

Introduction to Water Resources Issues in Water Division No. 3, The Rio Grande Basin.

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I. The Trouble at El Paso and the Rio Grande Convention of 1906.¹

Large scale use of the Rio Grande for irrigation and domestic purpose was well established in the vicinity of Juarez, Mexico and El Paso, Texas by 1851. Upstream irrigation development in northern New Mexico and the San Luis Valley did not begin in earnest until the late 1870's, and the 1880's was the era of large canal building in the San Luis Valley. The upstream use of water in Colorado and New Mexico resulted in shortages in El Paso and Juarez. The Republic of Mexico began a series of political actions and threatened legal actions against the United States for the depletion of the flows of the Rio Grande. The United States entered into negotiations with the Republic of Mexico to resolve the dispute. As part of its actions, the United States placed an embargo on the use of public lands for the construction of reservoirs upstream in Colorado and New Mexico, effectively preventing any large reservoir construction in Colorado or New Mexico. The embargo was intended to protect the water supply for the competing proposals for large main stem reservoirs on the Rio Grande at Elephant Butte and near El Paso, Texas.

A settlement in principal was reached in 1904 that called for the construction of a large reservoir on the Rio Grande near Elephant Butte in New Mexico and a permanent allocation of water from the reservoir to Mexico. The final agreement between the United States and Mexico is a treaty known as the Rio Grande Convention of 1906. It is quite short, consisting of only six articles. Article II, the heart of the international apportionment, contains the schedule for delivery of water to Mexico. It calls for the delivery of 60,000 acre-feet between February and November "distributed throughout the year in the same proportions as the water supply proposed to be . . . to the lands in the United States in the vicinity of El Paso, Texas. . . ." It goes on to provide "In case, however, of extraordinary drought or serious accident to the irrigation system in the United States, the amount delivered to the Mexican Canal shall be diminished in the same proportion as the water delivered to lands under said irrigation system in the United States." Echoes of this language appear in the 1944 treaty between the United States and Mexico governing the Colorado and Tijuana Rivers, and Lower Rio Grande. Neither treaty, however, defines extraordinary drought.

Article III provides that the water deliveries are at the United States' cost and the water is to be delivered in the Rio Grande at the head of the Mexican Canal (Acequia Madre). This means that the United States (the Rio Grande Project) bears all delivery losses (if any), but has no obligation to ensure further delivery to the Acequia Madre.

The 1906 Convention put in motion the development of the Rio Grande Project, to serve some 88,000 acres in New Mexico and some 67,000 acres in Texas, with water to be stored in Elephant Butte Reservoir, a 2.2 m.a.f. reservoir on the main stem of the Rio Grande upstream from Las Cruces, New Mexico. It allocates only a relatively modest 60,000 a.f. to Mexico, while contemplating the use of some 730,000 a.f. annually in the United States. As we shall see, the construction of the Rio Grande Project

¹ A detailed treatment of this topic can be found in Douglas R. Littlefield's PhD. thesis and his book, both of which are listed in the table of references at the end of this outline.

and its water demands became the “tail that wagged the dog” of all future upstream development on the Rio Grande in Colorado and New Mexico.

II. The Rio Grande Compact of 1939²

“The ratification of the treaty did not result in the immediate lifting of the embargo on the use of any public lands in the Upper Rio Grande Basin for water development, but rather selective modifications were made allowing certain small projects to proceed. This was deeply resented in Colorado and New Mexico because the embargo prevented any effective large reservoir construction. This, in turn, prevented any regulation of the Rio Grande above Elephant Butte for either flood control or water conservation purposes. While serving the goal of the Reclamation Service to prevent new upstream depletions, the embargo was perceived as enormously unfair by upstream water users. They felt they had been placed at the mercy of the recurrent cycles of flood and drought while water users below Elephant Butte had a guaranteed water supply. Continued complaints by New Mexico and Colorado led to slight relaxations of the embargo. By 1907 the embargo was modified to permit diversions for storage not exceeding 1,000 acre-feet and applications where the applicants could show they had initiated their rights prior to March 1, 1903, the date when active work on the Rio Grande Project began.

Relaxation of the embargo allowed for some limited reservoir construction in the San Luis Valley. Rio Grande Reservoir, with a 51,000 acre-foot capacity, and Santa Maria Reservoir, with a 43,800 acre-foot capacity, were constructed in the headwaters of the Rio Grande. La Jara Reservoir on La Jara Creek was constructed in 1910, and Terrace Reservoir on the Alamosa River was constructed in 1912, with a combined capacity of 32,000 acre-feet. At about the same time, Mountain Home and Smith Reservoirs were constructed on Trinchera Creek, and Sanchez Reservoir was constructed on Culebra Creek. No reservoirs of any consequence were constructed in the Middle Rio Grande as a result of the relaxation of the embargo.

In 1925, the embargo was lifted entirely, not to be reimposed until 1935 to hasten negotiations of a final compact. In 1928, Continental Reservoir, with a capacity of some 22,600 acre-feet, was completed in the headwaters of the Rio Grande. Thereafter, intense opposition by Texas and New Mexico thwarted further reservoir construction in Colorado. New Mexico did not fare much better after 1925. Increased seepage and water logging of land continued to reduce the irrigated acreage in the Middle Rio Grande. In 1923, New Mexico adopted a Conservancy Act, and in 1925 the Middle Rio Grande Water Conservancy District was created and adopted a plan for flood control, drainage, and irrigation in the Middle Rio Grande that included construction of the 198,000 acre-foot El Vado Reservoir which was finally completed in 1935.

Authorization and construction of the Rio Grande Project, coupled with the embargo on use of public lands, caused relations between Colorado, New Mexico, and Texas over the Rio Grande to continue to deteriorate. As a result, compact negotiations were suggested and, in 1923, President Coolidge appointed Commerce Secretary Herbert Hoover as the United States Representative to the Rio Grande Compact Commission. Each state appointed a representative: Delph Carpenter for Colorado, Francis C. Wilson for New Mexico, T. H. McGregor for Texas, and William J. Donovan was appointed as the United States Commissioner. Both Colorado and New Mexico then began engineering investigations to obtain necessary data for negotiations. As a consequence, it was not until early in 1929 that a temporary compact was concluded (the “1929 Temporary Compact”).”

² The material is part II, and IIA-D is taken directly from William A. Paddock, *The Rio Grande Compact of 1938*, 5 U. Denv. Water L. Rev. 1 (2001), with the footnotes omitted.

A. The 1929 Temporary Compact.

“The 1929 Temporary Compact did not apportion the waters of the Rio Grande. Rather, it was a standstill agreement under which Colorado and New Mexico agreed not to increase their depletions to the Rio Grande unless the new depletions were offset by increased drainage added to the River. In addition, the temporary compact entitled Colorado and New Mexico to use, in equal proportions, the amount of any estimated spill from Elephant Butte Reservoir.

The 1929 Temporary Compact was to remain in effect until June 1, 1935, by which time a final compact was to be agreed upon. During the interim, data was to be collected, all to the end that a final compact could be negotiated based upon river conditions existing in 1929. The 1929 Temporary Contract castigated the United States for thrusting on New Mexico, Texas, and Colorado the burden of the 1906 Convention with Mexico, and urged that the burden of this national obligation could only be alleviated by the United States' construction of the Closed Basin Drain and a large reservoir on the Rio Grande near the Colorado-New Mexico state line. This complaint, at least from the upstream perspective, seemed misplaced, because it the construction of Elephant Butte Reservoir to a size larger than needed to serve existing demands below San Marcial that placed the greatest burden on existing upstream water users.

In the 1929 Temporary Compact, Colorado and New Mexico also gave their consent to the construction of Caballo Reservoir below Elephant Butte Dam subject to the condition that its use would not be the basis of or give rise to any claim of appropriation or prior, preferred, or superior rights to use of the water so stored.

The overriding problem facing the states in 1929 was the lack of comprehensive data on stream flows and the available water supply. In addition, both Colorado and New Mexico felt that as much as 200,000 acre-feet of water was wasted by the Rio Grande Project that could be beneficially used upstream. Thus, under the 1929 Temporary Compact, stream gaging stations were to be established in each state, and annual reports of the data so collected were to be furnished to each state. In addition, New Mexico and Texas were required to collect data below Elephant Butte Reservoir to ascertain releases, flows, distribution, waste, and all other disposition of water for the Project, and all parties agreed to do their best to prevent the waste of water. In the view of Delph E. Carpenter,

The compact concludes a long period of interstate misunderstanding and threatened strife. It opens the way for an orderly and comprehensive development of the water resources of the Rio Grande in all three states without waste and without doing violence to the rights of either state. It preserves the autonomy of the states by state control before federal interference.

The 1929 Temporary Compact was twice extended, first from June 1, 1935, to June 1, 1937, and then from June 1, 1937, until October 1, 1937. The first extension was to allow the United States Natural Resources Committee to assist in compiling the data necessary for compact negotiations, and the second extension was to allow completion of negotiations on the final compact. The 1929 Temporary Compact expired, but the negotiations proceeded with the final Rio Grande Compact being signed in Santa Fe, New Mexico, on March 18, 1938.”

B. The Rio Grande Joint Investigation.

“When the 1929 Temporary Compact was signed, the three states seemed only to agree upon the fact that the Rio Grande did not have sufficient water to allow new depletions without equal amounts of “new” water being added to the system either by drainage, importation from other basins, or the elimination of waste. Colorado was convinced that it could develop additional storage to make its water supply parallel crop needs without injury to downstream states. New Mexico and Texas feared that any new use in Colorado would create corresponding shortages for them. At the same time, New Mexico was pressing ahead with the rehabilitation and improvement of irrigation systems for the Middle Rio Grande Valley, including the proposed construction of El Vado Reservoir. This latter activity was viewed with

great apprehension by Texas. The states thus hoped that the data to be developed before June 1, 1935, along with the construction of the Closed Basin Drain and a state-line reservoir, would provide a way around this impasse.

After the signing of the 1929 Temporary Compact, Colorado, New Mexico, and various federal agencies independently began conducting water supply investigations. Colorado's investigations largely focused on the amount of "new" water that could be produced by drainage from the Closed Basin to the Rio Grande; New Mexico's investigations looked at stream depletions in Colorado and northern New Mexico; Texas apparently undertook no studies; and the Compact Administration compiled stream flow measurements and made several seepage studies. The studies undertaken by the United States looked at the Closed Basin Drain, the Middle Rio Grande Project, and the canalization of the Rio Grande below El Paso.

Meanwhile, the Middle Rio Grande Water Conservancy District pressed ahead with its rehabilitation and drainage in the Middle Rio Grande Valley and the construction of El Vado Reservoir. Its construction was made possible by the federal government's Reconstruction Finance Corporation which purchased the bonds issued to fund the project. The construction of El Vado Reservoir, and the resultant concern about increased stream depletions and decreased water quality, caused Texas to file suit in 1935 against New Mexico and the Middle Rio Grande Water Conservancy District for violation of the 1929 Temporary Compact. The lawsuit apparently caused the United States to recognize the conflicting roles of various federal agencies on the Rio Grande: the Bureau of Reclamation was operating the Rio Grande Project to deliver water to irrigators in lower New Mexico, El Paso, Texas, and Juarez, Mexico; the State Department was responsible for implementing the 1906 Treaty with Mexico; the federal Reconstruction Finance Corporation had a stake in the success of the Middle Rio Grande Project; and the United States had participated in the negotiation of the 1929 Temporary Compact. The existence of these conflicts, the potential for a federal violation of the 1929 Temporary Compact, and the stalled negotiations for a permanent compact prompted the United States to again impose a form of embargo on the use of public lands for water development. In September 1935, President Franklin Roosevelt issued an executive order prohibiting any federal agency from approving any application for any new project involving use of waters of the Rio Grande without first securing an opinion on its advisability from the Natural Resources Committee.

