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WESTERN WATER LAW AND COAL DEVELOPMENT

BY A. DAN TARLOCK*

Since 1973 energy planners and developers have looked lovingly at western coal resources as a solution to the problems of national dependence on imported oil and gas. Many westerners have not returned this affection because of fears that the demands of the Pacific Coast, Southeastern and Midwestern states for electricity would simply be the final rape of the West for the benefit of other regions. Thus, the relationship between western coal development and western water allocation must be approached from the perspective of two macro-debates which relate to western coal development. The first of these debates is that over the content and direction of a national energy policy designed to achieve supply independence. The second controversy involves the regional impacts of energy development and what these impacts portend for deeply held values in the west.

Western environmentalists and farmers have often pictured the costs of increased coal development in terms of dry streambeds, destroyed wildlife habitats, “sun belt” cities denied the water to fulfill their manifest destiny, a devastated agricultural economy and Indian tribes denied the water that they need to progress economically. Proponents of coal conversion as an integral part of energy independence have sometimes argued that there is a need to give the use of water for coal development some form of preference; opponents of increased coal development suggest the opposite and argue that the use of water for this purpose should be rigorously controlled. The thesis of this Article is that the impact of increased coal development on western water allocation is significant but that the potential adverse impacts have been overexaggerated. There is no justification either for according water for coal development some form of preference or for specifically restricting the use of water for this purpose. Western coal developers must compete with other claimants under rules which are becoming complex as new interests are protected in the prior appropriation system. Coal developers will face competition from western states and the federal government, which are increas-

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ingly using instream flow protection mechanisms to promote regional stability, and from traditional consumptive use claimants. However, coal developers will not encounter unsurmountable problems in finding needed water rights or in complying with water quality laws. This Article will discuss the constraints that western water law imposes on coal development and will attempt to distinguish between justified and unjustified constraints.

THE ROLE OF COAL IN UNITED STATES ENERGY POLICY

The Upper Colorado and Upper Missouri basins form a western energy basket in which coal reserves abound. ¹ Coal is the nation's most abundant non-renewable energy resource. It is widely distributed throughout the United States, and reserves exceed the demand, but its use for industrial, commercial, and residential fuel has declined constantly since World War II as cleaner energy sources, primarily oil and natural gas, replaced coal. At the present time, the major use of coal is for the generation of electricity: utilities produce about forty-four percent of their energy with coal. Until the 1973 oil embargo dramatically illustrated that the Organization of Petroleum Export Council (OPEC) nations have the political power and will to control the world price of oil and that the United States was dependent upon OPEC oil² for our energy needs, there was little systematic effort to develop a national coal policy. Although eighty-five percent of western coal is found on the public lands or controlled by the federal government, the federal government had no incentive until the mid-1970's to promote the aggressive development of public as well as private western coal resources.³

1. Recoverable reserves for both underground and surface mining for the principal Upper Colorado and Missouri basin producing states (in million of tons) as of January 1, 1976 are:
   a. Colorado 10,100
   b. Montana 80,100
   c. New Mexico 3,200
   d. North Dakota 8,100
   e. Utah 3,800
   f. Wyoming 37,000

OFFICE OF TECHNOLOGY ASSESSMENT, THE DIRECT USE OF COAL 63 (1979) [Hereinafter cited as the DIRECT USE OF COAL].


3. The Department of the Interior's management of federal coal resources on public lands or controlled by the United States through mineral reservations has long been controversial. See, e.g., GENERAL ACCOUNTING OFFICE ROLE OF FEDERAL COAL RESERVES IN MEETING NATIONAL ENERGY GOALS NEEDS TO DETERMINED AND THE LEARNING PROCESSING IMPROVED (1976). In brief, after a 1970 BLM study, HOLDINGS AND DEVELOPMENT OF
The legislative and executive branches of the federal government have yet to clearly articulate a comprehensive national policy for the development of coal resources. Nonetheless, a policy can be inferred from the often contradictory goals of the recent federal statutes regulating the production and use of coal to minimize adverse environmental impacts and the statutes and executive actions adopted in pursuit of the often professed but not yet implemented goal of energy independence. As the impact of the political instability of most major foreign producers of oil has been felt, and as the continued decline in our domestic oil reserves has become more immediate, three independent, or at least less dependent, strategies are emerging. Highest priority is given to the reduction of existing levels of energy consumption by pricing oil and gas at their world replacement cost and enacting mandatory automobile and building energy efficiency conversion standards. The strategy given second priority is the increased use of existing and abundant domestic energy resources, coal and nuclear power. The third strategy is the development of new interim energy sources such as geothermal and synthetic fuels, to be replaced in the future by solar power and nuclear fission. This three part policy, with its current emphasis on increasing the cost of energy, is under attack from consumers and environmentalists as being inequitable and unduly dirty, and from others for its failure to take even harsher conservation measures or eliminate costly production constraints. Still, the rough outlines of a national energy policy are stabilizing.

Immediately after the 1973 oil embargo, a proposal to increase the use of low sulfur western coal was the centerpiece of a federal coal conversion policy which, along with the increased use of nuclear

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4. The Direct Use of Coal, supra note 1, at 337-370.

energy, would implement the second strategy. However, due to the public's increasing unease over the costs of the Faustian bargain struck with nuclear energy, the environmental costs of strip mining, and a clean air policy which currently gives little credit to one who burns low- as opposed to high-sulfur coal, increased western coal production became a less important component of this country's energy policy. The debate over reactor safety and waste disposal has resulted in a de facto moratorium on the construction of new nuclear plants. Although the slow down in the development of nuclear power may only be temporary, the current fate of the "nuclear promise" has lent increased support to the argument for increased coal conversion, if for no other reason than that the health and safety problems of coal production and use seem more manageable.

In 1979 three major energy policy studies were released; two of them urged the increased use of coal. The federal government has outlined an aggressive coal conversion policy, and the Department of Interior has released a long-awaited report calling for the increased development of federal coal reserves.

Energy consumption figures show that a substantial increase in coal conversion and production is, however, more of a goal than a policy in the process of rapid implementation. Recent projections suggest that the basic energy supply mix will not change significantly over the next decade. The mix is now oil, 44%; gas, 25%; coal, just under 20%; and nuclear and hydroelectric, 8%. The "exotics" (solar, wind, geothermal, etc.) scarcely register, and current projections suggest that at most "nuclear power and coal may pick up five

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6. Two new reactors were ordered by industry in 1978 and these were the last new orders. In 1979 not only were there no new orders but eleven previous orders were cancelled. Eight new reactors were not granted licenses, and by the end of 1979 the percentage of electricity generated by nuclear power fell from 12.9 to 10.6 percent. Burnham, Inactive Reactors: One Year's Toll of Three Mile Island, N.Y. Times, Mar. 16, 1980, § 3, at 1. For a lucid presentation of the technical arguments about reactor safety see Lewis, The Safety of Fission Reactors, 242 Scientific American, March 1980, at 53.


8. President Carter has proposed a Coal Conversion grant program, $2470, to displace the use of 1 million barrels of oil by 1990. CCH Energy Management ¶ 9342, March 20, 1980.

percentage points during the decade . . . .\footnote{10} In an attempt to change this projection, coal conversion has been articulated as a major government energy policy, and increased production from federal leases has been urged. While eastern coal is more valuable in terms of heating value per ton and is closer to the centers of demand, eastern coal has a higher sulfur content compared to that mined from the western region.

The President's Commission on Coal released a report in early March of 1980 which calls for a change in the eighteen to nineteen percent supply figure and argues that the increased use of coal could take the place of two million barrels of oil a year, slightly less than one-fourth of the amount we currently import, by 1990, with only minimal increases in pollution levels.\footnote{11} The Department of the Interior also released a study on March 1, 1980 which reported that one-hundred million tons of coal were produced on federal lands in 1979, a twenty-five percent increase over 1978, and the report predicts that federal leases will produce more than 220 million tons by 1985.\footnote{12}

As with any policy, there are trade-offs involved with this government energy program. Coal and other forms of energy development such as oil shale retorting and synthetic fuel plants threaten to disrupt the economic and social stability of this fragile and sparsely-populated region. Many farms which are economically marginal may be abandoned as energy developers bid away water rights. Without prior planning many small towns have become "boom towns" in an era that does not appreciate a nineteenth-century Cripple Creek or Virginia City.\footnote{13} The use of water to promote environmental values is threatened by energy development as substantial amounts of water for consumptive uses may be needed. Though the water use scenarios overestimate demand, there are many new and subtle water pollution problems in addition to the traditional ones which occur when mining wastes are dumped in a stream. To examine the consequences of coal development for western water resources, this Article will describe the likely water quality and quantity impacts of increased coal production and conversion, examine the major legal problems encountered in shifting water from existing uses to coal production and

\footnotesize{10. Winter, Oil and Gas to Remain Firms Primary Fuels as New Sources Falter, Wall St. J., Feb. 12, 1980, at 1, col. 6. With minor variation the same mix is reported in Energy in America's Future, supra note 7 at 71.}

\footnotesize{11. Report of the President's Commission on Coal (1980).}

\footnotesize{12. Federal Coal Management Report, supra note 9.}

\footnotesize{13. Little, Some Social Consequences of Boom Towns, 53 North Dakota L. Rev. 401 (1977).}
conversion, and discuss whether the use of water for coal production and conversion need be given some sort of preference in light of the "marco" perspectives of national energy policy, or whether it should be restricted because of the scarcity of western waters for competing uses. The enormity of this problem precludes a comprehensive resolution to the debates now going on in the west and in Washington over the future uses of western waters, but it is hoped that the explicit focus on the impact of western water law on coal production and conversion will provide a clearer perspective for future debate.

