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THE WATER QUALITY PROBLEM ON THE COLORADO RIVER

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The Colorado River has one major water quality problem—salinity. Imperial Dam is the downstream point of diversion for Colorado River water uses in the United States. About two-thirds of the water the United States delivers under the 1944 treaty with Mexico¹ passes through Imperial Dam for diversion by Mexico at Morelos Dam. It is estimated that the average annual concentration of dissolved solids, or salinity, in the Colorado River was about 600 parts per million (ppm) at the Imperial Dam site under virgin conditions. The United States Environmental Protection Agency (EPA) reports that the average annual concentration of dissolved solids in 1970 was 865 ppm. That agency forecasts that without measures to control salinity, the concentration of dissolved solids at Imperial Dam will be 1220 ppm by the year 2010.² This projection is based on current plans for development and use of the waters of the Colorado River to which the United States is entitled.

Increasing salinity has already forced irrigators in the highly productive Imperial and Coachella Valleys in California to undertake extensive drainage works to control salt buildup in their soil that would restrict the variety and yield of their crops. The EPA report estimates the current cost of salinity to users below Hoover Dam at \$16 million annually. The economic impact of salinity in the Lower Basin, if salinity control measures are not adopted, is projected at \$51 million annually in the year 2010.

In the late 1950's and early 1960's, Southern California interests opposed water projects in the Upper Basin of the Colorado River. These included New Mexico's Navajo Indian Irrigation Project and San Juan-Chama Transmountain Diversion Project for the reason, among others, that the development and use of water would increase the salinity of their supply. It is interesting to note that these opponents emphasized the effect of transmountain diversions on the quality of the downstream

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1. Treaty with Mexico on Water Utilization, Feb. 3, 1944, 59 Stat. 1219, T.S. No. 994.

2. U.S. Environmental Protection Agency, Summary Report on Mineral Quality, Colorado River (1971).

supply. The reasoning was that diversion from the basin of the relatively fresh water of the mountain streams would rob the river downstream of a dilution effect. On cross examination at Committee hearings by a Congressman from California, it was carefully explained that while the water to be diverted was relatively fresh, it did contain some salts and the diversion of this salt from the basin would leave a lesser concentration in the Colorado River than would the consumptive use of the same amount of water within the basin. As I recall, the gentleman from California was not convinced that transmountain diversions are good for the quality of the Colorado River.

Salinity increasing downstream is a fundamental aspect of southwestern rivers. This is particularly true of those that are drawn on heavily for consumptive beneficial uses. Thus, when salinity becomes a problem, it impacts on the downstream users.

A potential impact of the Colorado River salinity problem on the upstream states—Colorado, New Mexico, Utah, Wyoming and a part of Arizona—was brought into focus by the Federal Water Quality Act of 1965. This act gave these states until June 30, 1967 to submit water quality standards for interstate streams and adopt a plan for the implementation and enforcement of those standards or suffer the promulgation and enforcement of such standards by the United States.

In May of 1966, the Federal Water Pollution Control Administration promulgated its "Policy Guidelines" to be followed by the states in establishing water quality standards for interstate streams.³ These guidelines were twelve in number and No. 1 was the most troublesome. It stated:

Water quality standards should be designed to enhance the quality of water. If it is impossible to provide for prompt improvement in water quality at the time initial standards are set, the standards should be designed to prevent any increase in pollution. *In no case will standards providing for less than existing water quality be acceptable.* (Emphasis supplied).

A literal application of this policy guideline would have a grotesque and disastrous effect on New Mexico and the other states of the Upper Basin of the Colorado River.

The interstate streams of the West are subject to the doctrine of equitable apportionment. Under this doctrine, the upstream state

3. Fed. Water Pollution Control Administration, Guidelines for Establishing Water Quality Standards for Interstate Waters (under the Water Quality Act of 1965, P.L. 89-234) (May 1966).

does not have the right to take all of the waters arising within its borders; the downstream state cannot require the delivery of all of the natural flow of the stream.