The year 1935 found Colorado, New Mexico, and Texas no closer to agreement on a permanent allocation of water than they had been in 1929. At this point, the Natural Resources Committee met with the Rio Grande Compact Commission ("Compact Commission") to see if it might help resolve the impasse. In December 1935, the Compact Commission, acting through its Water Resources Committee, agreed to an investigation by the Natural Resources Committee into (1) the water resources of the Rio Grande Basin above Fort Quitman, (2) past, present, and prospective water use and consumption in the basin, and (3) opportunities to conserve and augment the basin's water supply. The study was being undertaken to assist the Compact Commission in establishing a basis to equitably apportion the Rio Grande. By late 1937, the Natural Resources Committee had completed its investigations and prepared a report commonly known as the Rio Grande Joint Investigation. The report is a comprehensive history and detailed analysis of surface and ground water supplies and usage, agricultural water-use practices and water demands, water quality, and opportunities for importation and storage of water throughout the basin. The report provided the states with complete information on all significant water uses and water resources in the basin as of 1937, and thereby provided the data needed for the states to negotiate a permanent compact.

The Joint Investigation confirmed that the normal water supply of the basin was fully appropriated and that drainage, importation of water, or capture of flood flows that would otherwise spill from the Rio Grande Project were the only means by which water use in the basin could increase. The Joint Investigation also concluded that reservoir development in Colorado making the water supply parallel crop water demands would benefit the entire basin. It concluded that less water would be used in

Colorado, that increased return flows from Colorado would enhance water supplies in New Mexico, and such storage would have no adverse impact on the Rio Grande Project.”

C. The Rio Grande Compact of 1939.

After extensive negotiations “[t]he Compact signed in Santa Fe, New Mexico, on March 18, 1938, bears little resemblance to the 1929 Temporary Compact. Rather, it embodies the principles for the equitable allocation of water contained in the Second Report of the Engineer Advisors. The Compact³ consists of a preamble and seventeen articles. The preamble states that the purpose of the Compact is to effect an equitable apportionment of the waters of the Rio Grande above Fort Quitman, Texas, between Colorado, New Mexico, and Texas. Article I contains the definition of seventeen terms crucial to understanding and interpreting the Compact.

The important definitions in Article I include “Project Storage” which is defined as:

[T]he combined capacity of Elephant Butte Reservoir and all other reservoirs actually available for the storage of usable water below Elephant Butte and above the first diversion to lands of the Rio Grande Project, but not more than a total of 2,638,860 acre feet.

This definition limits the total quantity of Project Storage and limits it to the area between Elephant Butte Reservoir and the first diversion to Project lands.

The Compact defines “Usable Water” as:

[A]ll water, *exclusive of credit water*, which is in project storage and which is available for release *in accordance with irrigation demands*, including deliveries to Mexico. (Emphasis supplied)

The significance of this definition is that it excludes credit water from the water usable to serve the Project and limits the timing of releases of Project Water to those made in accordance with irrigation demand.

The Compact defines “Credit Water” as:

[T]hat amount of water in project storage which is equal to the accrued credit of Colorado, or New Mexico, or both.

“Actual Spill” is defined as:

[A]ll water which is actually spilled from Elephant Butte Reservoir, or is released therefrom for flood control, in excess of the current demand on project storage and which does not become usable water by storage in another reservoir; provided, that actual spill of usable water cannot occur until all *credit water* shall have been spilled. (Emphasis supplied).

Thus, credit water spills before Project Water.

“Hypothetical Spill” is defined as:

[T]he time in any year at which usable water would have spilled from project storage if 790,000 acre feet had been released therefrom at rates proportional to the actual release in every year from the starting date to the end of the year in which hypothetical spill occurs; in computing hypothetical spill the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following the effective date of this Compact, and thereafter

³ Copy attached as Appendix I.

the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following each actual spill.

This provision prevents Project Water users from gaining any benefit from excessive releases that otherwise prevents a spill from occurring.

Article II identifies the twelve stream gaging stations necessary for administration of the Compact and requires that gaging stations be installed and maintained below any reservoir constructed after 1929 and at such other points as are necessary for carrying out the Compact.

Article III contains Colorado's delivery obligation at the Colorado-New Mexico state line. The first schedule of deliveries is that of the Conejos River and the second schedule of deliveries is that of the Rio Grande. The combination of these two schedules, less than 10,000 acre-feet, comprises Colorado's annual delivery schedule. While not stated in the Compact, the separate delivery schedules impose separate obligations on the Rio Grande and on the Conejos River to meet their separate delivery obligations. Thus, Colorado's Compact obligation is allocated intrastate based upon the separate delivery schedules, not by operation of a unified basin-wide administration under the priority system. One reason for this is that prior to the time of the Compact, the Conejos River and the Rio Grande operated independently of one another, and the Compact did nothing to alter the historical method of intrastate administration.

Article IV is New Mexico's schedule of deliveries to San Marcial. The persistent concerns about this schedule and the desire to have a twelve-month schedule rather than a nine-month schedule caused the Compact Commission to adopt in 1948 a new year-round schedule of deliveries for New Mexico. That schedule eliminated use of the San Marcial gaging station and replaced it with the Elephant Butte Effective Index Supply. This index supply is defined as the recorded flow below Elephant Butte Dam during the calendar year, plus the net gain in storage or minus the net loss in storage during the calendar year, as the case may be. This is essentially the same standard for measurement of deliveries as recommended in the First Report of the Engineer Advisors, except that it is a twelve-month schedule and it is based upon a different inflow-outflow relationship.

Article V is an administrative provision that permits the Commission, by unanimous action, to abandon gaging stations that are no longer reliable and to substitute new gaging stations that will result in substantially the same results.

Article VI contains the provisions for credits and debits and limitations on new storage in Colorado and New Mexico. In his report to Governor Ammons, M. C. Hinderlider gave the following summary of Article VI and Colorado's ability to vary from its scheduled deliveries:

Such variation in any year by Colorado may amount to as much as 100,000 acre-feet, together with larger debits resulting from holdover storage, without violating Colorado's obligation to meet its schedule of deliveries at the stateline. This provision is necessary to permit future diversions in Colorado in any year by presently decreed appropriations in the San Luis Valley in substantially the same manner in which the diversions and uses have been made in past years. Colorado, however, must always retain in storage reservoirs sufficient water to repay any debits due from failure to meet the required schedule of stateline deliveries. It should be noted that this obligation applies only to reservoirs constructed after 1937, and in no way affects the rights of present reservoirs in Colorado to store water within the limits of their present decrees.

This Article also provides that Colorado or New Mexico may not accumulate annual credits in Elephant Butte reservoir in excess of 150,000 acre-feet of water. This limitation is designed to prevent unsound expansion of development which otherwise might result from accumulations of large annual credits, and which

also might reduce the available capacity of that reservoir to regulate the portion of the river flow to which the lands under the Elephant Butte project are rightfully entitled.

Paragraph six of Article VI provides that the Commissioners of the upper states, which have accrued credits in Elephant Reservoir, may authorize any part of such credits to be used under the Elephant Butte project, if in their judgment failure to release such credits would result in "actual spill" from the Elephant Butte Reservoir. This would permit, at times, a greater use of water under that project for reduction of salinity in the lands, which, if not used, would pass over the spillway and be wasted down the river. It should be noted, however, that such releases of credit water belonging to an upper state is entirely optional with the Commissioner of the state holding such credits, and would not be agreed to unless, in his judgment, the stage of storage in Elephant Butte Reservoir at that time, or the prospect for an abnormally large runoff from the basin above, would definitely indicate that such credits would later be floated out over the spillway, or through the flood release valves of Elephant Butte Reservoir, of which no beneficial use could be made.

This Article also provides for reduction in the amount of credit water held in Elephant Butte storage, and debit water held in reservoirs in upper New Mexico and Colorado constructed after 1929, to compensate for losses due to evaporation.

Article VII of the Compact, again as summarized by M. C. Hinderlider:

[P]rohibits increase in storage of water in reservoirs in Colorado and New Mexico constructed after 1929, whenever there is less than 400,000 acre-feet of usable water in storage in Elephant Butte Reservoir, provided, however, that, if the total releases of usable water from that reservoir since the effective date of the Compact, or the last actual spill from the reservoir, have aggregated more than an average of 790,000 acre-feet per year, including required deliveries to Mexico, the time and amount of minimum storage in Elephant Butte Reservoir shall be adjusted for the excess deliveries.

Article VIII implements Royce Tipton's recommendation that as much water be retained in upstream storage as is consistent with a full water supply for the Rio Grande Project. As summarized by Hinderlider:

Article VIII provides for the releases of water from storage reservoirs in Colorado and New Mexico constructed after 1929, to the extent of accrued debits against those states at "the greatest rate practicable under the conditions then prevailing", sufficient to bring the quantity of usable water in Elephant Butte storage to 600,000 acre-feet, and to insure a release from that reservoir of 790,000 acre-feet in such year.

This provision is to prevent shortage under the Elephant Butte Reservoir due to the withholding of water which would otherwise have been in storage in that reservoir. The terms of the provisions are such that the release of the water can be made at a rate to protect structures and property along the Conejos and Rio Grande against high stages of flow, and to insure that the releases of reservoir water may be made in such manner as not to encroach upon the stream channel capacity to the detriment of the use of such capacity by Colorado appropriators.

Articles IX and X address importation of water into the Rio Grande Basin from the San Juan River. Article XI assures that such importation will protect present and future uses in Colorado and provides that proper credit will be given for the importation of such water.

In the view of Hinderlider:

Article XI is a most important declaration of principle with respect to the responsibility of an upper state, or citizen thereof, for the quality or character of the water flowing from an upper state into another state, and is designed for the protection of the interests of the upper state and its water users. It will be noted that there is now no question concerning the quality or character of the waters of the Upper Rio Grande Basin, but any state may at a later time raise this question in an action before the Supreme Court of the United States, should it decide that a change in quality or character of the waters in later years justifies such action.

Article XII sets up the administrative machinery for the Compact. This is the first interstate water compact to create a permanent commission responsible for overseeing its provisions. Article XIII permits the Compact Commission to review, at the end of each five-year period after the effective date of the Compact, any nonsubstantive provisions that do not affect the basic principles upon which the Compact is founded. Any changes to the Compact must be by unanimous action of the Compact Commission and ratified by the legislatures of the several states.

Article XIV deals with deliveries to Mexico. Hinderlider understood this article to be

[D]esigned to protect Colorado and New Mexico against any increases in future uses of water by Mexico over and above the 60,000 acre-feet recognized by treaty. By the provisions of this Article, any decrease in uses of water by Mexico would be to the benefit of the water users under the Elephant Butte Reservoir.

Article XV is a declaration that the Rio Grande Compact is based upon conditions peculiar to the Rio Grande Basin and does not establish any general principle or precedent applicable to other interstate streams. Article XVI recognizes that nothing in the Compact affects the United States' obligations to Mexico under existing treaties, or to the Indian tribes, or impairs the rights of Indian tribes.

Finally, Article XVII provides the Compact will become effective when ratified by each state and consented to by Congress. The Compact was ratified by Colorado on February 21, 1939; by Texas on March 1, 1938; by New Mexico on March 2, 1938; and the United States consented to the Compact on May 31, 1939."

D. Colorado's Failure to Comply with the Compact.

"During the 1940's, the Compact operated close to the vision of the Engineer Advisors. An "Actual Spill" of "Usable Water" occurred in 1942. Colorado and New Mexico accrued credits and debits, but stayed within the limits allowed by the Compact. In 1949, Colorado had an accrued credit of 144,700 acre-feet; New Mexico's debt was 286,000 acre-feet and it retained 137,220 acre-feet in El Vado Reservoir. And, at the end of 1949, Project Storage was 815,700 acre-feet, including 130,000 acre-feet of credit water.

By the end of 1951, New Mexico's accrued debit had ballooned to 331,800 acre-feet and El Vado Reservoir was empty. At the same time, Colorado had consumed its accrued credit and Project Storage had declined to 26,800 acre-feet. At this point, Texas sued New Mexico for violation of the Compact. In 1952, Colorado under-delivered by 153,300 acre-feet and its pattern of under-deliveries continued throughout the 1950's and 1960's. Likewise, New Mexico's debits continued to grow, reaching 498,000 acre-feet in 1959.

The 1950's were very dry. Both 1950 and 1951 were well below normal and were followed by a wet year in 1952. The 1953-1956 years were the driest four consecutive years of record, and there was no comparable dry period in any of the prior records of the Rio Grande. The departures by Colorado and New Mexico were not caused by hold-over storage in post-1929 reservoirs. Colorado had only one post-Compact reservoir of any consequence – the 60,000 acre-foot Platoro Reservoir on the Conejos River completed in 1951. New Mexico had not carried over water in post-1929 reservoirs. Thus, the large under-deliveries in this time period give credence to Tipton's view that the natural departures by Colorado would exceed 100,000 acre-feet during a dry series of years.