WATER QUANTITY AND QUALITY ISSUES IN THE UPPER COLORADO AND MISSOURI BASINS

The Upper Colorado and Upper Missouri Basins are harsh, often beautiful but vulnerable, arid regions of sparse population. Geography has forced dwellers of these regions to develop an economy based primarily on livestock grazing with patches of irrigated agriculture, mineral extraction and energy resource production, and tourism. Water is a necessary condition both to human life and to the economic survival of this arid region. The western states developed a law of water allocation to insure survival in dry country. Now, coal mining and conversion are said to cause substantial water quality problems and supply conflicts which the law of prior appropriation is not well equipped to minimize, thus, the law of water allocation is severely strained.

The law of prior appropriation deals primarily with relationships among holders of vested rights and not with public rights to environmental quality. Downstream senior appropriators have some rights to a clean stream as against upstream juniors, but downstream juniors have little right to expect a clean stream from upstream seniors on the theory that the senior could wipe them out at any time by taking all the water. In fact, recent pollution-related water rights fights have involved claims by juniors against upstream seniors


who cleaned up the stream by removing silt or changed the point of discharge of sewage effluent rather than demands for clean streams. Since the doctrine of prior appropriation was not designed to deal with water quality issues, the production of water resources has been guaranteed by state regulatory programs which administer federal effluent limitations and other pollution standards, or by direct federal regulation. These anti-pollution requirements affect coal mining by increasing the costs of operations, and in some cases the water quality requirements imposed by federal and state law on coal-related operations may conflict with the rules which protect holders of vested rights. For example, pollution standards imposed by the Surface Mining Reclamation Act of 1977 go beyond the protection of the integrity of a physical water supply system accorded by the law of prior appropriation.

The quantity of water available for coal mining and use is a function of the overall supply which is physically and legally available to each region, coupled with the number of competing claimants for appropriated and unappropriated supplies. This section surveys the water quantity demands and quality impacts associated with coal mining and use, the gross estimated amounts of the water available in the two basins, the legal and economic problems involved in applying this water to coal mining and use, and the claimants who are likely to compete for available supplies.

A. Water Quantity Needs and Quality Impacts

Today coal is primarily used for the direct generation of electrical energy. After the coal is removed from the ground it must be prepared to meet the customers' size, moisture, and mineral concentration needs. In the West, coal is only crushed, while in other parts

17. Cases from Colorado and Wyoming have recently held that downstream appropriators have no vested rights to the continued discharge of treated sewage effluent so long as the waste water was imported into the stream system into which it is discharged. City and County of Denver Board of Water Commissioners v. Fulton Irrigating Ditch Co., 179 Colo. 47, 506 P.2d 144 (1972) and Thayer v. City of Rawlins, 594 P.2d 951 (Wyo. 1979). Wyoming has not yet ruled whether an in-basin appropriator may treat its effluent by a process which totally consumes the effluent. See State By and Through Christopoulis v. Husky Oil, — Wyo —, 575 P.2d 262 (Wyo. 1978).
of the country it is also washed to remove mineral impurities. However, if coal slurry pipelines are constructed, considerable water is needed for the beneficiation process. A description of this process follows:

Preparation begins with impact crushing, followed by the addition of water and further grinding to a maximum particle size of one-eighth of an inch. More water is then added to form a mixture that is about 50 percent dry coal by weight, and the resulting slurry is stored in a tank equipped with mechanical agitators to prevent settling.20

A pipeline transporting 25 million tons per year will require 18,400 acre-feet, a nice water rights package in most parts of the west.21

When coal is burned directly to produce electricity, about sixty percent of the energy in the coal is converted not into electricity but into heat, and the Second Law of Thermodynamics requires that the resulting waste heat go somewhere. Traditionally, this heat was simply transferred to the water used to cool the generators, and this heated water was then discharged directly into the water source at a temperature higher than that of the original cooling water. This direct discharge of heated cooling water served as a potential source of ecological damage, and, as a result, thermal pollution became a concern which first emerged as a significant environmental problem in 1968-70.

Although the general adverse ecological impacts of the direct discharge of heated water are well-known, the adverse impacts of once-through cooling, unlike those arising from the discharge of SO₂, NOₓ, and CO₂ into the atmosphere,22 are site-specific. The Clean Water Act therefore draws a distinction between thermal pollution and all other forms of pollution by subjecting the discharge of heated cooling water to the Act’s general technology-forcing standards but permitting individual plants to obtain a variance by showing that no significant adverse environmental impacts are likely to occur from the discharge.23 A Section 316 variance was obtained at the Seabrook Plant on the Atlantic Ocean in New Hampshire,24 where the

20. THE DIRECT USE OF COAL, supra note 1, at 89.
21. Id. at 237.
22. Id. at 186-232.
24. Seacoast Anti-Pollution League v. Castle, 572 F.2d 872 (1st Cir. 1978), opinion on remand 597 F.2d 306 (1st Cir. 1979) cert. denied ___ U.S. ___ (1979). § 316 authorizes less stringent effluent limitations than would otherwise be imposed if the point source operator can still assure “the projection [sic] and propagation of a balanced, indigenous population of shell-
receiving water is quite cold all year, but most coal-fired and nuclear plants must install closed-cycle cooling systems to meet the best-practical- and best-available-technology requirements. Closed-cycle cooling is achieved primarily through the use of evaporative wet cooling towers or cooling lakes, and these evaporative systems will cause the largest consumptive use of water in the coal fuel cycle—some 29,000 acre-feet per year for a 3,000 MW plant.2

The final consumptive use of water will be for reclamation. The Office of Technology Assessment, using Environmental Protection Agency figures for 3,400 acre-feet per year, observes that “water also may be demanded for irrigation of revegetated surface mines, especially in the West where reclamation is more difficult. The quantities of water are comparatively small . . . but may nevertheless become a public concern in arid regions where competition or water is becoming critical.”

Water quality impacts occur at all stages of coal mining and use. Mining requires that the overburden be placed in soil banks pending reclamation. In the West, the alkalinity of the soil does not present a severe acid mine drainage problem, but mine drainage may cause salinity problems because of the dissolution of soluble ions such as sulfates and chlorides. The salinity problem is minimized in the Northern Great Plains because water is used to irrigate salt-resistant crops, but the problem is acute in the Colorado River Basin, where most crops are more salt-sensitive.

Additional degradation occurs when violent thunderstorms wash substantial amounts of silt from soil banks into local streams causing environmental damage and clogging headgates. Leaching from these soil banks is another source of contamination. Strip mining, a common method of extracting western coal, may have substantial adverse impacts on the quality of aquifers.

Mining and reclamation activities which affect surface and ground water resources are regulated primarily by two federal statutes which establish joint federal-state pollution control programs. These statutes are the Surface Mining Control Act of 1977, which is administered by the Department of the Interior, and the Clean

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25. The Direct Use of Coal, supra note 1, at 236.
26. Id. at 236.
27. Id. at 235.
Water Act, which is administered by the Environmental Protection Agency. The former attempts to protect ground and surface water supplies from impairment by deflecting mining away from water-dependent areas such as agricultural alluvial valleys and by protecting the hydrological balance in the area of the mining. The re-

30. 30 C.F.R. § 785.19 (c)(1) (1979) prohibits surface mining west of the 100th meridian unless the Office of Surface Mining finds, inter alia, that the proposed operations will not preclude farming unless the history of agriculture is insignificant or the pre-mining land use was undeveloped range land use and the proposed operations will not materially damage the quantity and quality of surface or ground waters in the defined alluvial valleys. See, Swift, Implementation of the Surface Mining Control and Reclamation Act of 1977 From a Coal Operator's Perspective, 25 ROCKY MT. L. REV. 4-1, 4-34-49 (1979).
31. 30 C.F.R. § 710.15 (1979) defines hydrologic balance as follows:
Hydrologic balance means the relationship between the quality and quantity of inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake, or reservoir. It encompasses the quantity and quality relationships between precipitation, runoff, evaporation, and the change in ground and surface water storage.

This concept and its relative alluvial valley floors will be very difficult to administer because the regulations attempt to formulate scientific standards on issues about which no consensus exists. The general purpose of the hydrologic balance regulations is to protect land and water users from two types of potential impairments which are neither well protected by existing federal and state pollution laws nor by the law of western water rights. 30 C.F.R. § 715.17 (1979) is intended to protect land and water users from numerous non-point sources of pollution such as erosion and leaching and from de-watering and the effect that this has on the ability of groundwater users to economically use aquifers. For example, § 715.17(h) requires that "[t]he disturbed area shall be reclaimed to restore approximate premining recharge capacity through restoration of the capability of the reclaimed areas as a whole to transmit water to the groundwater system." This section must be closely coordinated with the law of prior appropriation, for the hydrologic balance requirements could be interpreted to give groundwater users greater rights than they enjoy under state water law. No area of western water law is more confused than the law of groundwater, but groundwater users face impairment from two principal sources: senior surface right holders and other pumpers exercising a correlative right to lower the groundwater level without liability to senior pumpers who suffer increased lift costs. See C. MEYERS AND A. TARLOCK, WATER RESOURCE MANAGEMENT, 679-778 (2d ed. 1979).

