OUTLINE HISTORY OF COLORADO RIVER DEVELOPMENT
by
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I. Introduction

The history of the development of the Colorado River should read like a novel. Certainly such a history has all the elements of a heart-rending story—tragedy, pathos, comedy, romance, and human interest. An outline, such as this paper must be, will lack the qualities of a novel, yet it is hoped that part of the events enumerated will serve as a background for understanding the influences that have led to present conditions and for analyzing the consequences and relative values of alternative choices with respect to future development.

A word of caution is offered. This paper has been prepared from the viewpoint of the author who has spent over 21 years on Colorado River problems. The events selected to outline the historical development of the river naturally reflect his biases as well as his judgment. Many other events of historical significance could have been included, and another writer may have placed different emphasis or other interpretations on certain parts of the material discussed.

II. Exploration - Navigation

A. Early Explorers

Navigation was the first use made of the lower mainstem of the Colorado River by white men.\(^1\) As early as 1539, Ulloa, exploring what was believed to be a strait, sailed to the head of the Gulf of California. He noted the turbid condition of the water, and guessed that a great river entered

\(^1\) The earliest explorers were Spanish. Of a large number, Ulloa, Alarcon, Diaz, Coronado, Cardenas, and Onate appear to be the most outstanding in bringing knowledge to the world about the lower Colorado River.
the gulf near its head. Ulloa did not see this stream, the Colorado, but indicated its supposed position on a sketch map. The actual discovery of the river occurred the next year, 1540, when three explorers, one by sea and two by land, reached it. Captain Alarcon, the first of the three to be on the scene, sailed up the Gulf of California to its head, entered the Colorado River, and traveled upstream in boats for 15 days. Alarcon recorded that he ascended the river a distance of 85 Spanish leagues, or about 234 miles, which would have placed his party east of the present city of Blythe, California.

Diaz, from Coronado's main expedition, journeyed overland to the mouth of the Colorado, proceeded up the river to a point several leagues above the Gila River, crossed and explored some of the country to the west.

Cardenas, another of Coronado's Lieutenants, traveled through what is now northern Arizona and "arrived at a river the banks of which seemed to be more than three or four leagues apart in air line." This is the first written description of the Grand Canyon of the Colorado River.

As noted by Lieutenant J. C. Ives in 1861, "In less than 50 years after the landing of Columbus (1492), Spanish missionaries and soldiers were traveling upon the Colorado, following its course for a long way from its mouth, and even attaining one of the most distant and inaccessible points of its upper waters. More information was gained concerning it at this time than was acquired during the three subsequent centuries."

Onate, during his expedition in 1604-05, from the Rio Grande to the mouth of the Colorado, arrived on the banks of a stream flowing northwesterly, which he named Colorado. This stream is now known as the Little Colorado River. It appears that Onate was the first person to use the name "Colorado."

B. Commercial Navigation

Steamboating began on the lower Colorado River in 1851, mostly for the purpose of carrying freight from the head of the Gulf of California to Yuma.
From 1846 to the start of the Civil War, the lower Colorado was explored by surveying and exploring parties under the auspices of the U.S. Department of War. The most detailed examination of the river made during this period was by Lieutenant Joseph C. Ives in 1857-58. He ascended the river in a steel, stern-wheel steamboat, 50 feet in length, which had been constructed in Philadelphia and shipped in sections via ship and the Panama Railroad Company to San Francisco, and thence to the mouth of the Colorado River at the head of the Gulf of California where it was assembled. A detailed examination was made of the river with the objective of determining how far it was navigable for steamboats. Ives turned back at the mouth of Las Vegas Wash, which he called the head of navigation. Within a few years, steamboats carried cargos further upstream to the Mormon settlement of Callville, which was founded in 1864.

Although practically nothing was done to develop the river for navigation, except to periodically remove sandbars, blast rock obstructions, and construct a few docking facilities, it is of historical significance that early proposals were under consideration to make parts of the stream commercially navigable as a transportation artery. The coming of the railroad sounded the death knell of water navigation on the Colorado.