New Mexico was able to obtain federal funds for channel improvements, levies, the low-flow conveyance channels, and other works to help it control and reduce its accrued debits. Thus, in reliance on new structures built under the Congressional authorization of the Middle Rio Grande Project in 1948 and the authorizations of additional works in 1960, New Mexico had reduced its accrued debit to 200,000 acre-feet by 1968.

Colorado's debit, on the other hand, continued to increase. By 1966, Colorado's accrued debit was 927,300 acre-feet. At that point, Texas and New Mexico sued Colorado for violation of the Compact. In 1967, Colorado's debit reached its maximum of 944,400 acre-feet, and in 1968, Colorado, New Mexico, and Texas stipulated to a stay of the pending litigation so long as Colorado met its delivery obligations on an annual basis, without an allowance for accumulated debits, and used all available legal powers, including curtailment of diversions, to assure annual compliance. *Texas v. Colorado*, 391 U.S. 901, 88 S. Ct. 1649, 20 L.Ed.2d 416 (1968) (stay of litigation)

Colorado thereafter implemented strict administration of surface water rights and imposed a moratorium on new well construction. As a consequence, Colorado began to slowly reduce its accrued debit. By 1975, the accrued debit had been reduced to 725,200 acre-feet, and in 1980, the accrued debit stood at 674,600 acre-feet. In 1984, the unfilled capacity of Elephant Butte Reservoir was less than the combined debits of Colorado and New Mexico. Thus, under Article VI of the Compact, Colorado's accrued debit was reduced to 512,100 acre-feet. In 1985, there was an actual spill of usable water from Elephant Butte Reservoir for the first time since 1942. The spill eliminated the accrued debit of Colorado, and on December 9, 1985, the U.S. Supreme Court granted the motion by Texas and New Mexico to dismiss with prejudice their lawsuit against Colorado. *Texas v. Colorado*, 474 U.S. 1017, 106 S.Ct. 563, 88 L.Ed.2d 549 (1985) (final dismissal). Since 1985, Colorado has been in continual compliance with its delivery obligations under the Rio Grande Compact.”

E. Compact Administration⁴

The schedules of delivery for the Rio Grande and Conejos River are based upon the relationship between inflows at upstream gaging stations and the outflow at downstream gaging stations that existed during the compact study period (1928-1937). For any given quantity of inflow at the upstream compact gaging station, corresponding amount of outflow is scheduled for delivery at the downstream gaging station. The relationship between inflow and out flow is not linear, the greater the inflow, the greater the percentage of the inflow that scheduled for delivery at the state line. The practical effect of the Article III schedules of delivery is to limit the consumptive use of water in Colorado. New consumptive uses of water in Colorado were to come from water held-over in storage in post-1929 reservoirs that would otherwise have spilled from Project Storage or new water added to the Rio Grande, e.g. the Closed Basin Project.

⁴ This topic will be treated in much greater detail by other speakers.

Surface water on the Rio Grande and Conejos River are administered to keep Colorado in compliance with its Compact delivery obligations. Generally speaking no surface water diversions are allowed during the non-irrigation season, but pre-compact⁵ reservoirs are allowed to store. During the irrigation season the Division Engineer makes an estimate of the annual index flows at the upstream gaging stations and an estimate of the amount water to be delivered by the Rio Grande and Conejos River. That estimate is updated every 10 days. With this information the Division Engineer calculates the percentage curtailment: the amount of inflow at the upstream compact gaging station that should be delivered to the downstream gage. The curtailment percentage is then applied to and deducted from the amount of inflow available for diversion from the rivers, and that quantity is “passed through the system” for delivery to the downstream gaging station. This is done on a daily basis throughout the irrigation season to ensure Colorado remains in compliance with its compact obligations.

There are two exceptions to the schedule of deliveries. First, Colorado may have an annual and accrued debit (under-delivery) of 100,000 acre-feet, and an annual credit of 150,000 acre-feet, with no limit on accrued credits. Under deliveries can accumulate up to 100,000 acre-feet, and annual under deliveries are offset by accrued credits. Thus, if Colorado has accrued credits, the credits are reduced by annual debits before the under-delivery becomes an accrued debit.

Second, no credits or debits are calculated for years in which there is either an Actual Spill or Hypothetical Spill of Usable Water from Rio Grande Project Storage. Credit water spills from Project Storage before and after Usable Water spills. Thus, in a spill year there will be a reduction or elimination of accrued credits of Colorado and New Mexico.

F. Alamosa-La Jara Water Users Protective Ass'n v. Gould, 674 P.2d 914, 919 (Colo. 1984).

To implement the stipulation in *Texas and New Mexico v. Colorado* the State Engineer promulgated rules and regulations for compact administration and groundwater administration in water Division No. 3. The rules for compact administration allocated the responsibility for compact deliveries based upon Article III of the Compact. They required the Conejos River and its tributaries to meet the scheduled deliveries of the Conejos River schedule in Article III, and required the Rio Grande and its tributaries to meet the scheduled deliveries of the Rio Grande in Article III. The groundwater regulation phased out groundwater diversions over 5 years unless the well was operated pursuant to a decreed plan for augmentation, or as an alternate point of diversion for a surface water right that was in priority, or otherwise demonstrated its operation did not cause injury.

The rules and regulations were protested, and after a jurisdictional challenge over the compact rules, see *Kuiper v. Gould*, 196 Colo. 197, 583 P.2d 910 (1978), the case went to trial for 12 weeks. During the course of that trial the State Engineer stipulated, *inter alia*, that Culebra Creek did not flow to Rio Grande and that the wells in the unconfined aquifer of the Closed Basin would not be subject to the groundwater regulations.

The principal disputes over compact administration at trial were (1) whether the Rio Grande and Conejos had separate delivery obligations or whether a basin-wide priority system should be used to meet the state's delivery obligation; (2) whether water rights on certain tributaries of the Rio Grande were subject to compact administration; and (3) the allocation of the 10,000 acre-feet annual “paper credit” under Article III of the Compact. The principal issue with the groundwater regulations was whether the

⁵ Reservoirs constructed after 1929 are allowed to store when the contents of Project storage are at least 400,000 acre-feet. See Rio Grande Compact, Article VII.

doctrine of maximum use required surface diversions to drill wells and “pump” their decrees before junior groundwater rights could be curtailed. The water court upheld the State Engineer’s compact regulations and disapproved the groundwater regulations. On appeal this decision was affirmed in part and reversed in part.

1. Intrastate Apportionment.

On appeal the Conejos River interest argued that an interstate compact could not affect an intrastate apportionment of water without violating the Colorado Constitutions. It argued that water rights had to be administered as a unitary basin-wide priority system. In rejecting this argument the Supreme Court approved the trial court’s conclusion that

In an equitable apportionment of an interstate stream, the State of Colorado has legal power and authority to allocate by Compact different burdens and entitlements between various sections of the river. This is especially true where, as here, the burden represents only that quantity of water which was not consumed on each river at the time of the Compact.

Alamosa-La Jara Water Users Protective Ass’n v. Gould, 674 P.2d at 922.

The Supreme Court went on to hold:

Equitable apportionment . . . , can determine times of delivery and sources of supply to satisfy that delivery without conflicting with state law, for state law applies only to the water which has not been committed to other states by the equitable apportionment. (Citation omitted). In an equitable apportionment, strict adherence to prior appropriations may not always be possible. (Citations omitted).

The question before us is how the prior appropriation doctrine may be reconciled with the equitable apportionment of water under federal law, which in this case subjugates the heretofore independent water rights on the Rio Grande mainstem and the Conejos River to a relatively recently created obligation to deliver an equitable share of the rivers' water at the New Mexico state line. As a result of the doctrine of prior appropriation, local economies develop based on vested rights in appropriations, subject to the vagaries of nature, but with settled expectations — arising out of the pattern of development of a water source — as to how water is to be allocated. Under prior appropriation doctrine water is allocated according to chronology because such allocation has the effect of protecting historic patterns of use. This process of development based on vested rights occurred independently on the Rio Grande mainstem and the Conejos River. . . . At no time have diversions on one stream been subject to curtailment by senior appropriators on the other.

To hold . . . , that the compact obligation has the effect of re-sorting settled water rights on both streams into a single system of priorities based solely on dates of appropriation would reshuffle the economies of the valley according to a chronology of events unrelated to settled expectations derived from historical patterns of use and reflected in the independent priority systems. That this result is not compelled by the doctrine of prior appropriation was recognized by the General Assembly in section 37-80-104, C.R.S. which mandates that compacts which are deficient in provision for intrastate administration be implemented so

as to "restore lawful use conditions as they were before the effective date of the compact insofar as possible." We agree with the statutory implication that a compact obligation should not be viewed as a senior water right which upsets historical development and reshuffles rights according to a chronological formula. Under the doctrine of prior appropriation, streams which have been independently appropriated remain independent. If the water of those streams becomes subject to equitable apportionment by compact, the streams must be administered as mandated by the compact, or if the compact is deficient in providing for administration, according to section 37-80-104.

Id. at 923-924.

2. Issue of Fully Developed Tributary Streams

The compact rules applied to all tributaries of the Rio Grande, including Trinchera Creek, La Jara Creek, and the Alamosa River. Water rights on those tributaries challenged the application of the rules to those streams on the grounds that they were "fully developed" at the time of the compact, and did not have compact inflow or outflow gaging stations. The water court held the compact applies to all tributaries of the Rio Grande, but held that the State Engineer may choose not to curtail diversions on the three creeks, if he determines that delivery of water from these tributaries to the mainstem of the Rio Grande would be futile or wasteful. *Id.* at 945. The Colorado Supreme Court found the Compact to be ambiguous on this point and turned to the history of the compact negotiations to resolve the issue. Based upon its review of that history it reversed the water court, holding:

Our independent evaluation of the legislative history, coupled with the water court's finding that at the time of the compact the streams contributed little water to the mainstem, leads us to conclude that the drafters did not intend to include the *normal surface flows* of Alamosa Creek, La Jara Creek and Trinchera Creek under Article III compact administration, and therefore, that the state engineer does not have the authority to apply the tributary rule to these creeks. (Emphasis added).

Id. at 918.

The language in italic above was added after the filing of separate petitions for rehearing by the State Engineer and the Rio Grande Water Users Association. Those petitions argued that the tributaries contributed significant flows in some conditions to the Rio Grande, including significant return flow to the Rio Grande below Alamosa, which return flow was an important part of the inflow-outflow relationship that was used to derive the Rio Grande's separate delivery schedule. Thus, any reduction in historical contributions from these streams, either on the surface or as groundwater return flow, would cause injury to other water rights on the Rio Grande and its tributaries subject to compact administration. The Division Engineer now administers these streams to pass flood water to the Rio Grande and to prevent enlarged use that results in decreased return flow to the Rio Grande. The water users on these tributaries continue to resist such administration and assert they are "not tributary" to the Rio Grande.

3. 1975 Proposed Groundwater Regulations

With respect to the groundwater regulations the water court found (1) the underground water was tributary to the surface streams; (2) that surface decrees were experiencing increasing curtailment; and (3) that underground water withdrawals had accelerated in recent years, affecting surface flows. The water court also found that the effect of underground water withdrawals had not been specifically quantified and

had not been attributed to individual wells. *Id.* at 928. In disapproving the groundwater rules the water court suggested that section 37-92-502, C.R.S. requires the State Engineer to determine that each well causes material injury to a senior appropriator before that well may be curtailed. Relying on section 37-92-102, C.R.S. and *Fellhauer v. People*, 167 Colo. 320, 447 P.2d 986 (1968), and *Colorado Springs v. Bender*, 148 Colo. 458, 366 P.2d 552 (1961), the water court held that in some instances senior appropriators may be required to drill new wells to augment or replace their surface water diversions before curtailment of junior groundwater rights. *Id.* at 920.

On appeal the Colorado Supreme Court reversed the water court's ruling that the State Engineer must prove injury by each individual well. The court held that:

[W]here, as here, streams are over-appropriated and underground water diversions from an aquifer have been found to significantly affect stream flow, it may be presumed that each underground water diversion materially injures senior appropriators. The state engineer, therefore, will not be required to repeat for every well curtailed the painstaking analysis which led to the aquifer-wide determination of material injury.

