golden, in Clear Creek, Jefferson and Adams Counties, Supplemental Findings of Fact, Conclusions of Law, Judgment and Decree, Case No. 83-CW-361. District Court, Water Division One, Colorado, June 17, 1986.
85. Known by the participants as the "Cosmic Settlement," this complicated arrangement resolved many of the matters of dispute among the parties.
86. Application for Water Rights for Mission Viejo Company, Highlands Ranch Development Corporation and Centennial Water and Sanitation District, Findings of Fact, Conclusion of Law, Judgment and Decree of the Water Court, Case No. 85 CW 415, District Court, Water Division No. 1, Colorado, December 8, 1988.
87. The Q7-10 flow is the minimum average seven-consecutive-day flow expected to occur once in ten years. This low flow standard now has been replaced by a different standard. See supra note 37.
88. Application for Water Rights of the Board of Water Works of Pueblo, Colorado, in the Arkansas River and its Tributaries in Lake, Chaffee and Pueblo Counties, Findings of Fact, Conclusions of Law, Judgment and Decree, Case No. 84 CW 177, District Court Water Division No. 2, Colorado, February 24, 1988.
89. A long-term reduction in flows causes the Q7-10 level to be revised downward. To maintain water quality under these conditions it is necessary to increase the restriction on discharges from regulated point sources. In this case, the court found that the

cities' wastewater treatment facilities could only meet these tighter restrictions by making very expensive changes.

90. A stipulation entered into between Colorado Springs, which was seeking to obtain a decree for a similar exchange arrangement in the Arkansas and intermediate cities potentially affected by the reduction in flows, had already reached a similar settlement. Application for Water Rights of the City of Colorado Springs, Colorado in the Arkansas River and its Tributaries, Stipulation with Florence, Canon City, and Pueblo West, Case No. 84 CW 202 and 84 CW 203, June 16, 1987. By this stipulation, Colorado Springs agreed not to operate its exchanges in such a way as to decrease the flow of water in the Arkansas River at a point immediately above the discharge point of the Fremont Sanitation District Wastewater Treatment Plan to below 190 cubic feet per second.

91. See Hobbs & Raley, Water Quality Versus Water Quantity: A Delicate Balance, 34 Rocky Mt. Min. L. Inst., ch.24 (1988); Hobbs & Raley, Water Rights Protection in Water Quality Law, 60 U. Colo. L. Rev. ____ (1989 forthcoming).

92. See Laitos, Assault on the Citadel, Part I: Water Quality Laws and the Exercise of Water Rights, 17 Colo. Law. 1305 (1988); Laitos, Assault on the Citadel, Part II: Diversions and Water Quality Regulations, 17 Colo. Law. 2003 (1988); Kassen, The Burden of Maintaining Colorado's Water Quality, 18 Colo. Law. 23 (1989).