C. Proposed Railroad

After the two expeditions of John Wesley Powell in 1869 and 1871, from Green River, Wyoming through the canyons of the Green and Colorado Rivers, others began thinking of the Colorado River in terms of another form of transportation. Frank M. Brown conceived the idea that the deep canyons might provide a practicable route for a railroad. He and Robert Brewster Stanton organized an expedition to survey the river for this purpose from Grand Junction, Colorado to the Pacific Coast. Brown believed that such a railroad at approximately river grade all the way would carry enough coal to the Southwest to justify its construction. The railroad line was incorporated as the Denver Colorado Canyon and Pacific Railway. During the surveying expedition by boat in 1889-90, Brown lost his life in a whirlpool. Stanton's party carried out the remainder of the survey to the head of the Gulf of California. Due to lack of financing and
economic justification, construction of this railroad was never initiated, although Stanton's colleagues at the time agreed that his survey had established the feasibility of a railroad down the Colorado from an engineering standpoint.

In addition to those explorations mentioned above, there were many others that could be related to subsequent development of the Colorado River system. These played their part in spreading knowledge of the region and undoubtedly stimulated many of the hundreds of thousands of immigrants to the Pacific Southwest in the latter half of the 19th Century.

III. Primitive Irrigated Agriculture

A. Pre-White Men

Ancestors of the Cocopah and Yuma Indians should probably be credited with being the first to use the waters of the river for increasing their food supply over the amount provided by nature alone. If nature is regarded as reproducing plants by chance because only those seeds that "accidently" encounter satisfactory conditions of moisture, soil, light and heat, succeed in growing, the ancient Indians can be regarded as having improved upon nature by removing part of their dependency upon "accidents." Similar to the early Egyptians in the Nile Valley of Africa, these Indians undoubtedly scattered seeds in the mud when the river receded after seasonal overflow. Nature was then permitted to take its course. Nothing was done by the first Indian "agriculturists" to alter the flow of the river itself.

Progenitors of the Cliff Dwellers appear to be the first to artifically convey water to the land in order to raise crops in the Colorado River Basin. Lands below many of the abandoned cliff houses show unmistakable signs of having been traversed by ditches and irrigated. In the valleys of the Gila and Little Colorado Rivers, traces of old irrigation systems may still be discerned. Ancient canals of Arizona's Salt River Valley would have been capable of watering a quarter of a million acres of land, although probably not all at the same time, but in blocks, one block of land being abandoned when it became nonproductive and another farmed in its place.
B. First White Men

Catholic Priests of the Jesuit Order were the first white men to irrigate. Missions were established at Cuevavi and San Xavier by 1732. During the period from 1768-1822, considerable irrigation was practiced along the Santa Cruz River near the missions and the Spanish presidios of the Tubac and Tucson. Orchards were planted and annual crops of wheat, barley, corn, beans, melons, squash, peppers, and tobacco were harvested. The diversion of water to mission grounds transformed the surroundings from arid deserts to gardens of paradise. Headworks and canals of this period were small and of the simplest construction, but the Mexican workers were skillful irrigators. They also adopted certain ideas of equity and custom relating to the distribution and utilization of the water resource, some of which have persisted in irrigation practice to the present time. One of their rules of equity was that water is appurtenant to the land.

Father Escalante in his diary of the Dominguez expedition from Santa Fe, New Mexico into western Colorado, Utah, to Utah Lake, and south to the Virgin River, east and across the Colorado River and back to Santa Fe in 1776 recorded his speculations upon the possibility of diverting water for irrigation at various points during the journey. The good Father did not mention any use of water for irrigation from the deep canyon reaches of the river. There is no evidence that he contemplated any large impoundments of water behind huge dams, like Lakes Mead and Powell, which we take for granted today.

IV. Modern Type Irrigation

A. Western Immigrants

Modern irrigated agriculture utilizing Colorado River water may be regarded as dating from 1854 when the United States consummated the Gadsden Purchase from Mexico.\footnote{The Gadsden Purchase was negotiated in 1853. It involved purchase by the United States from Mexico of 29,640 square miles of land south of the Gila River in present Arizona and New Mexico.} Increasing numbers of Americans made up of military
men, immigrants enroute to California, and other hardy pioneers suddenly began to establish permanent homes in the Southwest. The first relatively modern irrigation works were started in the 1850's in the Colorado River Basin in Colorado, Utah, and Wyoming. At first only stream bottom lands were reclaimed, and the facilities were simple.