The fate of the hydrologic balance regulations is somewhat confused because of numerous suits challenging various aspects of the Surface Mining Control Act. See REPORT BY THE COMPTROLLER GENERAL OF THE UNITED STATES, ISSUES SURROUNDING THE SURFACE MINING CONTROL AND RECLAMATION ACT (September 21, 1979). In Virginia Surface Mining and Reclamation Ass'n v. Andrus, 483 F.Supp. 425, 14 E.R.C. 1055 (1980), order stayed pending appeal, ___ U.S. ___, 14 E.R.C. 1149 (1980), the district court held that the sections of the Act which require the restoration of land to its original contours violate both the Tenth Amendment and substantive due process. Relying on National League of Cities v. Usery, 426 U.S. 833 (1976), the court reasoned that because the Act deprived the state of control over land use and economic development in coal mining regions, the state was deprived of an essential attribute of sovereignty. This holding is, of course, not applicable to the regulation of mining on public lands. However, the case has implications for the West because on the substantive due process issue the court lumped the hydrologic balance and slope restoration requirements together. The court held that "in the case now before us the facts are on all fours with Penn-
requirements which the federal government may impose to insure compliance with these standards are designed to protect the integrity of a water regime beyond the protections afforded by the established principle of the prior appropriation doctrine that all those who rely on return flows may not be injured by a change of diversion point or transfer.\textsuperscript{32} The costs that these requirements will impose is not yet clear, but they are an excellent example of the integration of new interests in western water law. All surface run-off must be passed through sedimentation ponds which must be retained until the area is restored. Discharges from sedimentation ponds are point sources of pollution and thus are subject to the effluent limitations of National Pollution Discharge Elimination System (NPDES) permit requirements of the Clean Water Act.\textsuperscript{33} Effluent limitations have been set for total dissolved solids levels and for acidity and alkalinity.\textsuperscript{34}

In addition to effluent standards, point source discharges are subject to receiving water quality standards set by the states subject to Environmental Protection Agency (EPA) guidelines. The impact of receiving water standards on mining is illustrated by a recent case from the district court of South Dakota.\textsuperscript{35} A mining company accepted an NPDES permit with conditions imposed to protect a stream, designated as a permanent cold water fishery, into which the mining company discharged through a tributary. To avoid compli-

\textsuperscript{32} See J. SAX, WATER LAW, PLANNING & POLICY 230-62 (1968).
\textsuperscript{34} National suspended-solid limitations do not apply in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming but will be established on a case-by-case basis. The Administrator of the Environmental Protection Agency’s discretion to treat the western states differently was upheld in Consolidation Coal Co. v. Costle, 604 F.2d 239, 246-48 (4th Cir. 1979). The court also held that the Administrator was not required to take receiving water quality into account in considering variance requests but that “elements of the environment apart from receiving water” were relevant.
ance with the permit, the company attempted to upset EPA approval of the state's water quality standards because the Agency approved standards higher than those recommended in its guidelines, but it was not successful. The court held that the Clean Water Act allows states to set higher standards than those required by the EPA, and that standards may be set without reference to economic or social factors. Such water quality standards affect coal mining, since the Office of Surface Mining (OSM) of the Department of the Interior takes the position that no sedimentation pond may be removed until the stored run-off meets applicable water quality standards. Although it has been suggested that this run-off is a non-point source not subject to the state water quality standards, OSM's regulation has been upheld on the ground that it fills a gap left by the Clean Water Act.  

Coal mining does not require substantial amounts of water, and the availability of water for mining is not perceived as a substantial problem within the industry. As the preceding discussion illustrates, the major water problems are quality problems. The use of coal to generate electricity or to produce synthetic fuels does consume substantial amounts of water. With respect to the generation of electricity, the Office of Technology Assessment reports:

The environmental effect of massive consumption of water by powerplant cooling systems is twofold:

The amount of water available to dilute downstream discharges is reduced, and water quality is thus degraded. This effect is especially evident in the Colorado River, where massive water consumption (by agriculture, in this case) coupled with substantial pollution loadings have elevated salt concentrations in the River to the point where desalinization plants are required to keep water quality within standards. In critical watersheds, the physical quantity of water remaining in the streams may fall below that needed to support the water ecosystem. The recognition that this "instream use" of water is a "beneficial use" within the legal system established for allocating water rights is a recent one, and thus protection of water ecosystems from destruction by

sheer lack of water is a recent development.\textsuperscript{87}

Water consumption by power plants may be reduced by the substitution of dry for wet cooling towers. The issue is, as always, one of cost. At the present time, wet cooling is cheaper until water reaches $870.00 per acre-foot.

In addition to burning coal directly, technologies exist to convert coal to gas. Considerable sums of money are being spent to make synthetic fuel processes operational at costs comparable to conventional fuel sources, and the Priority Energy Act of 1979, which was defeated in Congress, would have created an Energy Mobilization Board to put projects such as synthetic fuel conversion plants on a "fast track" to expedite their construction.\textsuperscript{88} Synthetic fuels technologies such as Lurgi gasification, Synthane gasification, and Synthol liquefaction have water demands ranging from an estimated 17,500 acre-feet to 6,700 acre-feet per year. The Lurgi process is the most water efficient because it utilizes the moisture present in "wet" coal. The project director of "Energy From the West" has argued that the water use efficiency of the Lurgi process, compared to the direct use of coal for the generation of electricity, probably "should be interpreted to mean that coal gasification is preferable to electric power generation in the more critically water short areas."\textsuperscript{89}

B. Gross Supply Constraints in the Upper Colorado and Missouri Basin

Each basin faces a different supply problem. A 1977 study of the Upper Missouri Basin entitled "Energy From the West" estimated that there are 12.5 million acre-feet available for future development and that reasonable projections indicate that only eight to fifteen percent of that amount will be used, even assuming that no attempt at water conservation is made.\textsuperscript{40} There is, however, a site availability problem. "[M]uch of this potentially available water

\textsuperscript{37.} \textit{The Direct Use of Coal}, supra note 1, at 238.
\textsuperscript{38.} \textit{See} note 103, infra.
\textsuperscript{39.} Plotkin, Gold & White, \textit{supra} note 19 at 99. A recent paper, Abbey, Water Use For Coal Gasification: How much Water Is Appropriate? (Oct. 1979) (Informal Report LA-8060-MS, Los Alamos Scientific Laboratory), argues that a guaranteed source of supply is a necessary condition for any synthetic fuel plant but that "differences in process water consumption are inconsequential to the economics of competing processes. For a given quality of coal feed and production cost estimated, water would have to be valued at a galactic $66,000/acre-ft before it would influence the selection process." \textit{Id.} at 4.
\textsuperscript{40.} Plotkin, Gold, & White, \textit{supra} note 19.
may be very expensive because it will have to be transported long
distances to development sites.\textsuperscript{41} For example, proposals are pend-
ing to take water from the Oahe reservoir on the main stem of the
Missouri in South Dakota and pipe it to the Wyoming coal fields.\textsuperscript{42}
Controversies may result from shortages in critical parts of the Yel-
lowstone basin, and the Yellowstone compact may bar transbasin
diversions.\textsuperscript{43}

In the Upper Colorado River Basin many of the legal issues are
the result of one overriding factor: scarce physical supply of water.
In order to understand the potential supply problems one must un-
derstand the "law of the river"\textsuperscript{44} which controls the allocaton of the
great Colorado. Interstate streams must be shared among the ripa-
rian states by the law of equitable apportionment, under which the
Supreme Court oversees the proper allocation of water.\textsuperscript{45} Interna-
tional rivers must be shared among riparian nations by broad but
similar principles of international law.\textsuperscript{46} The Colorado River is cur-
rently allocated by treaty, compacts, federal legislation, and the Su-
preme Court decision in \textit{Arizona v. California}.\textsuperscript{47}

The gross rights to make a consumptive use of the river are di-
vided roughly as follows: First, Mexico is guaranteed the right to 1.5
million acre-feet annually except in times of extreme
shortage.\textsuperscript{48} Mexico has consistently claimed that they have a right to 1.5 million
acre-feet of high quality water, but the claim has never been legally
adjudicated. Instead the Colorado Basin Salinity Control Council\textsuperscript{49}
assumes federal responsibility for the quality of water through the
construction of a desalinization plant and other water quality mea-
sures. Second, the river is divided between the Upper and Lower Ba-
sins by the 1922 Colorado Compact.\textsuperscript{50} Each basin has the right to
the consumptive and beneficial use of 7.5 million acre-feet per annum, but the Upper Basin states of Colorado, New Mexico, Wyoming and Utah must bear the full burden of short years because the Lower Basin, has a preference in the form of a delivery guarantee. The Lower Basin has the right to an aggregate ten year flow of 75 million acre-feet, and thus, Upper Basin state diversions cannot deplete the flow so as to result in deliveries short of this ten year aggregate flow guarantee. Third, the Boulder Canyon Project Act of 1928\(^5\) allocated the 7.5 million acre-feet among the three Lower Basin states in Arizona, California and Nevada, but the Supreme Court interpreted this allocation in *Arizona v. California*\(^6\) to allow the Secretary of the Interior almost unlimited discretion to apportion the guaranteed amount in times of scarcity through supply contracts. Fourth, the Upper Basin states apportioned the flow among themselves on a percentage basis in 1948.\(^8\) The apportionment reached by the states and the federal government is not conclusive, however, as Indian tribes are not subject to the compact allocations; thus, those tribes with reservations bordering on the Colorado River may upset the above allocation through assertion of their reserved rights.\(^4\)

The Upper Basin states delivery obligations were “secured” by Congress in the 1950’s and 1960’s by the construction of Lake Powell and other storage reservoirs on the Colorado tributaries.\(^5\) Yet, while the Upper Basin states can bank water for delivery in dry years, the erratic yearly flows and evaporation losses insure that upstream storage will be no guarantee that the Upper Basin states will be able to use their full allocation. Assuming that the Upper Basin states have a delivery obligation of 8.25 million acre-feet (the 1922 Lower Basin obligation plus one-half of the Mexican burden), the question becomes one of how much water passes Lee’s Ferry, Arizona, the measuring point. The answer has consistently been “less than the drafters of the 1922 compact assumed,” and the estimated annual flow declines with each new study.