Interstate compacts and United States Supreme Court decrees apportion the use of interstate streams among the Western states. For example, eight interstate compacts and one Supreme Court decree affect New Mexico's use of the waters within her borders. What is apportioned among the states by such compacts and decrees is, in effect, beneficial consumptive use. Beneficial consumptive use is defined as the amount of water diverted from the stream, less the return flow thereto; this is a fair paraphrase of the definition used by the United States Supreme Court in its decision in *State of Arizona v. State of California*.⁴

The Colorado River Compact of 1922⁵ allocates the consumptive use of 8.5 million acre-feet of the waters of the Colorado River system to the Lower Basin states of California, Arizona, Nevada, Utah and New Mexico. The Compact allocates the beneficial consumptive use of 7.5 million acre-feet of the waters of the Colorado River system to the Upper Basin states of Colorado, Utah, Wyoming, Arizona and New Mexico. The Compact also provides that the Upper Basin shall deliver at Lee Ferry, a point on the Colorado River about 28 miles below the Utah-Arizona state line, not less than 75 million acre-feet in any period of ten consecutive years.

The Upper Colorado River Basin Compact of 1948⁶ apportioned among the Upper Basin states the 7.5 million acre-feet of consumptive use allocated to the Upper Basin by the 1922 Compact. It was agreed that Arizona should have 50,000 acre-feet annually and that the balance would be divided among the other four states. New Mexico's share is set at 11.25 percent of that balance. If the full amount of 7.5 million acre-feet is available to the Upper Basin, New Mexico is allowed to make uses that would deplete the flow of the river at Lee Ferry by 838,000 acre-feet annually. Records of the flow of the Colorado River system indicate that it will not be possible for the Upper Basin states to consumptively use 7.5 million acre-feet annually after having delivered at Lee Ferry not less than 75 million

4. 376 U.S. 546 (1963).

5. Colorado River Compact (1922), approved by U.S. Congress by Boulder Canyon Project Act, 43 U.S.C. § 6171 (1971).

6. Upper Colorado River Basin Compact (1948), approved by U.S. Congress by Colorado River Storage Project Act, 43 U.S.C. § 620 (1971).

acre-feet in each period of ten consecutive years, even with the virtually complete regulation of the river above Lee Ferry afforded by the Colorado River Storage Project. It is estimated that under the terms of the Compacts, New Mexico will be able to make depletions measured at the site of use amounting to 770,000 acre-feet annually.

When water is diverted from a stream for irrigation—or for that matter, for most municipal and industrial uses in the Southwest, a part of the water evaporates and the remainder returns to the stream. For example, about two-thirds of the water applied to the land for the irrigation of crops is consumed by evaporation and moves off in the wind. The balance returns to the stream.

Water diverted which is consumed, or evaporated, is pure H₂O. Water which returns to the stream carries all of the dissolved minerals, or salinity, that was in the diverted water. The 1971 Report of the United States Environmental Protection Agency on "The Mineral Quality Problem in the Colorado River Basin" projects that over 80 percent of the future increase in salinity concentrations at Hoover Dam will be the result of this concentrating effect. This is distinguished from activities of man that will increase the total tonnage of salt in the river.

Thus, an inescapable consequence of the beneficial consumptive use of water is a degradation of its quality by an increase in the concentration of dissolved solids in the water. Even though the tonnage of dissolved solids remains the same, the amount of water in which it is carried is less. Thus, the concentration is increased.

If this simple principle of physics is accepted, it is clear that the adoption of stream standards prohibiting any increase in salinity would preclude any increase in beneficial consumptive use above present levels. The Upper Basin states presently are consuming only about 3 million acre-feet, or less than half of the allocation made to them. Under a strict application of non-degradation standards, this consumptive use could not be increased and the Upper Basin states would be deprived of more than one-half of their entitlement.

New Mexico, for example, would lose over 500,000 acre-feet of the approximately 770,000 acre-feet of consumptive use that it is entitled to make annually from the Upper Basin of the Colorado River System. New Mexico would not be able to operate the San Juan-Chama Project which is now virtually complete or the

Navajo Indian Irrigation Project which is presently under construction in San Juan County. The Secretary of the Interior would not be able to contract water from Navajo Reservoir for municipal and industrial use in New Mexico. New Mexico would not be able to construct and operate the Animas-La Plata Irrigation Project which was authorized by the Congress in 1968. There would be similar and perhaps even greater impacts on water development and use in the other Upper Basin states.