B. Early Irrigation in Upper Basin

About the middle of the 19th Century, the Mormons, often regarded as the fathers of American reclamation, began irrigating lands from the upper reaches of numerous tributaries of the Colorado River as rapidly as their migrations from the basin of the Great Salt Lake would permit. The first irrigation facilities in the fertile tributary valleys consisted of simple diversion dams and ditches to water the most convenient river bottoms. The towns of Santa Clara in southern Utah and Fort Supply in Wyoming were established in 1854. Settlements spread into Arizona, Nevada, and many parts of Utah in the 1860's and 70's. Later these Mormon pioneers constructed reservoirs to store water for use on more extensive areas at higher elevations and during periods of low streamflow.

In the early 1890's, it was recognized that in many parts of the basin storage reservoirs were needed in order to provide a reliable supply of water during the latter part of the crop-growing season and to retain water from the years of plenty for use in following low-water years.

Prior to 1902, irrigation in the Colorado River Basin was first by the individual farmer and later by communities of farmers who joined to construct one diversion channel to water lands that otherwise would have required a number of ditches. Still later, local, private, water companies were organized. These were able to construct large canals and lateral distribution systems.

In the early 1900's irrigation in the Upper Colorado River Basin was principally in scattered small developments on the main stream and many tributaries. General farm crops were cultivated. On a large portion of the
irrigated areas, particularly in the Green River Basin, wild hay was raised for livestock feed. Irrigation was continuing to expand, limited by short growing seasons, extremes of temperature range, topography, low-value crops, and high cost of building projects.

C. Early Federal Reclamation Projects

After the Congress passed the Reclamation Act of 1902, the Reclamation Service\(\textsuperscript{3}\) began investigations to determine the feasibility of constructing large irrigation projects in western States. Some of the earliest projects investigated and constructed were: Salt River Project on the Salt River in Arizona, started in 1903; Uncompaghre on the Gunnison and Uncompaghre Rivers in Colorado, 1904; Yuma, on the Colorado River in Arizona, 1905; Strawberry on the Spanish Fork and Strawberry Rivers in Utah, 1906; and the Grand Valley Project on the Colorado River in Colorado, in 1912. Two of these, one in the Lower and one in the Upper Colorado River Basin, are mentioned below because they represent the initiation of concepts later incorporated into other federal reclamation projects.

1. Salt River Project, Arizona

Historically, before the Christian Era, at least as early as 200 B.C., the ancient Hohokam people, by means of 125 miles of hand-excavated canals, were irrigating their corn and cotton fields in the Phoenix area of the Salt River Valley, Arizona. Probably due to some combination of climatic change, erosion, lack of water storage reservoirs, or other factors, this stone-age people who created an early agrarian empire were forced to leave the valley.

The first white men promoted irrigation in central Arizona prior to 1869. Their facilities were primitive by modern standards, consisting of temporary brush and rock diversion wiers which were scoured from the stream

\(\textsuperscript{3}\) Reclamation Service was predecessor to U.S. Bureau of Reclamation in the Department of the Interior.
beds annually during high water. They had no storage reservoirs in which to conserve water for delivery to their land when streamflows were low. They badly needed capital and organization in order to provide storage and a system of regulated water delivery.

Within a month after the Federal Reclamation Law was enacted on June 17, 1902 the Federal government was making an examination of the feasibility of the Salt River Project in Arizona. Surveys and estimates were promptly made for construction of Roosevelt Dam, which was completed in 1911.

Early in 1903, the water users of the valley formed a Salt River Valley Water Users Association to contract with the government. An agreement covering construction of the dam was executed in mid-1904. Surveys were also made for an estimate of the cost of hydroelectric power generation for pumping. In 1910 a contract was executed between the Association and the United States for construction of power canals and electric generating facilities, with the cost to be borne by the Association because there was not enough money in the Federal Reclamation Fund. The two original purposes of the power generating facilities were to produce power necessary for the construction of the dam, and to provide power for pumping underground water.

As construction progressed, it became apparent that the possibilities for power generation were greater than originally contemplated. Electric energy could be generated in excess of requirements of the Salt River Project itself. The application of the revenues received from the sale of power in excess of that needed by the project was a bone of contention between the Federal government and the water users. In later years this issue was settled by public law in favor of the Salt River Project, which then became one of the forerunners of the concept of using revenues derived from the sale of power to retire that part of the construction costs of an irrigation project beyond the financial ability of water users to repay.
2. Strawberry Valley Project, Utah

The irrigation of the lower part of the Strawberry Valley on the south side of Spanish Fork river and of the area adjacent to Utah Lake on the north side of the river in the Great Basin (Salt Lake) was commenced by early settlers prior to 1860. Before 1900 the need for supplemental late season water became evident and placed a rigid limit on further development of irrigable lands. The federal government started the first reconnaissance surveys and assessment of irrigable lands in 1903, making Strawberry one of the earliest federal projects investigated under the Reclamation Act. The Strawberry Valley Water Users' Association was organized in 1903 to contract for repayment of construction costs.