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53. The percentages are Colorado, 51-75%; New Mexico, 11.25%; Utah, 23%; and Wyoming, 14%. Arizona, as a partial Upper State, is allotted 50,000 acre-feet per annum. Upper Colorado River Basin Compact, October 11, 1948, art. III(a), 63 Stat. 31, 32 (1949). The history of the negotiation of the compact is recounted in Meyers, supra note 44, at 26.
54. See notes 71-80, infra.
In 1976, the Lake Powell research project estimated the reconstructed virgin flow to be 13.5 million acre-feet, a 1977 Department of the Interior study puts the average yearly flow at 10.4 million acre-feet, and a recent Office of Technology Assessment Report on oil shale developments in the Upper Colorado River Basin bases its water demand projections on the availability of 13.8 million acre-feet. The implications for Upper Basin energy development based on the continued support of existing beneficial uses are mixed. Initially, there were a number of assertions to the effect that the lack of available freshwater supplies might seriously constrain energy development in the Upper Colorado River Basin. However, a more recent and more rigorous analysis of the welfare economics of allocating water to coal conversion asserts that there are no technical constraints, as opposed to cost constraints on the production of electricity with technologies (primarily dry cooling systems or hybrid dry-and-wet systems) which virtually eliminate water consumption. The study therefore concludes that "the future levels of electricity and synthetic fuels [needed] in the Colorado River Basin are likely to be much lower than expected several years ago." But it must be noted that, in part, this conclusion rests on the assumption that much of the energy needed for population centers growing on the rim of the basin will be generated outside the Upper Colorado River Basin. Urban growth will stress out-of-basin supplies and increase pressures for further transbasin diversions.

United States-Mexican agreements and the decision in *Arizona v. California* only set the ground rules for the resolution of future allocation conflicts. The allocation of water in the Colorado River among all competing users can only evolve over time, since many new conflicts are emerging. Such factors as the Environmental Protection Agency’s salinity standards, substantial Indian claims, and unresolved compact interpretation issues are some of the important potential barriers for energy development. For example, Article

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III(e) of the Colorado River Compact provides that the Lower Basin states "shall not require the delivery of water which cannot be reasonably applied to domestic agricultural uses;" and Article IV(b) of the Compact allows water to be impounded for electrical power generation but provides that impoundment for this purpose "shall be subservient to the use and consumption of such water for agricultural and domestic purposes, and shall not interfere with or prevent such use for domestic purposes." Commentators have pointed out that these compact provisions raise the issue whether a Lower Basin agricultural use has preference over an Upper Basin power use.61

CONSTRAINTS ON THE USE OF WATER FOR COAL PRODUCTION AND CONVERSION

To promote the settlement of the arid west, the early settlers developed a water policy suited to the Jacksonian vision and development of an agricultural and mining economy. The law of prior appropriation allows the first user on a stream to obtain a priority over all other subsequent users and so on down the line. To insure that access to available sources of supply would be available after the choice riparian bottom lands were patented, this doctrine allowed an appropriation to be applied to non-riparian land, and adopted requirements such as the necessity to complete a physical diversion with due diligence to discourage speculation.62 The only restriction

59. Colorado River Compact, supra Note 50.
60. Id.
61. See, e.g., Weatherford & Jacoby, supra note 56, at 197-98, where the authors speculate:
   For example, if and when California is actually limited to 4.4 m.a.f., could a California agricultural user, who could not be served within the 4.4 m.a.f. limit, successfully enjoin the use of water by one or more of the Upper Basin power plants? One commentator has argued that water can be withheld in the Upper Basin for power use as long as the G.A.F. obligation is met, but the issue has not been judicially resolved. The Secretary of the Interior did impose a ten percent reduction in Lower Basin water deliveries in 1964 to facilitate the filling of the reservoir behind Glen Canyon Dam. Provision was made for protecting Hoover Dam power contracts and the reduction in flow was offset by subsequent deliveries to assure compliance with the G.A.F.

   If and when another actual conflict arises over the issue, it could pit Lower Basin agricultural interests against Lower Basin electric power interests, since the latter are developing and exporting much of the electricity generated by coal-fired plants located in the Upper Basin. Unless the matter were to be legislatively clarified in advance, the Secretary of the Interior most likely would decide the question, perhaps precipitating a court test. (Footnotes omitted).

62. For a case where their requirements were construed to allow an energy developer a reasonable lead time to complete a diversion, see Montana Department of Natural Resources v. Intake Water Co., 171 Mont. 416, 558 P.2d 1110 (1977).
on the applications of water was that the use be beneficial, and this limitation, based largely on early irrigation practices, served to prevent only the grossest forms of waste.63

An appropriative right is based on use,64 not property ownership, and thus a water right is subject to partial or total abandonment or forfeiture from non-use. Except for some important restrictions water rights are alienable. The system of primarily private water rights originally served the west well, but the law of prior appropriation is now under considerable stress because of the demands for water for urban growth and energy development. This tension potentially both promotes and hinders coal development.

The strength of the law of prior appropriation in the late nineteenth and early twentieth centuries is often said to be the chief weakness in the late twentieth century. Water was allocated among a large number of agricultural users. As a result, today this water is used for crops of widely varying values and many streams are "over appropriated" with many owners of decreed rights not receiving any water in a lean year. Energy users need a guaranteed right to large amounts of water during dry years and thus have a strong interest in a water law which maximizes the fungibility of the resource. The existing pattern of many small vested rights and the resulting overappropriation of many streams makes it difficult but not impossible to assemble a sufficient water rights package.65 There is considerable interest at the federal level, and to a lesser extent at the state level, in making water rights more fungible, but there are also counter-

63. See Note, Water Waste—Ascertainment and Abatement, 1973 Utah L. Rev. 449. A frequently cited example of the ineffectiveness of the beneficial use doctrine is City of Corpus Christi v. City of Pleasanton, 154 Tex. 289, 276 S.W.2d 799 (1955), in which the court refused to enjoin a use which sustained transportation losses along a 118 mile ditch which ran as high as 74% of the water originally diverted.


65. See Clyde, Current Problems-Legal Overview, Water Acquisition for Mineral Development Institute, Paper No. 2, at 2-2—2-5 (A one-volume looseleaf collection of papers printed by the Rocky Mtn. Min. L. Fdn., 1978). A Wyoming attorney has advised energy developers that "[g]enerally speaking though many streams are overappropriated because of applications and permits in excess of the available supply of water in the stream, unless the construction of all facilities of prior application has actually been completed and it is an indisputable fact that there is no surplus water available at any time in the stream, only then will the State Engineer take the extreme measure of rejecting an application on the grounds [sic] that there is no unappropriated water available. Thus, the usual overappropriation situation does not cause the State Engineer to reject the application." Kirvin, Application for New Surface Water Appropriation and Acquisition of Existing Surface Water Appropriation, Water Acquisition for Mineral Development Institute, Paper No. 4, at 4-1, 4-8 (A one-volume looseleaf collection of papers printed by the Rocky Mtn. Min. L. Fdn., 1978.)
pressures for non-market allocations.

Because the law of prior appropriation is a law of private property rights, declarations of state ownership or trusteeship serve only to provide a rationale for state regulation of the ground rules for obtaining a private right. There had been no recognition of public rights for purposes such as fish and wildlife protection, aesthetic enjoyment, and recreation. Today, concern over the preservation of the unique heritage of the West has led to the recognition of public rights for in-stream flow preservation and to imposition of higher standards on new appropriation applications. In recent years the reservation of water in place for public enjoyment has been held to be a beneficial use and many states have mechanisms to permit the systematic reservation of water for in-stream uses. In places such as the Yellowstone basin in Montana a conflict between energy development and environmental protection has arisen in connection with administrative proceedings to reserve water from appropriation.66

To make more water available for energy development, urban growth, and environmental quality enhancement, the federal government launched a water policy program in 1977-7867 which sought in part to promote a variety of ground and surface water conservation strategies. States have not been uninterested in water conservation but still think of conservation primarily in terms of storage rather than use reduction.68 At the same time that the federal government, and to a lesser extent the state governments, are moving to allocate more water to environmental uses and debating conservation strategies, the Indian tribes, which have rights which are not dependent on congressional, executive, or state largesse, are moving aggressively to claim their share of western waters for uses from coal development to preservation of their cultural heritage.

Coal developers must operate in this changing and increasingly complex water allocation environment. In general, coal developers benefit from the conservation measures such as increased irrigation efficiency practices and pricing policies which encourage conservation, and from moves to make water more freely alienable, since energy developers are in a favorable financial position to bid for new supplies or to reallocate water through the market for energy development. Yet coal developers face competition from Indians, environ-

66. See note 133 infra.
67. 14 WEEKLY COMP. OF PRES. DOC. 1043-51 (June 6, 1978).
mental interests and municipalities which have preference rights to obtain water to serve their growing populations caused in substantial part by the western energy boom. This section of the Article will survey the constraints that state and federal statutes and doctrines which operate to withdraw water from appropriation for uses impose on coal development.