Id. at 931.

With respect to the water court's decision that maximum use may require surface users to drill wells, the State Engineer relied upon *Kuiper v. Well Owners Conservation Association*, 176 Colo. 119, 490 P.2d 268 (1971), which held "[I]t is not the present state of the law that the State Engineer is required to compel a person with a senior surface priority to use his ground water to apply on that priority before he makes a call." *Id.* at 283. On appeal the Supreme Court held that *Kuiper v. Well Owners* limited the doctrine of maximum utilization, and therefore overruled *Kuiper v. Wells Owners* to the extent it precluded the consideration of the reasonable-means-of-diversion requirement as a method of maximum utilization of integrated surface water and groundwater. *Id.* at 934. The Supreme Court went on to state, famously:

We note that the policy of maximum utilization does not require a single-minded endeavor to squeeze every drop of water from the valley's aquifers. Section 37-92-501(2)(e) makes clear that the objective of "maximum use" administration is "optimum use." Optimum use can only be achieved with proper regard for all significant factors, including environmental and economic concerns. (citations omitted). The water court observed that the state engineer's reconsideration might take the form of requiring senior appropriators to drill new wells before requiring curtailment of junior rights and listed a number of suggestions for increasing utilization. Similarly, the state engineer's reconsideration might result in assessment to junior appropriators of the cost of making those improvements to seniors' diversions which are necessitated by junior withdrawals. Selection among these and other possibilities, including retention of the scheme of the proposed rules, is a policy decision to be made by the state engineer, after consideration of all relevant factors.

Id. at 935.

G. Memorandum of Understanding among the State Engineer, the Conejos Water Conservancy District and the Rio Grande Water Users Association.⁶

The decision in *Alamosa-La Jara* left a number of difficult compact administration issues unresolved, including how to allocate credits and debits as between the Rio Grande and Conejos River, how to determine when to allow an under-delivery, how to control the effect of a debit by one stream system on the ability to utilize post-1929 reservoirs on the other stream, allocation of the paper credit, and relinquishment of credits under Article VII of the Compact. To avoid renewed litigation over these issues the State Engineer, the Conejos Water Conservancy District and the Rio Grande Water Users Association entered into a Memorandum of Understanding in January 1991 to resolve these and other issues. That is a complex agreement that addresses many issues. Generally speaking it allocated the state's allowable debits between the Rio Grande and Conejos River, has provisions for an intrastate accounting of credits and debits between the two stream systems, and contains protections for both stream systems from action of the other stream system under the Compact.

H. Compact Limitation on New Appropriations - Application of Tres Rios Ranch, Case No. 1991CW29.

The schedule of deliveries in the Rio Grande Compact was intended to protect existing levels of use in Colorado. This was to be accomplished, in part, with the system of credits and debits that allowed under deliveries (debits) in some years to be offset by over-deliveries (credits) in other years. In effect, the Compact permitted the storage of credits in Project Storage in one year and the exchange of that water for use in later years. Thus, new appropriations that reduce the amount of credits generated in one year could reduce the water available to more senior water rights in other years, thereby upsetting the protection for pre-compact water rights provided by the Compact.

Whether new appropriations caused injury to existing water rights under the Compact was litigated in the *Application of Tres Rios Ranch*, Case No. 1991CW29. That application involved four new surface appropriations for 12 c.f.s. from the Rio Grande below its confluence with Trinchera Creek. The appropriations would be the furthest downstream water rights on the Rio Grande in Colorado and therefore the diversions would only deplete deliveries to the state line, not the physical water supply available to senior upstream water rights. Much of the water reaching that location is water that, in most years, has been curtailed from upstream senior water rights or is return flow that is relied upon for compact deliveries.⁷

The Rio Grande Water Users Association opposed the application and argued, in part, that diversion by Tres Rios would divert water that was curtailed from upstream water rights in aid of Compact deliveries and increase the amount of curtailment on upstream senior water rights. The water court rules that "in-priority" diversions by Tres Rios would injure upstream senior water rights by reducing Compact credits and increasing required curtailment of upstream senior water rights to ensure Colorado's compliance with the Compact. Thus, the water court ruled that:

[D]iversions by the Applicant under the proposed conditional water rights will cause injury unless limited to years in which: (1) Elephant Butte Reservoir has spilled or, in the judgment of Colorado's Commissioner on the Rio Grande Compact commission, is certain to spill and under Article VI of the Compact no

⁶ A copy can be obtained from the author.

⁷ Flows at this location also include water from the Closed Basin Project and salvaged water delivered by the Norton Drain.

credits and debits will be calculated for Colorado under the Compact for that year; or, (2) Colorado has obtained or, in the judgment of Colorado's Commissioner on the Rio Grande Compact Commission, is certain to obtain an annual credit in excess of 150,000 acre feet. Diversions made under these two conditions must also be in priority with respect to other water rights in Colorado. Diversions at any other time must be made pursuant to a plan for augmentation approved in the manner required by law.

Findings of Fact, Conclusions of Law, Judgment and Decree of the Water Court, 1991CW29, Water Division No. 3, at 34.

III. Summary of Groundwater Development.

Groundwater development in the Valley began with the discovery of the confined aquifer in 1887. By 1891 there were estimated to be 2,000 flowing wells in the Valley; by 1904 there were 3,234 flowing wells in the Valley; and by 1916 there was estimated to be 5,000 flowing wells in the Valley. See W.J. Powell, 1958, *Ground Water Resources of the San Luis Valley, Colorado*, USGS Water Supply Paper 1379. That number increased to 6,074 flowing wells by 1936 and increased to an estimated 7,500 flowing wells by 1958. *Id.* at 26-27.

Significant development of the groundwater from the unconfined aquifer for irrigation did not begin until the 1930's. *Id.* at 56. While the first irrigation well in the unconfined aquifer was constructed in 1903, there was little or no further development of the unconfined aquifer for irrigation purposes for the next 25 years. *Id.* at 57. The number of wells withdrawing water from the unconfined aquifer increased from 176 in 1936 to approximately 1,300 wells in 1952, *id.*, and is several times that number today.

Well construction in both the confined and the unconfined aquifers continued until 1972 when the State Engineer imposed a moratorium on the issuance of well permits for new appropriations of groundwater from the confined aquifer and from the unconfined aquifer outside of the Closed Basin. In 1981 the State Engineer imposed a moratorium on the issuance of well permits for new appropriations from the unconfined aquifer in the Closed Basin, effectively ending new appropriations of groundwater in the Valley. In 2003, the State Engineer issued Policy No. 2003-3, in which the State Engineer declined to issue permits to deepen existing wells, to drill supplemental wells, or to drill alternate points of diversion for wells, without the applicant first obtaining a judicial confirmation of the absence of material injury. The purpose of this policy was to prevent enlarged use of groundwater rights.

IV. Conjunctive Use of Surface and Groundwater.

Prior to the advent of high capacity pumps and sprinkler systems, the predominate method of irrigation was surface application or "flooding." A particular method of flood irrigation, known as subirrigation, was common in many parts of the Valley, particularly in the Closed Basin area north of the Rio Grande. *Rio Grande Joint Investigation*, at 67. Subirrigation was:

[c]laimed to be essential to the successful growth of crops under the soil and water-supply conditions which prevail. By it the ground water is built up to within 1 to 3 feet of the surface and water is then allowed to run slowly through small ditches spaced about 8 rods apart. Water from these ditches seeps outward, supplying moisture to the plants. *This method really constitutes in part a substitution of underground storage for "headwater" or stream storage in an effort to adjust the water supply*

to the irrigation demand. It results, however, in overdiversion during the spring run-off, in unduly high water tables, and in excessive evaporation and transpiration losses.

Id. (Emphasis supplied).

In the Closed Basin area, the effect of this practice essentially was to create an “artificial” aquifer:

With continued large diversions from Rio Grande to the porous and shallow soils in the closed basin, the underground basin had filled rapidly; the water table had risen from depths ranging from 40 feet on the east to 100 feet on the west to a position practically at the surface on the east, bordering the sump, and to a level within 10 to 15 feet of the surface on the west.

Id. As a result, much, but not all, of the water in the unconfined aquifer of the Closed Basin results from diversions from the Rio Grande. The practice of subirrigation, however, was not without its drawbacks or its critics. As reported in the *Joint Investigation*:

A serious condition soon complicated the situation. It was brought about by the rise in ground-water levels to such an extent that lands in the lower parts of the valley were becoming seeped.

* * * *

The rise in ground water and the seeping of lower lands soon began to force abandonment of acreages along the eastern side of the closed basin, with concomitant substitution of lands farther west. This gradual process of abandonment at the east and extension westward . . . until it reached the extreme west side of the valley, while the broad stretch of once-occupied lands to the eastward was left to revert to its natural state, badly damaged, however, by alkali.

Joint Investigation at 67; see also Siebenthal, C.E., *Geology and Water Resources of the San Luis Valley, Colorado*, 1910.

Reservoir storage in the headwaters of the streams in the Valley was hindered by the series of embargos on the use of federal lands for reservoir construction. In this context the use of the unconfined aquifer as a storage reservoir through the practice of subirrigation helped solve the water supply timing problem that otherwise only could be addressed with surface water storage. Thus, with respect to the practice of subirrigation, the water court has previously found:

[T]his unique mode of irrigation was highly efficient from the point of view of the water users. It eliminated many capital and labor costs. *Most importantly, subirrigation allowed water users to make parallel their water supply and the actual demands of growing crops.* The necessity for achieving parallel timing stems from the fact that the Rio Grande is a typical western stream in that it has a relatively short period of high flow. Crop demands, however, continue long after the peak flows have passed and water available for direct flow diversion is then less than sufficient. Because the practice of subirrigation maintained an underground water reservoir after the peak flows had passed, water was available to the crops for an extended period, thus circumventing the

water supply timing problems inherent in a western surface irrigation system. . . .

Findings of Fact, Conclusions of Law, Judgment and Decree, Case No. W-3979, Water Division No. 3, at 6 (Emphasis supplied); Finding of Fact, Conclusions of Law, Judgment and Decree, Case No. W-3980, Water Division No. 3, at 6.

Subirrigation is no longer practiced widely in the Valley. As explained by the water court in the decrees in Cases No. W-3979 and W-3980:

19. A combination of factors has worked to render subirrigation no longer a feasible method of irrigation. An extended period of low water years, the attendant imposition of curtailments on diversions from the Rio Grande in aid of assuring compliance with the Rio Grande Compact, and the development of pumps to extract huge quantities of ground water were all factors contributing to a lowering of the ground water table in the Closed Basin area. Such a lowered water table in turn eliminates the possibility for subirrigation.

20. The increased use of wells drilled into the underground aquifers became an important part of the economy of the Closed Basin. While subirrigation was still feasible, the essentially artificial aquifer created by that irrigation practice in which the water table level was quite near to the ground surface assured that irrigation water could be pumped from that shallow aquifer quite economically. This pumping itself, however, worked at cross purposes with the method of subirrigation because subbing depends on holding the water table near the ground surface and pumping from the shallow aquifers tends to lower the water table. See Powell at pages 57 and 63; Siebenthal at page 30.

* * * *

22. The advent of center pivot sprinklers once again changed the irrigation practices in the Closed Basin. Sprinkler irrigation has increased the yield of crops and represents a more efficient use of water with reduced waste. Water for the sprinklers is most efficiently supplied from wells in the underground aquifers but, because these aquifers are not maintained by natural recharge, continuation of pumping is necessarily dependent upon artificial recharge. See Powell at pages 51-52. Just as they have in the past, [San Luis Valley Irrigation District] landowners have imported water into the Closed Basin from the Rio Grande and used it to recharge the underground aquifers, in effect using these aquifers as storage facilities. The stored water is then extracted from the aquifers by means of wells which supply the sprinklers.

Finding of Fact, Conclusions of Law, Judgment and Decree, Case W-3980, Water Division No. 3, at 6-7.