As part of the construction process, a diversion dam, power canal, and powerplant were built, and the electric energy generated was used in constructing other project features.

Constructed facilities included a dam and storage reservoir with an active capacity of 270,000 acre-feet, a tunnel 3.7 miles long, and a main canal and distribution system of 77 miles of which 62 miles were concrete lined.

The Strawberry Valley Project is distinctive in two respects. It was the first large-scale diversion of water from the Colorado River drainage basin into the Great Basin. It was also one of the first of the federal projects to generate hydroelectric energy.

D. Early Privately Organized Irrigation Projects

With the beginning of construction on Federal reclamation projects, interest in the development of irrigation by private capital was renewed. During the period from 1903 to 1909, many irrigation systems were planned, most of them under another Federal law known as the Carey Act, and under various State irrigation district laws. One of the earliest of the private developments to become firmly established was in the Palo Verde Valley of California. Probably the most important was that of the California Development Company in the basin of the Salton Sea, the Imperial Valley of California.
1. Palo Verde Valley

About 1856, Thomas H. Blythe acquired about 40,000 acres of land for his Blythe Rancho in the Palo Verde Valley, west of the Colorado River in California. He made water filings, constructed a gravity intake from the river known as the Blythe Intake, a main canal and laterals, and irrigated a considerable area by gravity. By 1877 permanent irrigation development from the lower mainstem of the river had become a reality.

2. Imperial Valley of California

The title of "Father" of the Imperial Valley could rightfully be bestowed upon Oliver M. Wozencraft, a doctor of medicine from San Francisco, who assumed the position of Indian Agent for the Federal Government. Dr. Wozencraft, in 1849, with several men, mules, and a pack train, carefully investigated that section of the then almost unknown Colorado Desert, now called Imperial Valley. While enduring many hardships due to the heat and blowing sand, Dr. Wozencraft conceived the idea of reclamation of the desert. Ten years later, in 1859, the doctor induced the California State Legislature to pass a Bill giving him all State rights to 1600 square miles of the Salton Sink.

Dr. Wozencraft had to gain permission from the Federal Government before he could proceed further. A Bill was presented to the Congress in the fall of 1859 and referred to the proper committee which reported favorably upon it. In its report on the Bill, the committee said:

"This bill proposes, in consideration of the introduction of a wholesome supply of fresh water into the Colorado desert tract, as described in the bill. This tract embraces (according to Lieutenant Brigland) about 1600 square miles in the basin of what now is and must remain, until an energetic and extensive system of reclamation is inaugurated and brought to successful completion, a valueless and horrible desert. The labor of reclamation must be commenced within two years and be completed within ten years. As fast as water shall be introduced, upon a report to that effect being made by a duly appointed commission, patents shall issue for the parts reclaimed, and when all the conditions are fulfilled, then, and not until then, shall the title rest in said grantee."
The Civil War caused the Congress to sidetrack the legislation. After the war, Dr. Wozencraft appealed to one Congress after another, but that body was too engrossed in affairs of reconstruction of the nation to listen. After expending all of his personal assets, including his family home, the doctor died in 1887 while still trying to fulfill his dream to bring water to the parched Salton Basin.

Charles R. Rockwood rediscovered Imperial Valley in the Salton Basin in 1892. He immediately became obsessed with the idea of bringing water to it as a reclamation process. Another gentleman by the name of George Chaffey during the 1880's had shared the vision of irrigating the Salton Sink with Dr. Wozencraft. Mr. Chaffey was an organizer, practical engineer, financier, and the contractor hired by the California Development Company in April 1900 to construct canals capable of bringing 400,000 acre-feet of water from the Colorado to the desert at a cost not to exceed $150,000. In spite of the financial and organizational impediments, difficulties with Mexico over canal routes, several changes from the original plans of the parent company, and friction among company officers, water was turned through the headgates on May 14, 1901. Canal construction continued without interruption until February 1902. In 22 months the California Development Company had been transformed from bankruptcy to a concern worth millions of dollars, with 400 miles of canals and laterals, 100,000 acres of land ready for water, 2,000 enthusiastic homeseekers ready to start, and the towns of Imperial and Calexico in embryo stage.