A. Federal Proprietary Rights

Although most western waters are allocated pursuant to state law, the federal government as proprietor of the retained public lands and as a superior sovereign has the right to use some western waters independent of state allocations. The federal government may make three types of claims: (1) Indian reserved rights, (2) non-Indian reserved rights for reserved federal lands, and (3) non-reserved federal water rights. Reserved rights were first recognized by the Supreme Court for the benefit of Indian tribes in 1907, and were expressly extended to public lands in 1963.69 The scope of non-Indian rights were drastically narrowed by the Supreme Court in the 1978 decision of United States v. New Mexico.70 As a result, the Solicitor of the Department of the Interior has issued an opinion which tries as best as possible to ignore New Mexico by asserting the federal government's right to condemn water rights to carry out Congressional public land management policies and to appropriate, without reference to state law, unappropriated waters to carry out these management policies.71 All of these federal proprietary rights both negatively and positively affect the availability of water for coal mining.

1. Indian Reserved Rights

In 1907, the United States Supreme Court ruled in Winters v. United States72 that the federal government may claim water rights for the benefit of Indian reservations to fulfill its trusteeship or wardship obligations. One explanation of the reserved rights doctrine is that federal water rights are based on Congress's power to vest in the federal government the riparian rights which arise because of federal

72. 207 U.S. 564 (1907).
ownership of the public domain. However, since Congress did not claim these riparian rights prior to their recognition by the Supreme Court, the best explanation of this doctrine is that reserved rights are judicially created federal rights in which Congress has acquiesced over a long period of time. Unlike state-created appropriation rights, reserved rights are not dependent on use and thus may be claimed at any time and are not lost by non-use. The federal government claims Indian rights on the theory that Congress or the President reserved the water as owner of the public domain when it set aside by treaty or executive order various Indian reservations. The Indians increasingly claim that treaties and other acts of reservation establishment merely confirm aboriginal rights. The difference between the two theories relates both to the priority date and the scope of the water right. Under the federal government's theory the priority date is the date of the creation of the reservation, and under the aboriginal theory the date is time immemorial.

Because most reservations were established in the mid-nineteenth century, the difference between the two theories on the priority is trivial. However, on the issue of the scope of the right the theories may be more significant. The standard used to determine the amount of water reserved is unclear. Arizona v. California held that irrigated acreage, which includes future potential use, is the standard, but in United States v. New Mexico the Court held that the standard is the amount necessary to fulfill the original purpose of the reservation. This standard would limit uses to those in existence at the time that the reservation was created. The federal government, on the other hand, has argued that for uses other than agriculture the standard might be "all possible uses, including uses which appear in the future without reference to the purposes contemplated at the time of the creation of the reservation." This standard makes reserved rights difficult to qualify but does allow tribes with

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73. Support for the Indians' claim may be found in the Court's citation to U.S. v. Winnans, 198 U.S. 371 (1905), a case holding that a treaty confirmed Indian fishing rights. Subsequent federal circuit court cases have awarded tribes rights even though there was no mention of water in the treaty, Conrad Investment Co. v. U.S., 161 Fed. 829 (9th Cir. 1908), and when the reservation was created by executive order, U.S. v. Walker River Irr. Dist., 104 F.2d 334 (9th Cir. 1939).


76. Ranquist, supra note 74, at 658.
coal resources to claim that they are entitled to sufficient water to develop these resources.

The original purpose offered by the Supreme Court to justify Indian rights was the need to civilize the Indians by making them a pastoral rather than a nomadic people. Under this theory, water rights would be appurtenant to the reservation and limited to pastoral uses; under the aboriginal theory, rights would be limited to traditional uses such as fishing. Both these theories would preclude the sale of reserved rights to on- and off-reservation mineral development. However, if the purpose of reserved rights is to give Indian tribes the natural resources to become economically self-supporting, and thereby obtain parity with non-Indians, it is reasonable to conclude that Indian water rights are alienable for on- and off-reservation uses, including energy development, so long as the tribe is benefited. A recent Washington district court decision, however, Colville Federated Tribes v. Walton, held that reserved rights which are appurtenant to allotted land held by an Indian cannot be transferred to a non-Indian. While the issues in Colville are different from tribal transfers of water for on- or off-reservation mineral development, when the tribe plans to use the revenues to benefit the reservation, the case does cloud the possibility of the use of Indian water for mineral development.

Although the issue of alienability of reserved rights is open, energy developers have been able to negotiate with tribes to obtain

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77. The Supreme Court has held that water rights may be transferred when allotted land is sold to non-Indian purchasers, U.S. v. Powers, 305 U.S. 527 (1938), but no case squarely holds that Indian water rights may be transferred to non-Indian users for on- or off-reservation purposes for energy development. An Indian rights specialist has concluded that 25 U.S.C. §§ 2, 81 and 476 dealing with federal supervision and contracts with tribes provide "[a] reasonably sound basis of inferential statutory authority..." for such transfers. Boyden & Pugsley, Use of Indian Water Law Developing Mineral Properties, Water Acquisition for Mineral Development Institute, Paper No. 5, at 5-15 (A one-volume looseleaf collection of papers printed by the Rocky Mtn. Min. L. Fdn. 1978).


79. In ruling that Indian reserved rights do not apply to allotments owned by non-Indians, the court stated:

The conclusion that water rights reserved for Indian reservations must be limited to tribal members is supported by recent Supreme Court opinions which have articulated a more restricted view of the concepts of reserved rights in general.

460 F. Supp. at 1328.
water for energy development. The fruit of the negotiation is usually some form of waiver of present claims, yet these waivers may be more difficult to obtain in the future as tribes are split into pro-development and traditional factions. In any event, rights based on tribal waivers of present rights in favor of some form of future recognition of tribal water needs are subject to two deficiencies. First, these rights are uncertain because the impact of Congressional action on the scope of Indian reserved rights is unknown, and second, waivers are subject to substantive, largely unarticulated, fairness standards because the United States is trustee for the Indians.

2. Non-Indian Reserved and Other Federal Rights

In 1963 the Supreme Court held that the federal government could claim reserved rights when retained public lands were withdrawn from entry and reserved for a water-related purpose. Between 1963 and 1978, the Court reaffirmed the doctrine three times but did little to delineate the standards for claiming non-Indian rights. Numerous bills were introduced in Congress after Arizona v. California to force federal qualification of all reserved rights, but western water rights "settlement" legislation has never been enacted. With their long traditions of cooperation with state agencies, federal agencies remain somewhat indifferent to the possibility of acquiring and managing federal water rights and asserted non-Indian rights only on an ad hoc basis through intervention in state court adjudication.

Between 1978 and 1979, two events occurred which appeared to simultaneously contract and attempt to expand the reserved rights doctrine. These events created considerable confusion about the future of federal non-Indian reserved rights. First, the Supreme Court decided United States v. New Mexico, which sharply limited the situations in which reserved rights can be claimed by announcing a narrow standard for federal claims. In holding that the Forest Ser-

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80. See Boyden & Pubsley, supra note 77, at 5-17, 5-22.
vice could not claim instream flows and water for recreation under the 1891 and 1897 Organic Acts, the Court held that the federal government must meet a strict two part test: the water must be necessary to fulfill the original purpose of the reservation, and the water must be applied to support a primary, not secondary, purpose of the reservation. Second, as part of the Carter Administration’s water policy growing out of the Bureau of Reclamation (now the Water and Power Resource Service) and Corps of Engineers “hit list,” the Department of the Interior is coordinating an effort to quantify all the government’s reserved rights and to integrate them into the day-to-day operations of the mission agencies subject to a reasonableness standard which encourages assertions of less than the full extent of the government’s potential claims.

In response to United States v. New Mexico and the need to provide guidance for the initiate Task Force groups, the Solicitor of the Department of the Interior issued a long and controversial opinion on federal non-Indian reserved rights. The opinion sought to minimize the impact of New Mexico by asserting two alternative bases for federal instream flow rights, condemnation and federal appropriation of unappropriated waters, without reference to state procedural and substantive law. An inter-agency task force is currently at work recommending methods of implementing the Solicitor’s Opinion on a systematic basis. The precise impact of the federal government’s new approach to reserved rights and non-reserved rights on coal development is difficult to estimate since it will take years and a great deal of money to implement the recommendations of the Federal Non-Indian Reserved Rights Task Force, and it is unlikely that the necessary appropriations for a comprehensive quantification program will be forthcoming in the foreseeable future. However, some form of new federal policy may replace the present approach.