While the earliest use of center pivot sprinkler systems occurred in the Closed Basin area north of the Rio Grande, center pivot sprinklers are now used throughout the Valley. And while many center pivot irrigation systems are supplied only from groundwater, the practice of artificially recharging the unconfined aquifer with surface water is what sustains the groundwater supply in many parts of the valley. In addition, some farmers use both surface water and groundwater to their sprinkler systems for

irrigation of their crops. It is not uncommon, particularly south of the Rio Grande, to deliver surface water to center pivot sprinklers and to use groundwater to supplement the surface water supply in times of shortage. Surface water used for flood irrigation is also supplemented with groundwater in times of shortage. And, as established by the prior decrees in Cases No. W-3979, W-3980, 95CW45, and 95CW46, there long has been a practice of using surface water to recharge or replenish the unconfined aquifer to provide a water supply for wells dependent upon that aquifer. These practices of conjunctive use of surface water and groundwater are common in much of the Valley, with groundwater recharge being practiced most extensively in the Closed Basin area north of the Rio Grande.

V. Closed Basin Project.

As a consequence of the subirrigation practices drains were constructed to carry excess groundwater away from the irrigated lands returning some water to the Rio Grande. *See e.g. San Luis Valley Irr. Dist. v. Rio Grande Drainage Dist.*, 84 Colo. 99, 268 P. 533 (Colo. 1928). Much of the excess water in the Closed Basin flowed to the “sump” on the east side of the Closed Basin and is lost to evaporation and transpiration. Thus, for many years water users in the Valley discussed the construction of a large open drain to lower water levels in the sump and return the water to the Rio Grande. This water would have been considered new water that would allow increased consumption in Colorado under both the 1929 Temporary Compact and under the Compact. As a consequence, Article III the Compact provides that if water is imported into the Rio Grande from the Closed Basin, Colorado will receive no credit for the water “unless the proportion of sodium ions shall be less than forty-five percent of the total positive ions in that water when the total dissolved solids in such water exceeds three hundred fifty parts per million.”

The Closed Basin Project is a federal reclamation project which was constructed in the sump area of the San Luis Valley by the Bureau of Reclamation. The project is designed to “salvage” shallow groundwater from the sump area of the Closed Basin and to deliver that water to the Rio Grande. *See generally Closed Basin Landowners Ass’n v. Rio Grande Water Conservation District*, 734 P.2d 627 (Colo. 1987); and *Memorandum and Order of Partial Summary Judgment, Application of Water American Water Development, Inc.*, 86 CW 46, *Water Div.3*. The project was sponsored by the Rio Grande Water Conservation District pursuant to section 37-48-105, C.R.S., and the Project is administered by the Rio Grande Water Conservation District. The decree approving the Project was signed by this Court in Case No, W-3038, authorizing diversion of up to 117,000 acre-feet annually for Project priorities and the other authorized uses. The first priority is to meet the Article III delivery obligations of the Rio Grande Compact. Up to 600,000 acre feet of water in any consecutive ten-year period can be made available under the first priority for this purpose. The second priority is delivery of water to the wildlife areas in the San Luis Valley and the third priority is for sale for use for irrigation. The Closed Basin Project consists of 110 wells (footnote omitted) completed into the unconfined aquifer which pump water into a ditch for conveyance to water users and to meet Colorado’s obligations under the Rio Grande River Compact. Water is also conveyed by ditch from outside the Closed Basin Project area into the sump area. The project discharges water into the Rio Grande above its confluence with Trinchera Creek. Water has been available from the Project since 1988. The annual yield from the Closed Basin Project has not lived up to expectations. Still, 43,520 acre-feet have been applied to beneficial use per the decree and the rights to this are now absolute. (Footnote omitted) The Rio Grande Water Conservation District voluntarily relinquished 32,000 acre-feet of its conditional decree Once setoffs for poor water

quality are factored in, the Project has consistently produced less than 50 percent of its original conditional decreed amount. In 2002 it produced approximately 14,000 acre-feet, or approximately 13% of the projected yield.

Findings of Fact, Conclusions of Law, Judgment and Decree, Nov. 9, 2006, *In the Matter of the Confined Aquifer New Use Rules*, Case No. 2004CW24, Water Division No. 3, at 32-33.

A. Allocation of the Yield of the Closed Basin Project.

The allocation of the yield of the Closed Basin Project is a central part of current water supply administration in the San Luis Valley, and was well summarized by Judge Kuenhold in Case No. 04CW24 as follows:

In 1985, the Conejos Water Conservancy District, the Rio Grande Water Users Association, the San Luis Valley Water Conservancy District, the Alamosa-La Jara Water Conservancy District, and the Rio Grande Water Conservation District entered into an Agreement known as the *Resolution Regarding the Allocation of the Yield of the Closed Basin Project* (“60/40 Agreement”). . . . The Conejos Water Conservancy District, the Rio Grande Water Users Association, the San Luis Valley Water Conservancy District, and the Alamosa-La Jara Water Conservancy District all adopted substantially identical resolutions asking the Rio Grande Water Conservation District to allocate the yield of the Project between the Rio Grande and the Conejos River and the District did so. The District’s resolution, the 60/40 Agreement, is intended to address, at least in part, the problem of stream depletions caused by the then existing levels of production by wells in the Valley. The allocation of the water between the two rivers mirrors the way in which the Rio Grande Compact allocates separate delivery obligations between the rivers. The agreement over-optimistically contemplated that the Project would provide not less than 250,000 acre-feet of additional water over any ten-year period once phase 4 of the Project was in operation.

103. The understandings and goals of the 60/40 Agreement, as described therein, include, *inter alia*, (1) reducing the burden of curtailment of surface water rights to meet the obligations of the Compact which threatened “the economic stability of the San Luis Valley by reducing the total agricultural production within the Rio Grande Water Conservation District;” (2) avoid the threat to “the economic stability of the San Luis Valley” presented by a further reduction of total irrigated acreage within the Rio Grande Water Conservation District from well regulation; (3) use of the Project water to reduce the curtailment of surface diversions that would otherwise be required by the Compact while at the same time reducing claims of stream depletion from well pumping; and (4) to reduce the burdens of curtailment of surface diversions which are currently required to meet the delivery obligations of the Compact; (5) to restore higher levels of surface diversions within the District; and (6) to relieve well users within the District from claims that the operation of wells has reduced the discharges of the Rio Grande and Conejos River. The parties sought to accomplish this by making a permanent allocation between the two river systems of that portion of the yield of the Project that is subject to section 104(b)(1) of the Reclamation Project Authorization Act of 1972.

104. The allocation resolution contemplated that the usable yield from the Project would be divided, as nearly as possible, on a 60/40 basis between the Rio Grande

and the Conejos River. It further contemplated that the water so allocated would be beneficially used by exchange. . . . Use of this water by exchange is generally physically possible given the place of delivery of the Project water to the Rio Grande and the manner of administration of the Compact. The Project delivers water to the Rio Grande downstream of Alamosa and upstream of both the confluence between the Rio Grande and the Conejos River and Trinchera Creek. (Citations omitted). Essentially all of the surface water rights on the Rio Grande divert upstream from the outfall of the Project, see *Application of Tres Rios Ranch, 1991 CW 29* at 24; *Alamosa-La Jara* at 923. The water needed to meet the Rio Grande's separate Compact delivery obligation is curtailed from the upstream ditches and is carried in the Rio Grande to the Colorado-New Mexico State line. Thus, water delivered by the Project can physically serve as a substitute supply for water that would otherwise have to be curtailed away from upstream senior water rights to satisfy the Rio Grande's Compact obligation. The use of the Project water to help meet the Rio Grande's Compact obligation has the effect of making more water available for diversion by the upstream water users.

105. The exchange can be physically operated for the benefit of the Conejos River in much the same manner. The Conejos River's compact delivery obligation is measured at the La Sauses gage, located on the Conejos River at its confluence with the Rio Grande. See *Alamosa-La Jara* at 939; Rio Grande Compact, Art. III. Project water delivered in the Rio Grande for the benefit of the Conejos can be substituted for the Compact deliveries otherwise required from the Conejos River, thereby making additional water available for upstream diversion.

* * * *

109. In exchange for this permanent allocation of Project water, the Conejos Water Conservancy District, the Rio Grande Water Users Association, the San Luis Valley Water Conservancy District, and the Alamosa-La Jara Water Conservancy District waived all claims against all existing wells located within the boundaries of the Rio Grande Water Conservation District for alleged effects on the flows of the Rio Grande, Conejos River, Alamosa River, and La Jara Creek resulting from the existing levels of attained production and use of those wells. The agreement defines "existing levels of production and use" to generally refer to the levels of diversion and beneficial use of groundwater attained during the period 1981-1985. In the case of municipal or quasi-municipal wells, their levels of attained use and production are to be measured by the wells' permitted and/or decreed capacity.

Id. at 33-35.

VI. Speculative Efforts to Develop the Confined Aquifer: the Legacy of Phil Emery's Back-of-the-Envelope Calculations.

One of the principal investigators of the hydrologic system in the San Luis Valley in the late 1960s and early 1970s was the USGS geologist Philip A. Emery. Mr. Emery authored or co-authored a number of the studies that formed the basis of our understanding of the hydrology of the San Luis Valley through the mid-1980s. At one point Mr. Emery made what he later described as a "back of the envelope" calculation of the amount of water in storage in the confined aquifer systems of the San Luis

Valley. He estimated the total volume of the confined aquifer and multiplied the volume by an assumed specific yield of 25% and concluded that the confined aquifer system held as much as 2 billion acre-feet of groundwater. This estimate was repeated by the Colorado Supreme Court in its *Alamosa - La Jara* decision and, like flies to honey, it attracted a number of speculative water development schemes to the San Luis Valley.

The first was the Application of American Water Development (“AWDI”), Case No. 86CW46, who sought to develop as much as 200,000 acre-feet annually from the confined aquifer, much of which was for export out of the Valley. After five years of protected litigation and a lengthy trial, the case ended badly for AWDI. The claims on which it went to trial were dismissed by the water court, and the opposers were awarded costs and attorney fees for claims dismissed on the eve of trial. See *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352 (Colo. 1994).

Cabeza de Vaca and its financial backer Farallon Capital Management bought AWDI’s property and began extensive engineering investigation to try to succeed where AWDI had failed. At this juncture water users from the San Luis Valley went to the general assembly to seek an alternative to continued litigation to resolve the questions of future use of the confined aquifer. Those efforts resulted in the adoption of H.B 89-1011.

In his decision in Case No. 04CW24 Judge Kuenhold ably summarized that legislation:

In 1998, the General Assembly enacted House Bill 98-1011 (“HB 98-1011”) to address concerns regarding groundwater use in the San Luis Valley, and in particular, new uses from the confined aquifer. HB 98-1011 recognized that, at that time, there was insufficient comprehensive data and knowledge of the relationship between the surface streams and the Confined Aquifer System to permit a full understanding of the effect of the groundwater withdrawals upon the natural stream and aquifer system within Water Division 3. Ch. 231, sec. 1, 1998 Colo. Sess. Laws 852, section 37-90-102(3)(a), C.R.S. (2005). HB 98-1011 directed the State Engineer to promulgate rules governing new withdrawals of groundwater affecting the Confined Aquifer System, based upon a specific study of the Confined Aquifer System. *Id.* sec. 2; section 37-90-137(12)(b)(I), C.R.S. (2003). Subsection (12)(b)(I), provided that any well permit in Water Division 3 that involves a new withdrawal of groundwater that will affect the rate or direction of movement of water in the Confined Aquifer System, referenced in section 37-90-102(3), shall be permitted pursuant to a judicially approved plan for augmentation that, in addition to all other lawful requirements for such plans, shall be subject to the requirements of rules for the withdrawal of such groundwater that are promulgated by the State Engineer pursuant to the procedures of section 37-92-501(2). Subsection (12)(b)(I) required that those rules be promulgated by July 1, 2001, which date was later extended several times to July 1, 2004. Ch. 67, sec. 2, 2001 Colo. Sess. Laws 158, 159; Ch. 239, sec. 3, 2003 Colo. Sess. Laws 1595, 1597.

120. Section 37-90-137(12)(b)(I) stated that in promulgating the Rules, the State Engineer “shall recognize that unappropriated water is not made available and injury is not prevented as a result of the reduction of water consumption by nonirrigated native vegetation.” Finally, it provided that the Rules must:

permit the development of the water resources of water division 3 in a manner that will protect Colorado's ability to meet its interstate compact obligations and to prevent injury to senior appropriators in the order of their priorities, and with due regard for daily, seasonal, and longer demands on the water supply. . . . The state engineer and the Colorado Water Conservation Board shall proceed with diligence to complete needed studies.