It is almost unthinkable that anyone could seriously consider adopting and enforcing stream standards that would prohibit the beneficial consumptive use of water that states are entitled to under solemn interstate agreements. The simple principle of physics that dictates that an inescapable consequence of the beneficial consumptive use of water is the degradation of water quality by an increase in the concentration of dissolved solids was as well known in 1922, when it was agreed to apportion 7½ million acre-feet of consumptive use to the Upper Basin as it is today. Therefore the compact must be construed to contain an agreement that less water containing a greater concentration of dissolved solids will flow to the Lower Basin as the Upper Basin develops and uses the amount of water that it is entitled to.

In negotiations with the Federal Water Pollution Control Administration for the approval of New Mexico's proposed stream standards, the State made it clear that it could not agree to hold the concentration of dissolved solids in the waters of the Colorado River system at present levels. Furthermore, the state representatives took the position that New Mexico could not reasonably be expected to even attempt to set numerical salinity standards on these waters until the Federal agencies had completed their ongoing studies of current and projected salinity conditions on the Colorado River. All of the other states of the Colorado River Basin, after extensive conferences, took the same position. The New Mexico standards were approved by the Secretary of the Interior in August of 1969 with the implicit understanding that an attempt would be made to set reasonable numerical standards at a later time.⁷

Late in 1971, the Environmental Protection Agency, successor to the Department of the Interior in the administration of the Federal Water Quality Act of 1965, issued its report on the

7. Letter from James R. Smith, Acting Secretary of the Interior to Governor David Cargo, Aug. 21, 1969.

mineral quality problem in the Colorado River Basin.⁸ This report recommended the adoption of numerical water quality standards throughout the Colorado River Basin in accordance with the Federal Water Pollution Control Act. The report specifically recommended a standard requiring a maximum mean monthly salinity concentration at Imperial Dam below 1,000 ppm. The records show that this standard was equalled in January of 1957 and has been closely approached a number of times in recent years. The report also recommended carrying out a basin-wide salinity control program to maintain salinity concentrations at or below levels presently found in the lower main stem. In effect, the report recommended that projects under construction and planned in the Upper Basin be shelved unless or until the recommended salinity control program could reduce the salt load of the river by an amount sufficient to offset the concentrating effect of new beneficial consumptive uses in the Upper Basin.

The EPA report was a subject of discussion by the Colorado River Enforcement Conference in Las Vegas, Nevada on February 15 of this year. At this same meeting Ellis Armstrong, Commissioner of the Bureau of Reclamation, presented a report entitled "United States Department of Interior Position Statement—Proceedings of the Water Quality Enforcement Conference." This report described a salinity control program including measures such as the plugging of wells discharging saline waters; control of brine springs; improved management of irrigation water; reduction of water losses by vegetation management and channelization; desalinization; and weather modification.

Reconnaissance estimates contained in the report and supplemental data indicate that these measures could reduce the salinity of the Colorado River at Imperial Dam by 145 ppm in 1980 and by 410 ppm in the year 2000. The reconnaissance estimates indicate that even with development and use of the waters of the Colorado River in accordance with current plans and schedules, implementation of the salinity control program would give an average annual concentration of dissolved solids at Imperial Dam of 840 ppm in 1990—a concentration slightly below the 1970 level. No reliable estimates of the cost of the salinity control program are available. However, persons knowl-

8. Environmental Protection Agency, *supra* note 2.

edgeable in the matter have talked about a total cost in the neighborhood of one-half billion dollars.

The conferees representing the seven Colorado River Basin states unanimously embraced the proposal of the Bureau of Reclamation report. The resolution recommended that no numerical salinity standards be adopted at this time, and that the states and the federal government fully support the authorization and implementation of the salinity control program proposed by the Bureau of Reclamation. The conferees representing the Environmental Protection Agency stated for the record that they agreed in general and in principle with the resolution adopted by the state representatives.

In Denver at the April 27, 1972 session of the Conference, representatives of the seven States and the E.P.A. unanimously adopted a set of recommendations urging acceleration of the Bureau's salinity control program and making no mention of numerical salinity standards.

CONCLUSION

Thus, it appears that we are approaching a solution of the water quality problem of the Colorado River that will not spell disaster for the Upper Basin and will spare the water users in the Lower Basin the burden of increasing salinity in the lower main stem. Obviously, a solution to this problem, which the United States must reach in its own interests, will be of great benefit to our good neighbors in Mexico. The Department of State and the Commissioner of the United States Section of the International Boundary and Water Commission, in the interest of international comity, have already evidenced their support for a salinity control program on the Colorado River.