United States v. New Mexico is considered by many to be a cramped reading of the enabling legislation under which reserved rights were sought, and of prior decisions of the Court recognizing the reserved rights doctrine. However, the holding in this case is now the law, and the issue becomes that of determining the impact of the opinion on other future federal reserved rights claims. Beyond

86. See Task Force Report, supra note 84.
88. The cost has been estimated at “about 120 million dollars.” Task Force Report, supra note 84, at 32.
the resolution of the Forest Service’s claims under the two early organ-ic acts,\textsuperscript{90} the majority opinion casts doubt on other reserved rights claims by other agencies, such as the National Parks Service. To shore up the reserved rights doctrine, the Solicitor’s Opinion vigorously asserts the validity of the doctrine for claims by agencies such as the Parks Service and the Bureau of Land Management. In addition to various reserved rights claims, the Solicitor’s Opinion asserts that the federal government has the power to appropriate unappropriated waters arising on public lands by reference to state substantive, and perhaps procedural, water law.\textsuperscript{91}

Non-reserved federal appropriative rights are claimed based on the reasoning that “the United States also has the right to appropriate water on its own property for congressionally-authorized uses, whether or not such uses are part of any ‘reservation’ of land.”\textsuperscript{92} Such rights may be claimed under a much lower standard than a reserved right because the former “right does not arise by implication from the reservation of land for particular purposes, but instead arises from actual use of unappropriated water by the United States to carry out congressionally-authorized management objectives on federal lands.”\textsuperscript{93} These rights are not dependent on the substantive doctrines and policies of state water law since agencies of the Department are advised to follow state procedural law “to the greatest practicable extent,”\textsuperscript{94} but the Opinion reserves the right to hold that the federal government need not always comply with state procedural law. The possibility of substantial federal claims by federal agencies such as the Bureau of Land Management, with no tradition of claiming and administering federal water rights, is the most upsetting aspect of the Opinion to the Western states.

The western states fear the Opinion primarily because of the Solicitor’s almost casual reading of the Federal Land Policy and Management Act of 1976 (FLPMA).\textsuperscript{95} FLPMA charts a new course for public lands policy by mandating multiple use-sustained yield management of the retained public lands, but Congress clearly did not intend to alter the pre-1976 balance of federal-state control over

\begin{itemize}
  \item \textsuperscript{91} Opinion No. M-36914, supra note 71, at 15-18.
  \item \textsuperscript{92} \textit{Id.} at 15.
  \item \textsuperscript{93} \textit{Id.}
  \item \textsuperscript{94} \textit{Id.} at 18.
  \item \textsuperscript{95} 43 U.S.C. §§ 1701 et seq. (1976).
\end{itemize}
water rights. Nonetheless, on the incredible ground that federal appropriation of unappropriated waters is the status quo, the Opinion concludes "that in FLPMA, Congress authorized the United States to appropriate unappropriated water available on the public domain as of October 21, 1976 to meet the management objectives dictated in the Act." The examples listed are water for such consumptive uses as recreational campgrounds, timber production, livestock grazing, and "instream flows and other non-consumptive uses."

Despite seventy-two pages of analysis, the legal foundation for the assertion of federal non-reserved appropriative rights is not clear. The Solicitor urges that this foundation is based on both the Property and Supremacy Clauses of the Constitution, and concludes:

[I]t is my opinion that, since Congress has vested (under the Acts of 1866, 1870, and 1877) only the public with the right to appropriate unappropriated water arising on, under, through or appurtenant to federally-owned lands under the state law, the United States retains a proprietary interest in those waters that have not been appropriated pursuant to state law. The United States therefore retains the power to utilize those unappropriated waters to carry out the management objectives specified in Congressional directives. Any legislation enacted by Congress to accomplish management objectives on federal lands preempts conflicting state regulations or laws as a result of the operation of the Property and Supremacy Clauses.

The Solicitor's conclusion rests on the assumption that Congress only precluded the federal government from establishing a general federal water law for private parties, but never precluded the federal government from doing so for its own benefit. Clearly the federal government has the constitutional power to establish a system of federal water rights; however, the issue is not one of power, but one of intent. On this issue the Opinion is wrong. None of the cases or secondary sources cited by the Solicitor support his position, and the conclusion misreads over a hundred years of history, congressional action and Supreme Court decisions. The Supreme Court created

98. Id.
99. Id. at 16.
100. A careful criticism of the Solicitor's use of precedents, especially United States v.
the reserved rights doctrine to allocate waters to uses which would seldom be recognized under state law. The reserved rights cases taken as a whole manifest a sensible, if logically troublesome, effort to integrate federal water rights into state law by treating a reservation as a federal appropriation with a long relation-back period.

The evidence of some congressional intent to reserve, however, is crucial to the accommodation of federal and state interests. Congress has acquiesced in the limited use of the reservation doctrine, but has never shown any desire to develop a federal system of water rights as it clearly could have done under the Property Clause. Instead, Congress has expressed a preference for state allocation unless a strong federal interest required a contrary result. If the three acts of 1866, 1870, and 1877101 and the Supreme Court decision in California Oregon Power Co. v. Beaver Portland Cement Co.108 mean anything, they mean that western waters will be allocated by state law unless Congress finds that the federal interest requires an allocation not recognized by state law. To treat the Federal Land Policy and Management Act of 1976 in such a manner demonstrates a complete unwillingness on the part of the Solicitor to follow the basic framework of federal-state water rights which has evolved over time.

Energy developers will also be interested in the sections of the Solicitor’s Opinion dealing with reserved rights claims by federal permittees and licensees. United States v. New Mexico refused to recognize reserved rights for Forest Service stock grazing permittees, and the Opinion extended this denial to the Taylor Grazing Act and oil shale lease permits. The reason for both decisions is that the non-Indian reserved rights had traditionally been limited to that amount of water needed to manage specific federal lands for the benefit of the public generally, not for beneficiaries of federal public domain policies. This is a sound basis on which to deny federal water rights.

Congress recently refused to claim federal water rights for projects subject to the priority mobilization board or for coal slurry pipeline permittees, thus indicating that there is no national interest at the


102. In California Oregon Power Co., 295 U.S. 142, at 158 (1935), the Court said that the language of the 1877 Desert Land Act “effected a severance of all waters upon the public domain, not theretofore appropriated, from the land itself.” Id. at 158.
present time to justify overriding state water law.\textsuperscript{103}

B. Coal Slurry Pipelines and Appropriation Withdrawals

Coal slurry pipelines are a promising technology to move coal to areas of high demand. There is currently one operating slurry pipeline from the Black Mesa mine in northern Arizona to the Mojave power plant in southern Nevada, a distance of 273 miles. Pipelines have been proposed for the major Rocky Mountain coal producing states of Colorado, Montana, Utah, and Wyoming. Pipelines are said to be economically efficient compared to rail transportation, and water efficient in the arid states compared to mine mouth generation plants. However, the railroads have been set to block the entry of pipelines into the market by refusing to grant the necessary rights of way at the same time that they have raised rates which threaten to make coal an economically unattractive alternate source of energy. One pipeline company has recently won two significant federal court victories on rights of way issues. In the first decision the court held that the company can acquire the right of underground passage under lands in which railroads hold an easement.\textsuperscript{104} The ruling in the second decision provided that where the railroads conveyed fee title to alternate sections obtained under the Pacific Railroad Acts, under which the railroads retained rights of way, the railroads did not retain any subsurface rights to prevent the passage of the pipeline under the railroad.\textsuperscript{105} However, because the railroads can still block the pipelines which must cross land owned in fee, Congress is considering legislation which would grant pipeline companies certificates of public convenience and necessity with a right of eminent domain against railroad lands.\textsuperscript{106}

Water availability is a necessary condition to operate a pipeline; however, the two largest coal-producing states restrict the use of water for a slurry pipeline. Montana simply declares that to export


\textsuperscript{104} Energy Transportation Systems, Inc. v. Union Pacific R.R. Co., 606 F.2d 934 (10th Cir. 1979). The two district court opinions were consolidated on appeal.

\textsuperscript{105} Id.

water from Montana for this purpose is not a beneficial use, and Wyoming prohibits the use of water for a coal slurry pipeline without the consent of the legislature. These statutes make it impossible or very difficult to transport water out of state, and thus potentially violate the negative Commerce Clause doctrine which allows a court to hold unconstitutional a state statute which places an undue burden on interstate commerce. Western states have constantly asserted that because they "own" the water they can allocate to whom they choose, but this argument rests on faulty logic.

In Hughes v. Oklahoma the Court overruled Geer v. Connecticut, thereby rejecting the proposition that state ownership of things ferae naturae was a sufficient basis for a state to prefer its citizens to those of other states. Hughes squarely holds that all state resource conservation statutes, regardless of the theory of state control of the resource, will be subject to the scrutiny under the negative Commerce Clause, and probably implicitly overrules Hudson County Water Co. v. McCarter, the one Supreme Court case holding that a state may forbid the export of water out of state. Montana and Wyoming would therefore have to defend their legislation on the ground that the statutes are valid local conservation measures. This would be a very hard burden to sustain, as prior cases hold that a state may not discriminate against interstate commerce by forbidding the shipment of the resource out of state, by restricting access to the resource by out-of-state residents, and by preferring in-state to out-of-state demands.

The risk of invalidation of Wyoming's and Montana's statutes has been lessened, but not eliminated, by the proposed Coal Pipeline.