Section 37-90-137(12)(b)(I) was repealed by section 37-90-137(12)(b)(II) on July 1, 2004. That repeal does not affect the validity of the Rules. Section 37-90-137(12)(b)(II), C.R.S. (2005).

121. HB 98-1011 also added section 37-92-305(6)(c), C.R.S. (2005), which requires a plan for augmentation for any application in Water Division 3 that involves new withdrawals of groundwater that will affect the rate or direction of movement of water in the Confined Aquifer System. In addition to all other lawful requirements for such plans, it requires the augmentation plan to "recognize that unappropriated water is not made available and injury is not prevented as the result of the reduction of water consumption by nonirrigated native vegetation." Finally, it requires that "in any such augmentation plan decree, the court shall also retain jurisdiction for the purpose of revising such decree to comply with the rules and regulations promulgated by the state engineer pursuant to section 37-90-137(12)(b)(I)."

122. Pursuant to the legislative direction in HB 98-1011, the State Engineer and the Colorado Water Conservation Board performed a specific study of the aquifer systems, the RGDSS Study. As discussed in greater detail below, this study involved collection and evaluation of existing data, supplementation of the existing data with new studies, development of several models and the organization of the data and models into an accessible format. The RGDSS Study was carried out in phases from 1998 through 2004 and cost some \$5 million of state funds, together with significant monetary and in-kind resources from water users. The evidence before the Court shows that the RGDSS Study is one of the most comprehensive studies of the Valley's geology and hydrology that has ever been undertaken. In addition to his own professional knowledge and experience, the State Engineer has relied upon the data and conclusions of the RGDSS Study in promulgating the Rules.

Findings of Fact, Conclusions of Law, Judgment and Decree, Nov. 9, 2006, In the Matter of the Confined Aquifer New Use Rules, Case No. 2004CW24, Water Division No. 3, at 40-41.

The effect of HB 98-1011 was to put a hold on new speculative efforts to develop the confined aquifer until completion of the RGDSS Study and the State Engineer's adoption of rules governing new appropriations from the confined aquifer system. See *Simpson v. Cotton Creek Circles, LLC*, 181 P.3d 252 (Colo. 2008)(Appeal of Confined Aquifer New Use Rules).

With respect to Phil Emery's back-of-the-envelope calculation, in Case No. 04CW24 Judge Kuenhold found:

197. The confined aquifer has been the source of a good deal of speculative interest in the water development community. See e.g. *Application of American*

Water Development, Inc., Case No. 1986 CW 46, District Court, Water Division No. 3; *Am. Water Dev., Inc. v. City of Alamosa*, 874 P.2d 352, 384 (Colo. 1994). This has been driven, in part, by the suggestion that there is 2 billion acre-feet of water in storage in the confined aquifer. This suggestion was first made by Mr. Philip Emery, an investigator for the USGS responsible for many of the pioneering studies of the hydrology of the Valley that the USGS carried out in the late 1960's and early 1970's. As explained by Mr. Harmon, this "back of the envelope" calculation by Mr. Emery was just that, and it does not represent at all what is currently known about the hydrogeology of the Valley. Mr. Harmon further explained that although there is a large volume of water in the confined aquifer, at depths greater than 3,000 feet below ground, the water quality degrades very rapidly, and even if economically recoverable, that water would not be practical for any known use. In addition, there are substantial practical hurdles to producing this water. In Mr. Harmon's opinion the production of large quantities of water from the confined aquifer would require removal of the artesian pressure from the entire aquifer, top to bottom, which would be physically difficult to accomplish, even with a large capacity well on every section corner in the Valley. The San Luis Valley as a whole contains less than half the quantity of groundwater estimated by Mr. Emery, a part of which is of unusable quality and a part of which is not economically recoverable. *Transcript (Harmon) Vol. III* at pages 527- 531 and pages 546-47. Thus, the Court concludes that the claims about the large quantities of water available for withdrawal in the confined aquifer in the Valley have been substantially overstated and simply serve to obscure rather than advance any thoughtful analysis of the confined aquifer and the consequences of new withdrawals from that aquifer. The fact that the best estimate today is that there is less than one half of the water in storage than what we believed only thirty years ago is also a strong indicator that this Court should be cautious in committing to irreversible actions based on past or current hypotheses which may or may not prove accurate.

Findings of Fact, Conclusions of Law, Judgment and Decree, Nov. 9, 2006, In the Matter of the Confined Aquifer New Use Rules, Case No. 2004CW24, Water Division No. 3, at 67.

VII. Drought of 2000-2005 and Senate Bill 04-222

The period from 2000 to 2003 was the second driest consecutive four year period of recorded stream flow on the Rio Grande, exceed only by the drought of 1953-1956. Two-thousand and two was the driest year of record on the Rio Grande, falling below the lowest level of the schedule of deliveries in Article III of the Compact. With decreased stream flow came increased reliance on groundwater, and resulting groundwater levels declines and depletions to stream flows. Water Users in the San Luis Valley began discussing ways to protect surface and groundwater supplies in the Valley in a manner that was less destructive than the examples of groundwater regulation seen in the Arkansas and South Platte Basins.

As explained by Ray Wright, then President of the Rio Grande Water Conservation District, when testifying before the Senate Committee on Agriculture, Natural Resources and Energy, in support of Senate Bill 04-222:

We've been highly involved over the past two years. . . . About two years ago this April our level of concern over the impacts to the aquifers rose highly.

. . . .

Approximately a year ago the Rio Grande District as well as the Rio Grande Water Users worked together and began promoting the idea of the ground water management subdistricts.

Through various efforts and seminars and speakers we've learned the trials and tribulations and expenses that have been incurred in the Arkansas and the South Platte Basins over the issue of ground water regulation.

We knew that these types of fights often took years and millions of dollars. And hoped that all costs to be able to avoid inflicting that sort of expense and anguish on the water users of the San Luis Valley. This is where the concept of the ground water management subdistricts arose, that we knew that no solution to the problem that we have all created would be cheap or easy.

* * * *

The legislation does provide a strong incentive for people to work together and join together and find cooperative solutions. It doesn't require that anyone should do this, but in any case the folks on the Rio Grande District believe that that type of cooperation should be the model rather than encouraging a greater degree of regulatory action by the state.

As summarized by Judge Kuenhold:

The drought of 2002, combined with a reduction in the Closed Basin Project's yield due to bio-fouling of production wells, renewed the concern of Valley water users over well depletions to both the aquifer systems and the surface streams. This concern is evidenced by their support for SB 04-222 (codified in section 37-92-501(4), C.R.S.) In testimony before the House Agriculture Committee on April 28, 2004, Mr. Paddock, on behalf of the Rio Grande Water Users Association, described the 60/40 Agreement and the fact that the decline in yield of the Closed Basin Project together with the drought showed that the 60/40 Agreement was not a complete solution to groundwater problems in the Valley, and that other measures would be required to address groundwater overdraft and to protect senior vested water rights from injury caused by groundwater pumping. Similar testimony was given before the Senate Agriculture Committee on April 8, 2004, describing the use of the 60/40 Agreement in lieu of groundwater regulation in the Valley. This testimony acknowledged that this agreement has proved to be an incomplete solution to the groundwater problems of the Valley.

Id. at 35.

In 2004, at the urging of water users from the San Luis Valley, the General Assembly enacted SB 04-222. Ch. 235, 2004 Colo. Sess. Laws 777-79. SB 04-222 added a new subsection (4) to section 37-92-501, which is applicable to rules and regulations governing the use of "underground water" in Water Division No. 3. This new subsection provides, in part:

(4) (a) In addition to the provisions of subsection (2) of this section, when adopting rules governing the use of underground water in division 3, and in recognition of the unique geologic and hydrologic conditions and the conjunctive use practices prevailing in division 3, the state engineer shall have wide

discretion to permit the continued use of underground water consistent with preventing material injury to senior surface water rights In regulating an aquifer or system of aquifers in division 3, the state engineer shall apply the following principles:

(I) Use of the confined and unconfined aquifers shall be regulated so as to maintain a sustainable water supply in each aquifer system, with due regard for the daily, seasonal, and long-term demand for underground water;

* * *

(III) Fluctuations in the artesian pressure in the confined aquifer system have occurred and will continue to occur in response to climatic conditions, water supply, and water demands. Subject to subparagraph (IV) of this paragraph (a), such pressure fluctuations shall be allowed with the ranges that occurred during the period of 1978 through 2000. Artesian pressures shall be allowed to increase in periods of greater water supply and shall be allowed to decline in periods of lower water supply in much the same manner and within the same ranges of fluctuation as occurred during the period of 1978 through 2000, while maintaining average levels similar to those that occurred in 1978 through 2000.

* * *

(V) Underground water use shall not unreasonably interfere with the state's ability to fulfill its obligations under the Rio Grande compact, codified in article 66 of this title, with due regard for the right to accrue credits and debits under the compact.

SB 04-222 also contains additional requirements for the Rules to be promulgated pursuant to HB 98-1011. Those requirements include:

(b) In adopting rules pursuant to paragraph (a) of this subsection (4), the state engineer shall:

(I) Recognize contractual arrangements among water users, water user associations, water conservancy districts, ground water management subdistricts, and the Rio Grande water conservation district, pursuant to which:

(A) Water is added to the stream system to assist in meeting the Rio Grande compact delivery schedules or to replace depletions to stream flows resulting from the use of underground water; or

* * *

(III) not recognize the reduction of water consumption by phreatophytes as a source of replacement water for new water users or to replace existing depletions, or as a means to prevent injury from new water uses.

Section 37-92-501(4)(b)(I), (III), C.R.S. (2010). SB 222 also provides that the State Engineer is not to curtail pumping from wells in Division 3 that are included in a groundwater management subdistrict with a judicially approved management plan that meets the requirements of paragraphs (a) and (b) of section 37-92-501(4). Section 37-92-501(4)(c), C.R.S. (2010).

VIII. Groundwater Management Subdistricts

To date one groundwater management subdistrict has been formed and its Plan of Water Management has been approved by the water court. Findings of Fact, Conclusions of Law, Judgment and Decree, *Concerning the Office of the State Engineer's Approval of the Plan of Water Management for Special Improvement District No. 1 of the Rio Grande Water Conservation District and In the Matter of the Rio Grande Water Conservation District, In Alamosa County Colorado*, Consolidated Cases Nos. 2007CW52 and 2006CV64, Water Division No. 3, May 27, 2010. That decision is currently on appeal to the Colorado Supreme Court, and the resolution of the issues in that appeal will guide the formation of other groundwater management subdistricts.

The existing Subdistrict is located in the heavily irrigated area north of the Rio Grande within the Closed Basin of the San Luis Valley. The Subdistrict contains some 174,000 acres of irrigated land and some 3,000 irrigation wells, approximately 300 of which withdraw water from the confined aquifer system, and the balance of which withdraw water from the unconfined aquifer. Subdistrict lands are primarily served by either the Rio Grande Canal, the Billings Ditch, the Farmers Union Canal, the Prairie Ditch, or the San Luis Valley Canal.

In May 2006, the Rio Grande Water Conservation District ("District") filed a Petition for Establishment of a Special Improvement District No. 1 of the Rio Grande Water Conservation District in Case Number 06CV64. On July 19, 2006, the Alamosa County District Court approved the Petition to form the Subdistrict. *Id.* In September of 2006, the District's board of directors appointed an eleven-member board of managers for the Subdistrict. The board of managers thereafter prepared a plan of water management ("Original Plan") pursuant to section 37-48-126, C.R.S. (2010). By order dated February 18, 2009, the water court found the Original Plan to be inadequate under section 37-48-126(2) and remanded it to the Board of Managers with specific instructions and suggestions for reconsideration of the plan.

Pursuant to the February 2009 Order, the Subdistrict reconsidered the Original Plan, made changes to it, and adopted the Amended Plan of Water Management ("Amended Plan"). The Amended Plan consists of the body of the plan together with five new appendices containing the operational details of the Amended Plan. Appendix 1 is the Annual Replacement Plan ("Annual Plan") that sets forth in detail how the Subdistrict will determine and replace injurious stream depletions, and the process for review and approval of the Annual Plan. Appendix 2 is the procedure for determining surface water credits used in calculating the Subdistrict Annual Fee. Appendix 3 is the database of Subdistrict Wells. Appendix 4 is the Subdistrict's Budget and Accounting Plan, and Appendix 5 is the Subdistrict's Annual Operational Timeline for accomplishing the tasks required by the Amended Plan.