The original canal from the Colorado River started at Hanlon's Crossing in California about 500 feet north of the Mexican boundary. The canal crossed the boundary and extended thence about four miles south to the dry channel of the Alamo River, which was cleared and enlarged. The canal traveled for about 55 miles in Mexico before it was turned back into the United States so that the water could be used in Imperial Valley.
In some respects, the construction of this Alamo Canal was ill-conceived and fool-hardy. It was built before the dangerous, erratic, and unpredictable flows of the river were controlled. It is difficult to forget that its construction was accomplished in the face of a stern warning by an eminent authority, Mr. F. H. Newell, later director of the Reclamation Service, who wrote in the Smithsonian Institute Report that:

"If we go into this depression below sea level and interfere with natural conditions, or--as we say--'develop the country,' we are brought face to face with the great forces of the river and the uncertainty as to whether it will desire to continue in the channel in which we happen to have found it."

The Alamo Canal was abandoned in 1904 in favor of an alternate diversion several miles downstream in Mexico because difficulty had been encountered in establishing a firm water right from the United States, and there was a tendency for the upper reaches of the canal to become clogged with silt deposits. In granting a license for the alternate diversion site, the Mexican Government demanded several severe conditions, one of which was that up to one-half of all water diverted would be used for irrigation of Mexican lands. As a result of this condition there occurred periods of water shortage when American water users were forced to decrease their irrigation in order that Mexican lands could be watered.

A large river regulating reservoir was needed on the main Colorado River upstream to store water in seasons of plenty for deferred use during low natural water flow periods.

Unprecedented floods destroyed the Mexican heading in the spring of 1905. Due to poorly organized and incompetent operation and maintenance, control of the river was lost. The entire flow poured through two enormous canal breaks, eroded cavernous channels on its way to the Salton Sink creating the Salton Sea on the site of the ancient Lake Cahuilla. The flow of the Colorado River into the Salton Sea continued for almost two years, raising its
surface from about 250 feet below sea level to 195 feet below sea level, and creating a lake surface of 330,000 acres. The break was finally closed in 1907 with the financial backing and efforts of the Southern Pacific Railroad.

Closing the break did not terminate the struggle for the Imperial Valley people. Danger from floods that might occur at any time, increasing demands for water, constant difficulties associated with diverting the river and maintaining the Alamo Canal, created what appeared insurmountable problems. The river did break westward again in 1909, requiring a levee system to be constructed in Mexico at a cost of about $6 million, paid by Imperial Valley land owners and the United States. Furthermore, the Mexicans were not paying a fair proportion of costs of operating the canal. Flood control work was impeded by Mexican requirements for paying duty on equipment and supplies sent across the border, and the requirement that a large amount of inefficient foreign labor had to be utilized. These factors, in combination with the fact that Americans had to decrease their use of water due to shortage of stream flow, led to agitation and support for a canal to be entirely located on American soil.

The Imperial Valley development was a project constructed by private enterprise that encountered severe problems due to the vagaries of the river. At the same time, other developments were taking place in both the Upper and Lower Colorado River Basins.

V. Need for Water Storage Reservoirs

A. Irrigation Insurance

Mr. E. C. LaRue of the U.S. Geological Survey estimated that in 1913 there were 378,000 acre-feet of water being taken, or proposed to be removed annually, by transmountain diversions from the Colorado River Basin. Four ditch systems in Utah accounted for 120,000 acre-feet per year from the headwaters of the Duchesne, Price, and Virgin Rivers. Four ditches were taking 21,000 acre-feet from the headwaters of the Colorado River to the South Platte
and Arkansas River Basins. Four other systems were in the planning stage that would divert 237,000 acre-feet per year to the eastern slope of Colorado for a total of 258,000 acre-feet. According to a report by F. E. Weymouth, Chief Engineer of the Reclamation Service, in 1922 the approximate irrigation development in the Colorado River Basin consisted of:

<table>
<thead>
<tr>
<th>Irrigation Development in the Colorado River Basin (1922)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper Basin</strong></td>
</tr>
<tr>
<td>Area: 1,450,000</td>
</tr>
<tr>
<td><strong>Lower Basin</strong></td>
</tr>
<tr>
<td>Area: 950,000</td>
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<tr>
<td><strong>Total in United States</strong></td>
</tr>
<tr>
<td>Area: 2,400,000</td>
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<tr>
<td><strong>Mexico</strong></td>
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<tr>
<td>Area: 200,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>Area: 2,600,000</td>
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* Includes 430,000 acres irrigated and 400,000 irrigable in the Gila River Basin.