111. 161 U.S. 519 (1896).
Act of 1979.\textsuperscript{116} In the face of considerable argument in favor of some federal override of state laws, this proposed act rejects federal assertion of reserved or appropriative rights as advocated by the 1979 Solicitor's opinion.\textsuperscript{117} Section 302(c) permits a state, in order to "effectuate state public interest," to place restrictions on diversion of water for coal pipelines.\textsuperscript{118} Under this Act, Congress clearly intends to exempt statutes such as Montana's and Wyoming's from the operation of the Commerce Clause and thus recognize the strong state interest in the control over its water resources:

The position of the Committee goes beyond mere protection of the water law of western states: it grants the states a certain degree of protection from possible Commerce Clause challenges. It is the Committee's view that each individual State in furtherance of its legitimate State public interests, must have the ability to decide whether or not a coal pipeline making use of a State's water originates in that State. A State must be able to say "no" to coal pipelines; otherwise, it could lose effective control over its water and, therefore, its future. Thus the Committee, by the adoption of a number of provisions regarding water law, has, within rather broad limits, assured the States of the ability to reject coal pipelines.

\begin{itemize}
  \item \textsuperscript{116} H.R. 4370 (96th Cong., 1st Sess. 1979).
  \item \textsuperscript{117} H.R. REP. No. 692 Part I, supra note 103, at 24-25.
  \item \textsuperscript{118} Section 302(c) of the proposed Act provides in full:
    \begin{itemize}
      \item \textsuperscript{(1)} \textit{State Water Permit Condition.}---(1) In granting a State water permit or authorization for a coal pipeline for which a certificate of public convenience and necessity is issued under title II or a right-of-way is granted under title I, any State, to effectuate a legitimate State public interest, may place terms or conditions pursuant to State law, regulation, or rule of law of the establishment, exercise or enforcement of such terms and conditions; or State law or laws enacted so as to effectuate a legitimate State public interest upon which such terms and conditions are based or which apply specifically or generally to coal slurry pipelines shall not be deemed to prevent, unreasonably burden, discriminate against, or directly negate interstate commerce even though in the absence of this Act, such State law or laws of the establishment, exercise or enforcement of such terms and conditions may be deemed violative of the commerce clause of the United States Constitution.
      \item \textsuperscript{(2)} The establishment of terms or conditions to effectuate a legitimate State public interest pursuant to State law existing at the time of the issuance of a permit or authorization; or the exercise or enforcement of such terms or conditions; or the termination pursuant to such terms and conditions of permits or authorization for the appropriation, use, diversion or dedication of water; or the State law or laws enacted so as to effectuate a legitimate State public interest (1) upon which such terms and conditions are based or (2) which apply specifically or generally to coal slurry pipelines shall not be deemed to prevent, unreasonably burden, discriminate against, or directly negate interstate commerce even though in the absence of this Act, such State law or laws of the establishment, exercise or enforcement of such terms and conditions may be deemed violative of the commerce clause of the United States Constitution.
      \item \textsuperscript{(3)} Once a water permit or authorization is granted by the State and accepted by the grantee no term or condition placed thereon can be challenged later as to whether any such term or condition effectuates a legitimate State public interest.
    \end{itemize}
\end{itemize}
or to accept them, and limit or condition their use of State water. 119

The proposed legislation is clearly constitutional. Congress has the power under the Commerce Clause to decide how the nation's resources shall be allocated. It may appropriate resources under federal control for the benefit of all the states, or it may, as it did in reversing a 1947 Supreme Court decision giving the federal government title to the tidelands and their oil, 120 distribute resources selectively to the states. The Supreme Court has held that Congress may consent to a state statute which would otherwise impose an unconstitutional burden on interstate commerce. 121

Congress has not, however, insulated state legislation limiting the availability of water for a coal slurry pipeline from attack. To qualify for the proposed Section 302 exemption, the state's interest must be "legitimate." The House Committee Report does not specify the standards Congress considered relevant to the question of legitimacy, but it is clear that lack of legitimacy is a litigable issue. At a minimum there would seem to be some duty placed on the state to justify giving the alternative uses of water a preference over coal development, or to explain why the appropriation of water for a coal slurry pipeline is consistent with the domestic water needs of the state. Surprisingly, Montana's statute seems more consistent with proposed Section 302, because it contains the inference that the state needs all its water to fulfill uses that the legislature or the court has found to be beneficial. Wyoming's statute contains no suggestion that the water is needed for other uses in the state, and the requirement of legislative consent is a clear vehicle to allow the state to discriminate between in- and out-of-state users. Neither statute can be said to be per se valid under Section 302, although the declarations of state interest that the section requires do not seem onerous.

C. State Reservations of Water

An energy appropriator seeking to perfect a direct flow or storage appropriation for new supplies must now consider the possibility that the right to appropriate may be foreclosed by reservations of the

water for instream uses such as fish and wildlife preservation and recreation. States have two basic mechanisms to reserve water from appropriation. First, all western states except Colorado have a permit system, and most states allow a state agency to deny a permit on public interest grounds. Second, in Colorado, Idaho, and Montana, state agencies may apply to appropriate or reserve water for instream uses.

1. Public Interest Permit Denials

Traditionally, the two primary inquiries in appropriation proceedings are the availability of unappropriated water and the impact of the appropriation or transfer on vested rights held by third parties. The power to deny appropriations where the supply is available has been sparingly used. Appropriation applications have been denied to eliminate inefficient projects or to preserve the available supply for a major future federal or state project. The power to subject appropriations to a public interest standard is, however, increasingly being used to condition storage applications to require the release of water for environmental purposes. Because energy appropriations involve large and long-range commitments of water, it has been suggested that such appropriations be subjected to comprehensive evaluation because of the possible impacts of a present appropriation on future claimants and on the public interest generally. Most states require some form of water resources planning, and other states have little NEPA's which require an environmental impact statement to be prepared for large-scale appropriations. Courts may impose similar planning and evaluation responsibilities under common law doctrines.

In United Plainsmen v. North Dakota State Water Conservation Commission, the court ruled that the public trust doctrine imposes some responsibility on the permit-granting agency to consider the impact of energy appropriation on present and future water demands. Plaintiffs asked for an injunction against all energy appropriations until the requisite planning had been done. The court

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125. South Dakota requires that all appropriations in excess of 10,000 acre feet be presented to the State legislature. 1975 Sess. Laws 275.
126. 247 N.W.2d 457 (N.D. 1976).
held only that the plaintiffs were entitled to a trial on the merits because of the duties imposed by the common law public trust doctrine. Plaintiffs also argued that state legislation declaring a catch-all water resources policy mandated that the planning report be completed, but the court refused to construe the legislation as imposing such a duty, and also suggested that any duties rising from the public trust doctrine fell short of those required by little NEPAs. The court noted that the public trust doctrine:

... permits alienation and allocation of such precious state resources only after an analysis of present supply and future need.

The Legislature has indicated its desire to see such planning take place, although not in mandatory language. Until the Legislature speaks more forcefully, we think the Public Trust Doctrine requires, as a minimum, evidence of some planning by appropriate state agencies and officers in the allocation of public water resources.

Despite the narrowness of the holding, United Plainsmen suggests that a state agency with the discretion to deny an application when unappropriated water is available has some minimal duty to consider the long-range impacts of energy appropriations and to compare the value of water for energy development with a reasonable range of alternative uses.

2. Instream Use Appropriations and Reservations

State appropriations and reservations for instream uses are fast becoming an integral part of western water law. At one time neither private individuals nor the state could appropriate water for instream uses. Leaving water in place was simply not a beneficial use, as the custom of the region had come to define the term. The requirement that an actual diversion be made was fatal to instream use claims, and courts seldom reached the issue of whether the use was beneficial. A recent California appellate court decision holds that private individuals may not appropriate water for instream uses in the absence of statutory authority. However, recent decisions in Idaho

129. 247 N.W.2d at 463. For a discussion of the relevant factors in water planning related to energy, see Harte & El-Gasseir, Energy and Water, 199 SCIENCE 623 (1978).
and Colarado indicate that a state may eliminate the actual diversion requirement and declare that instream flow preservation is a beneficial use and that instream use appropriations do not contravene the constitutional guarantee of the right to appropriate. The actual diversion and beneficial use requirements functioned to provide notice to future claimants and to prevent speculation in paper rights. Both these policies, which still remain valid, can be accomplished by other means, and thus there is no need for a per se rule against instream appropriations. States have the discretion either to run instream uses through the appropriation system, as have Colorado and Idaho, or, as Montana has done, to reserve water for instream uses from the appropriation system.

In Idaho, state filings have been used to preserve selected high quality trout streams, including "Papa" Hemingway's favorite stream. Instream appropriations in overappropriated Colorado serve primarily to give the state standing to object to changes in place of use or point of diversion. The widest use of instream flow preservation techniques has occurred in Montana, where the state reservation procedure has been used to promote basin-wide ecological stability in the Yellowstone Basin. State agencies filed for some eight million acre-feet per year on some reaches of the Yellowstone, and the instream claims could have severely constrained energy development in the Powder River basin. In 1979, the Board of Natural Resources issued a final order granting substantial reservations but not in the full amounts requested.

Cal. Rptr. 672 (1979).


135. A final order was issued by the Board of Natural Resources in December of 1978. An appeal of the Board’s Powder River reservations has been filed, and several other minor appeals may be filed, but in the main the order is final. Flows were awarded in percentiles as the Fish and Game Commission claimed the reservations by percentile claims. For example, a ninety percentile claim is a claim to a flow which is exceeded in ninety out of 100 years, but not to the ten years of low flow. Thus, the higher the percentile, the lower the flow reserved in dry years. In general, the Board granted the Fish and Game Commission a substantial portion of the claimed flow in western and central Montana, but decreased the amounts granted in eastern Montana to allow water for future coal development. For example, the Commission claimed 4,110,343 acre feet at Billings and the Commission was
An energy appropriator is like any other appropriator. He must proceed through the state system to perfect a right, or he must find the holder of a vested right willing to sell. Congress has made it clear that water use for coal development should, for the present, be governed by state law, and revised projections about the impact on energy development on coal supplies and availability of supplies for coal conversion suggest that appropriators should neither be afforded some form of preference nor be specifically constrained from competing for water rights. A coal developer does have an interest in being free from constraints which impose costs in excess of benefits on coal development. Yet this acknowledgement is fraught with controversy, because many in the West support the present allocation patterns produced by the law of prior appropriation on the ground that the present system produces off-balance sheet benefits in the form of a desirable "way of life." All life is change, and the status quo per se can never be frozen, but there is force to the argument that the rate of change is a matter of public concern.