The principal goals of the Amended Plan are to (1) replace injurious stream depletions, (2) recover groundwater levels in the Unconfined Aquifer of the Closed Basin in the Subdistrict, (3) maintain a sustainable irrigation water supply in the unconfined aquifer, and (4) avoid interference with Colorado's obligations under the Rio Grande Compact. To restore groundwater levels and maintain a sustainable water supply in the unconfined aquifer the Amended Plan proposes to reduce irrigated land within the Subdistrict by 40,000. The Amended Plan also proposes, within 20 years, to have recovered groundwater levels in the unconfined aquifer to within 200,000 to 400,000 acre-feet below the January 1, 1976 storage level.

The Amended Plan must replace all on-going injurious stream depletions resulting from the operation of Subdistrict Wells. Appendix 1 contains the procedure for determining the depletions that must be replaced and demonstrating how they will be replaced. It also contains a detailed description of the Annual Plan and the comprehensive information supporting the Annual Plan that must be provided to

the State and Division Engineers (“Engineers”) by April 15 of each year. The Engineers then review the Annual Plan to determine whether it complies with the Amended Plan and prevents injury to senior vested water rights. If the Engineers find it meets these requirements, the Subdistrict Wells can operate under the Amended Plan, but not otherwise.

The Amended Plan is implemented with funds raised from service charges (user fees) for the benefits and services provided by the Subdistrict. §§ 37-48-105(1)(n), 37-48-123(2)(e)(I)(D), C.R.S. (2010). The Annual Fee has three components: an Administrative Fee of up to \$5.00 per Subdistrict acre; a Conservation Reserve Enhancement Program (“CREP”) Fee of up to \$12.00 per Subdistrict acre; and a Variable Fee based on Water Value of up to \$75.00 per acre-foot of groundwater pumped by each Subdistrict farm or farm unit. The CREP fee is to be used to provide the local cost-share component for the federal program designed to secure the retirement of irrigated lands. *See generally* February 2009 Order, at 55-56.

The amount of the Annual Fee will be submitted annually by the Subdistrict to the District for approval and, when approved, will be submitted to the appropriate county officers for each county in the Subdistrict for addition to the tax rolls and collection in accordance with law. § 37-48-110(2), C.R.S. (2010). The components of the Annual Fee may be adjusted annually by the board of managers within the specified dollar ranges.

Because the Subdistrict’s fees are collected by the counties, the Subdistrict must submit the fees in the fall of each year, but the Subdistrict does not receive funds until the counties receive tax payments the following year. § 37-48-148, C.R.S. (2010). Before the Subdistrict can assess and collect fees the court must approve the official plan of the Subdistrict. § 37-48-126(4), C.R.S. (2010). This means that until the Subdistrict’s plan of water management is judicially approved, it has no source of funds to implement the Amended Plan.

The Amended Plan allows the Subdistrict, to the extent permitted by law, and in accordance with rules to be adopted by the Subdistrict, to contract with other well owners either within or outside the Subdistrict exterior boundaries to replace their injurious stream depletions and to advance the goals and overall objective of the Amended Plan. In adopting rules for this purpose, however, the Subdistrict may only contract with well owners whose well impacts can be determined using the Subdistrict response functions pursuant to the procedures set forth in Appendix 1. The reasons for this contracting authority are, as explained by the water court:

293. . . . Within the Subdistrict’s boundaries and in close proximity to the Subdistrict, however, there are numerous wells which are not currently included within the Subdistrict or its Amended Plan. *Testimony of Carla Worley* (Sept. 29, 2009). These wells are owned by the Federal Government, by State government, by municipalities, school districts and commercial establishments. Although none of these were included within the Subdistrict, their depletions need to be addressed. Allowing these entities to contract with the Subdistrict to perform the complicated analysis of injurious depletions and to provide the source of replacement water is logical, efficient and desirable. In fact, to require these scattered wells to attempt to file individual plans of augmentation would be contrary to the overall goals of SB 04-222.

Findings of Fact, Conclusions of Law, Judgment and Decree, Nov. 9, 2006, In the Matter of the Confined Aquifer New Use Rules, Case No. 2004CW24, Water Division No. 3, at 100.

The Amended Plan implements a new approach to groundwater management in water division 3 authorized by section 37-92-501(4). The Amended Plan seeks to protect the Subdistrict's agricultural economy, while preventing injury to senior vested water rights and restoring and managing the aquifers on a sustainable basis.

IX. Proposed Groundwater Regulations for Existing Uses of Groundwater

The State Engineer has begun the process of promulgating rules and regulations for existing uses of groundwater in Water Division No. 3. The rules are to meet the requirements of SB-222, including the prevention of injury, providing for sustainable groundwater supplies, and prevention of interference with the Rio Grande Compact. The promulgation of these rules has been delayed by the need to update and recalibrate the RGDSS groundwater model to include, among other things, measured well pumping data being obtained pursuant to the Division No.3 groundwater measurement rules. That updating and recalibration effort is expected to be completed in the fall of 2011.

In addition, the rules will contain the standards for the type of information required for Plans of Water Management for Groundwater Management Subdistrict in Water Division No. 3. This should streamline the process for formation of groundwater management subdistricts and resolve many of the disputed issues litigated in the approval of the Plan of Water Management for Subdistrict No. 1. The State Engineer has posted all proceedings of the citizens advisory committee working with him in the formulation of these rules and that information can be found at <http://water.state.co.us/SurfaceWater/RulemakingAndAdvising/SLVAC/Pages/default.aspx>. Other speakers at this seminar will cover this topic in greater detail.

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APPENDIX I

RIO GRANDE COMPACT

The State of Colorado, the State of New Mexico, and the State of Texas, desiring to remove all causes of present and future controversy among these States and between citizens of one of these States and citizens of another State with respect to the use of the waters of the Rio Grande above Fort Quitman, Texas, and being moved by considerations of interstate comity, and for the purpose of effecting an equitable apportionment of such waters, have resolved to conclude a Compact for the attainment of these purposes, and to that end, through their respective Governors, have named as their respective Commissioners:

For the State of Colorado	M. C. Hinderlider
For the State of New Mexico	Thomas M. McClure
For the State of Texas	Frank B. Clayton

who, after negotiations participated in by S. O. Harper, appointed by the President as the representative of the United States of America, have agreed upon the following articles, to-wit:

ARTICLE I

(a) The State of Colorado, the State of New Mexico, the State of Texas, and the United States of America, are hereinafter designated "Colorado," "New Mexico," "Texas," and the "United States," respectively.

(b) "The Commission" means the agency created by this Compact for the administration thereof.

(c) The term "Rio Grande Basin" means all of the territory drained by the Rio Grande and its tributaries in Colorado, in New Mexico, and in Texas above Fort Quitman, including the Closed Basin in Colorado.

(d) The "Closed Basin" means that part of the Rio Grande Basin in Colorado where the streams drain into the San Luis Lakes and adjacent territory, and do not normally contribute to the flow of the Rio Grande.

(e) The term "tributary" means any stream which naturally contributes to the flow of the Rio Grande.

(f) "Transmountain Diversion" is water imported into the drainage basin of the Rio Grande from any stream system outside of the Rio Grande Basin, exclusive of the Closed Basin.

(g) "Annual Debits" are the amounts by which actual deliveries in any calendar year fall below scheduled deliveries.

(h) "Annual Credits" are the amounts by which actual deliveries in any calendar year exceed scheduled deliveries.

(i) "Accrued Debits" are the amounts by which the sum of all annual debits exceeds the sum of all annual credits over any common period of time.

(j) "Accrued Credits" are the amounts by which the sum of all annual credits exceeds the sum of all annual debits over any common period of time.

(k) "Project Storage" is the combined capacity of Elephant Butte Reservoir and all other reservoirs actually available for the storage of usable water below Elephant Butte and above the first diversion to lands of the Rio Grande Project, but not more than a total of 2,638,860 acre feet.

(l) "Usable Water" is all water, exclusive of credit water, which is in project storage and which is available for release in accordance with irrigation demands, including deliveries to Mexico.

(m) "Credit Water" is that amount of water in project storage which is equal to the accrued credit of Colorado, or New Mexico, or both.

(n) "Unfilled Capacity" is the difference between the total physical capacity of project storage and the amount of usable water then in storage.

(o) "Actual Release" is the amount of usable water released in any calendar year from the lowest reservoir comprising project storage.

(p) "Actual Spill" is all water which is actually spilled from Elephant Butte Reservoir, or is released therefrom for flood control, in excess of the current demand on project storage and which does not become usable water by storage in another reservoir; provided, that actual spill of usable water cannot occur until all credit water shall have been spilled.

(q) "Hypothetical Spill" is the time in any year at which usable water would have spilled from project storage if 790,000 acre feet had been released therefrom at rates proportional to the actual release in every year from the starting date to the end of the year in which hypothetical spill occurs; in computing hypothetical spill the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following the effective date of this Compact, and thereafter the initial condition shall be the amount of usable water in project storage at the beginning of the calendar year following each actual spill.

ARTICLE II

The Commission shall cause to be maintained and operated a stream gaging station equipped with an automatic water stage recorder at each of the following points, to-wit:

- (a) On the Rio Grande near Del Norte above the principal points of diversion to the San Luis Valley;
- (b) On the Conejos River near Mogote;
- (c) On the Los Pinos River near Ortiz;
- (d) On the San Antonio River at Ortiz;
- (e) On the Conejos River at its mouths near Los Sauces;
- (f) On the Rio Grande near Lobatos;
- (g) On the Rio Chama below El Vado Reservoir;
- (h) On the Rio Grande at Otowi Bridge near San Ildefonso;
- (i) On the Rio Grande near San Acacia;
- (j) On the Rio Grande at San Marcial;
- (k) On the Rio Grande below Elephant Butte Reservoir;
- (l) On the Rio Grande below Caballo Reservoir.

Similar gaging stations shall be maintained and operated below any other reservoir constructed after 1929, and at such other points as may be necessary for the securing of records required for the carrying out of the Compact; and automatic water stage recorders shall be maintained and operated on each of the reservoirs mentioned, and on all others constructed after 1929.

Such gaging stations shall be equipped, maintained and operated by the Commission directly or in cooperation with an appropriate Federal or State agency, and the equipment, method and frequency of measurement at such stations shall be such as to produce reliable records at all times.

ARTICLE III

The obligation of Colorado to deliver water in the Rio Grande at the Colorado-New Mexico State Line, measured at or near Lobatos, in each calendar year, shall be ten thousand acre feet less than the sum of those quantities set forth in the two following tabulations of relationship, which correspond to the quantities at the upper index stations:

DISCHARGE OF CONEJOS RIVER
Quantities in thousand of acre feet

<u>Conejos Index Supply (1)</u>	<u>Conejos River at Mouths (2)</u>
100	0
150	20
200	45
250	75
300	109
350	147
400	188
450	232
500	278
550	326
600	376
650	426
700	476

Intermediate quantities shall be computed by proportional parts.

(1) Conejos Index Supply is the natural flow of Conejos River at the U.S.G.S. gaging station near Mogote during the calendar year, plus the natural flow of Los Piños River at the U.S.G.S. gaging station near Ortiz and the natural flow of San Antonio River at the U.S.G.S. gaging station at Ortiz, both during the months of April to October, inclusive.

(2) Conejos River at Mouths is the combined discharge of branches of this river at the U.S.G.S. gaging stations near Los Sauces during the calendar year.

DISCHARGE OF RIO GRANDE EXCLUSIVE OF CONEJOS RIVER
Quantities in thousands of acre feet

<u>Rio Grande at Del Norte (3)</u>	<u>Rio Grande at Lobatos less Conejos at Mouths (4)</u>
200	60
250	65
300	75
350	86
400	98
450	112
500	127
550	144
600	162
650	182
700	204
750	229
800	257
850	292
900	335
950	380
1,000	430
1,100	540
1,200	640
1,300	740
1,400	840

Intermediate quantities shall be computed by proportional parts.

(3) Rio Grande at Del Norte is the recorded flow of the Rio Grande at the U.S.G.S. gaging station near Del Norte during the calendar year (measured above all principal points of diversion to San Luis Valley) corrected for the operation of reservoirs constructed after 1937.