In general, techniques such as comprehensive instream flow reservation procedures are preferred as a means of stabilizing a basin to ad hoc procedures, which involve great delay and no determinative outcomes. The western states and the federal government, as the preceding section illustrates, are moving to put such stabilization mechanisms in place. This section will examine two areas where the law of water rights may impose costs in excess of benefits: the doctrine of relation back, and possible restrictions on the sale of the water from Bureau of Reclamation and Corps of Engineers reservoirs. The last issue addressed is related to the growing debate about water conservation. In general, federal and state initiatives toward conservation will benefit coal development and use because energy developers are financially better able to bid the new supplies released by conservation and can better institute water-saving practices to use available supplies.

granted 3,914,455 at a 75 percentile flow. But, the Commission's claim at Sidney of 8,206,723 acre feet was cut back to 5,492,310 acre feet at an 80 percentile flow less depletions to Sidney. This leaves 2,667,214 acre feet for a 50 percentile flow unreserved, 1,034,100 unreserved for a 70 percentile flow, and none reserved or deficits for eighty percentile flows on up. All reservations were made subject to "all existing and/or inchoate senior water rights in the source of supply, including but not limited to federal or Indian reserved rights. . . ."

Tarlock, supra note 132, at 24-39.
A. Relation Back

An appropriation must be completed with due diligence in order to be vested. If the appropriator proceeds with due diligence, he is entitled to relate his priority back to the time that the diversion was commenced. Early case law and statutes imposed short completion times to discourage speculation. Large municipal and energy projects require long lead times. Colorado has accommodated the law of relation back to large municipal and industrial supply projects through the conditional decree procedure, but in other states energy appropriations which were not completed because of physical and legal difficulties have been challenged under the due diligence doctrine. In a significant precedent, Montana refused to construe a nineteenth-century due diligence statute to knock out an energy appropriation plagued by no end of problems, and in 1973 the state enacted a statute which gives the state the flexibility to monitor energy development projects and apply anti-speculative policies, if necessary, in cases of excessive delay.

In construing this statute, the Montana Supreme Court observed that “the fact that the final determination of the validity of Intake's appropriation may be years away does not place the rights of the people of Montana or subsequent appropriators in limbo for an indefinite and open-ended term to any greater extent here than in the case of any case involving a multi-million dollar project of great magnitude and complexity . . .,” but cautioned that diligence had to be determined on a case-by-case basis. Thus, the court made it clear that in appropriate circumstances the state may conclude that it is inefficient to preclude the acquisition of present vested rights, because the possibility of a future higher-valued use of the water occurring is too remote. In short, the state may conclude that the opportunity cost of the de facto withdrawal is too high.

136. 1 WIEL, WATER RIGHTS IN THE WESTERN UNITED STATES § 382-85.
137. MONT. REV. CODES ANN. 85-2-312 (1979), provides:
The department may limit the time for commencement of the appropriation works, completion of construction and actual application of the water to the proposed beneficial use. In fixing those time limits, the department shall consider the cost and magnitude of the project, the engineering and physical features to be encountered, and, on projects designed for gradual development and gradually increased use of water, the time reasonably necessary for that gradual development and increased use. For good cause shown by the permittee, the department may in its discretion reasonably extend time limits.
B. Sale of Water From Federal Storage Reservoirs

Federal multi-purpose storage reservoirs are an important source of water for energy development. The primary purpose for the construction of these reservoirs was for irrigation and flood control, but many reservoirs, especially in the Upper Missouri basin, have surplus waters which can be marketed for energy development. The Secretaries of the Army and Interior apparently have the authority to sell water for purposes other than irrigation, but the conditions of such sales are not clear. While the Bureau of Reclamation has general statutory authority for surplus water sales, a federal district court, in a controversy surrounding the sale of water from the Boysen and Yellowtail reservoirs, examined the legislative history of the project-enabling legislation to determine if the sale for industrial use would be inconsistent with the primary purpose of the project, and the Ninth Circuit affirmed this approach. This has led some to claim that the authority for the sale of water for new uses must be found in the authorizing legislation, but no court has expressly so held.

Another constraint on using water in federal multi-purpose storage reservoirs for energy development may be posed by President Carter's Water Policy Initiatives. Under these initiatives, federal agencies may be required to implement water conservation programs as a condition for industrial and municipal supply contracts from federal storage reservoirs. Two practitioners have speculated about the impact of this policy on energy development:

If "development of water conservation programs" is to be a "condition of contracts for storage or delivery of municipal and industrial water supplies from federal projects," then it seems likely that entities such as energy companies analyzing this water as a possible source of supply will be faced with contractual conditions affecting the amounts of water which they may receive from federal projects and the ways in which that water must be utilized. This situation might make other

139. Environmental Defense Fund, Inc. v. Andrus, 596 F.2d 848 (9th Cir. 1979). After California v. United States, 438 U.S. 645 (1978), which held that § 8 of the Reclamation Act requires conformity to state law unless such conformity would be clearly inconsistent with federal policy, states have more discretion to control the allocation of water from federally-financed reservoirs. However, this discretion will probably not be allowed to be used to frustrate federal energy objectives.

potential sources of water look relatively more attractive.\footnote{141} Given that the water supply available for coal development may be limited, energy companies may be compelled to agree to such conditions.

C. Water Conservation

Water conservation is a widely proposed strategy for balancing energy development with other water demands. Conservation potentially allows existing water users to have their demands satisfied at the same time that new supplies are made available for coal development. For this reason, all energy development scenarios stress the role that conservation can play in meeting the demand for water for coal conversion at a “price” the region can afford.\footnote{142}

A conservation agenda is now before the federal government and the western states. The agenda includes (1) strict enforcement of existing prohibitions against waste, (2) elimination of custom as a standard for beneficial use, (3) clarification of the rights of conservers and elimination of the disincentive to conserve in Colorado created by the \textit{Shelton Farms} opinion,\footnote{143} (4) improvement of water rights transfers within the limits of the vested rights of third parties,\footnote{144} (5) elimination or reduction of federal subsidies to ensure that prices charged for water reflect the cost of supply, and (6) the establishment of water banks which allow temporary or permanent deposits of water in a bank so that water is available, at a price, for withdrawal by other users.\footnote{145} Despite the recent federal water policy initiatives, most water conservation measures will be initiated and implemented by the states, for “reforms can be imposed by Washington only when they are attached as conditions to hydraulic bribes. In an age of austerity there is no money for big water projects.”\footnote{146} This is no simple “conservation fix,” and all of the conservation measures will be opposed by those who perceive them to be simply

\begin{footnotes}
\footnotetext[142]{Plotkin, Gold, & White, \textit{supra} note 19.}
\footnotetext[143]{Southeastern Water Conservancy Dist. v. Shelton Farms, 187 Colo. 81, 529 P.2d 1321 (1974) holds that the water saved by an upstream appropriator is not free from the call of the river but rather is part of the pre-existing river regime and thus must be allotted by the existing schedule of priorities.}
\footnotetext[144]{For a case that imposes excessive restraints on transfers, see Basin Electric Power Cooperative v. State Board of Control, 578 P.2d 557 (Wyo. 1978).}
\footnotetext[146]{Richard J. Barnet, \textit{New Yorker Magazine}, March, 1980.}
\end{footnotes}
means of taking away water which rightfully and unconditionally belongs to the present holder of the water rights. Coal developers will generally benefit from the imposition of conservation strategies; however, they can live with existing water use patterns. There is a market in water rights, and coal developers are in a favorable position to bid for available supplies regardless of the ground rules for water allocation.

CONCLUSION

This Article on coal development and western water suggests that much of the fears voiced in the West about the water-related impacts of coal development have been exaggerated. There is no need for a policy which gives coal development a federal or state preference, and there is no need for a policy which singles out coal development and limits the use of water for this purpose. What is needed is a legal system which establishes clear and rational instream use dedication policies, encourages conservation, and eliminates unjustified constraints which impede the operation of the market.147 As a recent observer of the economics of water allocation for energy development has concluded:

Water availability and uncertainty are greatly overrated as constraints to energy development. Recall that old western adage, “Water flows uphill to money.” The Intermountain (electric) Power Project purchased water rights from irrigators in Utah at $1,750/acre-ft., many times greater than the value of water in crop production. Panhandle Eastern Pipeline Company is paying all of a $5 million low-interest loan to repair an irrigation district storage reservoir in exchange for 25% of reservoir yield, about 5,000 acre-ft/yr. Burlington Northern and Tenneco propose to develop large irrigation projects in conjunction with their synthetic fuel operations. It is not that energy companies can flash “big bucks” around and get anything they want, but rather that, with some patience, imagination, and willingness, they can avoid injury to

147. A study by the leading political scientist concerned with western water allocation problems found that western state voters and legislators are generally unwilling to cut back on any use of water in the future. The study concludes that since western state legislators seem unwilling to intervene in the water allocation controversies stimulated by the energy boom, “crucial decisions will be left to the courts, the executive, special commissions, and negotiations among interest groups or the market.” Ingram, Laney & McCain, Water Scarcity and the Politics of Plenty in the Four Corners States, 32 THE WESTERN POLITICAL QUARTERLY, 298, 299 (1979). For a similar conclusion, see F. TRELEASE, supra note 108, at 216-17.
third parties or compensate them for damages and otherwise make a project attractive to a skeptical public. . .