(4) Rio Grande at Lobatos less Conejos at Mouths is the total flow of the Rio Grande at the U.S.G.S. gaging station near Lobatos, less the discharge of Conejos River at its Mouths, during the calendar year.

The application of these schedules shall be subject to the provisions hereinafter set forth and appropriate adjustments shall be made for (a) any change in location of gaging stations; (b) any new or increased depletion of the runoff above inflow index gaging stations; and (c) any transmountain diversions into the drainage basin of the Rio Grande above Lobatos.

In event any works are constructed after 1937 for the purpose of delivery water into the Rio Grande from the Closed Basin, Colorado shall not be credited with the amount of such water delivered, unless the proportion of sodium ions shall be less than forty-five percent of the total positive ions in that water when the total dissolved solids in such water exceeds three hundred fifty parts per million.

ARTICLE IV

The obligation of New Mexico to deliver water in the Rio Grande into Elephant Butte Reservoir during each calendar year shall be measured by that quantity set forth in the following tabulation of relationship which corresponds to the quantity at the upper index station:

DISCHARGE OF RIO GRANDE AT OTOWI BRIDGE
AND ELEPHANT BUTTE EFFECTIVE SUPPLY
Quantities in thousands of acre-feet

<u>Otowi Index Supply (5)</u>	<u>Elephant Butte Effective Supply Index Supply (6)</u>
100	57
200	114
300	171
400	228
500	286
600	345
700	406
800	471
900	542
1,000	621
1,100	707
1,200	800
1,300	897
1,400	996
1,500	1,095
1,600	1,195
1,700	1,295
1,800	1,395
1,900	1,495
2,000	1,595
2,100	1,695
2,200	1,795
2,300	1,895
2,400	1,995
2,500	2,095
2,600	2,195
2,700	2,295
2,800	2,395
2,900	2,495
3,000	2,595

Intermediate quantities shall be computed by proportional parts.

(5) The Otowi Index Supply is the recorded flow of the Rio Grande at the U.S.G.S. gaging station at Otowi Bridge near San Ildefonso (formerly station near Buckman) during the calendar year, corrected for the operation of reservoirs constructed after 1929 in the drainage basin of the Rio Grande between Lobatos and Otowi Bridge.

(6) Elephant Butte Effective Index Supply is the recorded flow of the Rio Grande at the gaging station below Elephant Butte Dam during the calendar year plus the net gain in storage in Elephant Butte Reservoir during the same year or minus the net loss in storage in said reservoir, as the case may be.

The application of this schedule shall be subject to the provisions hereinafter set forth and appropriate adjustments shall be made for (a) any change in location of gaging stations; (b) depletion after

1929 in New Mexico of the natural runoff at Otowi Bridge, and (c) any transmountain diversions into the Rio Grande between Lobatos and Elephant Butte Reservoir.

Concurrent records shall be kept of the flow of the Rio Grande at San Marcial, near San Acacia, and of the release from Elephant Butte Reservoir to the end that the records at these three stations may be correlated.

ARTICLE V

If at any time it should be the unanimous finding and determination of the Commission that because of changed physical conditions, or for any other reason, reliable records are not obtainable, or cannot be obtained, at any of the stream gaging stations herein referred to, such stations may, with the unanimous approval of the Commission, be abandoned, and with such approval another station, or other stations, shall be established and new measurements shall be substituted which, in the unanimous opinion of the Commission, will result in substantially the same results so far as the rights and obligations to deliver water are concerned, as would have existed if such substitution of stations and measurements had not been so made.

ARTICLE VI

Commencing with the year following the effective date of this Compact, all credits and debits of Colorado and New Mexico shall be computed for each calendar year, provided, that in a year of actual spill no annual credits nor annual debits shall be computed for that year.

In the case of Colorado, no annual debit nor accrued debit shall exceed 100,000 acre feet, except as either or both may be caused by holdover storage of water in reservoirs constructed after 1937 in the drainage basin of the Rio Grande above Lobatos. Within the physical limitations of storage capacity in such reservoirs, Colorado shall retain water in storage at all times to the extent of its accrued debit.

In the case of New Mexico, the accrued debit shall not exceed 200,000 acre feet at any time, except as such debit may be caused by holdover storage of water in reservoirs constructed after 1929 in the drainage basin of the Rio Grande between Lobatos and San Marcial. Within the physical limitations of storage capacity in such reservoirs, New Mexico shall retain water in storage at all times to the extent of its accrued debit. In computing the magnitude of accrued credits or debits, New Mexico shall not be charged with any greater debit in any one year than the sum of 150,000 acre-feet and all gains in the quantity of water in storage in such year.

The Commission by unanimous action may authorize the release from storage of any amount of water which is then being held in storage by reason of accrued debits of Colorado or New Mexico; provided, that such water shall be replaced at the first opportunity thereafter.

In computing the amount of accrued credits and accrued debits of Colorado or New Mexico, any annual credits in excess of 150,000 acre feet shall be taken as equal to that amount.

In any year in which actual spill occurs, the accrued credits of Colorado, or New Mexico, or both, at the beginning of the year shall be reduced in proportion to their respective credits by the amount of such actual spill; provided that the amount of actual spill shall be deemed to be increased by the aggregate gain in the amount of water in storage, prior to the time of spill, in reservoirs above San Marcial constructed after 1929; provided, further, that if the Commissioners for the States having accrued credits authorize the release of part, or all, of such credits in advance of spill, the amount so released shall be deemed to constitute actual spill.

In any year in which there is actual spill of usable water, or at the time of hypothetical spill thereof, all accrued debits of Colorado, or New Mexico, or both, at the beginning of the year shall be cancelled.

In any year in which the aggregate of accrued debits of Colorado and New Mexico exceeds the minimum unfilled capacity of project storage, such debits shall be reduced proportionally to an aggregate amount equal to such minimum unfilled capacity.

To the extent that accrued credits are impounded in reservoirs between San Marcial and Courchesne, and to the extent that accrued debits are impounded in reservoirs above San Marcial, such credits and debits shall be reduced annually to compensate for evaporation losses in the proportion that such credits or debits bore to the total amount of water in such reservoirs during the year.

ARTICLE VII

Neither Colorado nor New Mexico shall increase the amount of water in storage in reservoirs constructed after 1929 whenever there is less than 400,000 acre feet of usable water in project storage; provided, that if the actual releases of usable water from the beginning of the calendar year following the effective date of this Compact, or from the beginning of the calendar year following actual spill, have aggregated more than an average of 790,000 acre feet per annum, the time at which such minimum stage is reached shall be adjusted to compensate for the difference between the total actual release and releases at such average rate; provided, further, that Colorado, or New Mexico, or both, may relinquish accrued credits at any time, and Texas may accept such relinquished water, and in such event the state, or states, so relinquishing shall be entitled to store water in the amount of the water so relinquished.

ARTICLE VIII

During the month of January of any year the Commissioner for Texas may demand of Colorado and New Mexico, and the Commissioner for New Mexico may demand of Colorado, the release of water from storage reservoirs constructed after 1929 to the amount of the accrued debits of Colorado and New Mexico, respectively, and such releases shall be made by each at the greatest rate practicable under the conditions then prevailing, and in proportion to the total debit of each, and in amounts, limited by their accrued debits, sufficient to bring the quantity of usable water in project storage to 600,000 acre feet by March first and to maintain this quantity in storage until April thirtieth, to the end that a normal release of 790,000 acre feet may be made from project storage in that year.

ARTICLE IX

Colorado agrees with New Mexico that in event the United States or the State of New Mexico decides to construct the necessary works for diverting the waters of the San Juan River, or any of its tributaries, into the Rio Grande, Colorado hereby consents to the construction of said works and the diversion of waters from the San Juan River, or the tributaries thereof, into the Rio Grande in New Mexico, provided the present and prospective uses of water in Colorado by other diversions from the San Juan River, or its tributaries, are protected.

ARTICLE X

In the event water from another drainage basin shall be imported into the Rio Grande Basin by the United States or Colorado or New Mexico, or any of them jointly, the State having the right to the use of such water shall be given proper credit therefor in the application of the schedules.

ARTICLE XI

New Mexico and Texas agree that upon the effective date of this Compact all controversies between said States relative to the quantity or quality of the water of the Rio Grande are composed and settled; however, nothing herein shall be interpreted to prevent recourse by a signatory state to the Supreme Court of the United States for redress should the character or quality of the water, at the point of delivery, be changed hereafter by one signatory state to the injury of another. Nothing herein shall be constructed as an admission by any signatory state that the use of water for irrigation causes increase of salinity for which the user is responsible in law.

ARTICLE XII

To administer the provisions of this Compact there shall be constituted a Commission composed of one representative from each state, to be known as the Rio Grande Compact Commission. The State Engineer of Colorado shall be ex-officio the Rio Grande Compact Commissioner for Colorado. The State Engineer of New Mexico shall be ex-officio the Rio Grande Compact Commissioner for New Mexico. The Rio Grande Compact Commissioner for Texas shall be appointed by the Governor of Texas. The President of the United States shall be requested to designate a representative of the United States to sit with such Commission, and such representative of the United States, if so designated by the President, shall act as Chairman of the Commission without vote.

The salaries and personal expenses of the Rio Grande Compact Commissioners for the three States shall be paid by their respective States, and all other expenses incident to the administration of this Compact, not borne by the United States, shall be borne equally by the three States.

In addition to the powers and duties hereinbefore specifically conferred upon such Commission, and the members thereof, the jurisdiction of such Commission shall extend only to the collection, correlation and presentation of factual data and the maintenance of records having a bearing upon the administration of this Compact, and, by unanimous action, to the making of recommendations to the respective States upon matters connected with the administration of this Compact. In connection therewith, the Commission may employ such engineering and clerical aid as may be reasonably necessary within the limit of funds provided for that purpose by the respective States. Annual reports compiled for each calendar year shall be made by the Commission and transmitted to the Governors of the signatory States on or before March first following the year covered by the report. The Commission may, by unanimous action, adopt rules and regulations consistent with the provisions of this Compact to govern their proceedings.

The findings of the Commission shall not be conclusive in any court or tribunal which may be called upon to interpret or enforce this Compact.

ARTICLE XIII

At the expiration of every five-year period after the effective date of this Compact, the Commission may, by unanimous consent, review any provisions hereof which are not substantive in character and which do not affect the basic principles upon which the Compact is founded, and shall meet for the consideration of such questions on the request of any member of the Commission; provided, however, that the provisions hereof shall remain in full force and effect until changed and amended within the intent of the Compact by unanimous action of the Commissioners, and until any changes in this

Compact are ratified by the legislatures of the respective states and consented to by the Congress, in the same manner as this Compact is required to be ratified to become effective.

ARTICLE XIV

The schedules herein contained and the quantities of water herein allocated shall never be increased nor diminished by reason of any increase or diminution in the delivery or loss of water to Mexico.

ARTICLE XV

The physical and other conditions characteristic of the Rio Grande and peculiar to the territory drained and served thereby, and to the development thereof, have actuated this Compact and none of the signatory states admits that any provisions herein contained establishes any general principle or precedent applicable to other interstate streams.

ARTICLE XVI

Nothing in this Compact shall be construed as affecting the obligations of the United States of America to Mexico under existing treaties, or to the Indian Tribes, or as impairing the rights of the Indian Tribes.

ARTICLE XVII

This Compact shall become effective when ratified by the legislatures of each of the signatory states and consented to by the Congress of the United States. Notice of ratification shall be given by the Governor of each state to the Governors of the other states and to the President of the United States, and the President of the United States is requested to give notice to the Governors of each of the signatory states of the consent of the Congress of the United States.

IN WITNESS WHEREOF, the Commissioners have signed this Compact in quadruplicate original, one of which shall be deposited in the archives of the Department of State of the United States of America and shall be deemed the authoritative original, and of which a duly certified copy shall be forwarded to the Governor of each of the signatory States.

Done at the City of Santa Fe, in the State of New Mexico, on the 18th day of March, in the year of our Lord, One Thousand Nine Hundred and Thirty-eight.

(sgd.) M.C. Hinderlider
(sgd.) Thomas M. McClure
(sgd.) Frank B. Clayton

Approved: (Sgd.) S.O. Harper

Ratified by: Colorado, February 21, 1939; New Mexico, March 1, 1939; Texas, March 1, 1939
Passed Congress as Public Act No. 96, 76th Congress,
Approved by the President May 31, 1939