Additional large diversions, amounting to almost half a million acre-feet, were under consideration for development in Utah and Colorado, including transmountain diversion for Denver's municipal water system.

Although climatic conditions were more favorable for growing high-value crops with superior yields, such as melons, lettuce, cotton, alfalfa, and semi-tropical fruit in the Lower Basin, its development was limited by restricted late season low river flows. By 1922 irrigation in the Gila River Valley of Arizona was well advanced. The Imperial Valley in California had

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4/ Compiled from tables (figures rounded) in Report on the Problems of the Colorado River Basin by F. E. Weymouth, February 1924.
over 400,000 acres in cultivation, watered by direct diversion from the Colorado River. The Imperial lands suffered water shortages in every low water year. In addition, Imperial had to supply water for 200,000 acres of land in Mexico. At this point, when the water was available, about 3,000,000 acre-feet per year were being exported from the Colorado River Basin for use in the United States and Mexico.

To insure that an adequate supply of water for irrigation would be available seasonally and annually a large equalizing reservoir was needed upstream from the agricultural lands in Arizona, California, and Mexico.

B. Flood Protection

The lower reaches of the river were constantly in danger from prolonged flooding from the melting snows of Colorado, Utah, and Wyoming mountains. Floods originating on the lower tributaries, while of shorter duration, could also be extremely damaging. As described above, the tragic menace from floods was fully realized in 1905-06 when 30,000 acres of valuable land were inundated, homes destroyed, farms ruined, highways and the railroad washed away. Millions of dollars worth of damage resulted.

The construction of levees in both the United States and Mexico was required to protect lands in the Imperial Valley and others being farmed on the river delta. Each year new floods attacked the levees, and they had to be built higher and stronger. International problems with Mexico complicated their maintenance and caused an excessive financial burden. Levees to protect the Yuma Project gave way several times with disastrous consequences. In 1922 levees along the Palo Verde Valley were breached. To protect the lands along the Lower Colorado, about 150 miles of levee system had to be maintained. Menace of the flooding river remained even after $10.25 million dollars had been spent in levee construction and maintenance between 1906 and 1924. At least 100,000 people in the area lived in constant fear that they might be inundated.
A mammoth river-regulating, flood-storage reservoir was needed on the main river upstream to protect the lives of thousands of persons and millions of dollars of capital investments in the Lower Basin.

C. Silt Retention

The Colorado River annually deposited over 100,000 acre-feet of silt in the delta region between the levees raising its bed higher and higher, and making larger and continuous expenditures of funds necessary to maintain levees that protected Imperial Valley. By 1923-24, the Imperial Irrigation District was spending over half a million dollars per year to remove silt from its canal system. In addition, it was costing Imperial Valley farmers $1 million annually to repair damages caused by silt on their farms.

A large silt retention basin was needed upstream on the main stem of the Colorado River.

D. Reliable Water Supply for Municipalities and Industries

The population of the coastal plains adjacent to the Los Angeles metropolitan area experienced phenomenal growth, doubling between 1920 and 1930. It was apparent that this area needed a new source of water. Los Angeles had absorbed its entire supply from Owens Valley and had studied other sources for water. The only practicable and adequate source at that time was the Colorado River by conservation of its flood waters in a storage reservoir. The City of Los Angeles made a reconnaissance survey of a route to the Colorado River in 1923 and established the feasibility to justify construction of an aqueduct.

The need for municipal and industrial water in Southern California, therefore, was another link in the chain of necessity for construction of a large conservation reservoir in the canyon reach of the Colorado River.
E. Increasing Demands for Electric Energy

In the early 1920's hydroelectric power developments in the Colorado River Basin were mostly confined to tributaries of the river. There were 36 powerplants with the combined installed capacity of only 37,000 kilowatts. The largest of these were the Reclamation Service plant at Roosevelt Dam on the Salt River in Arizona (10,300 kilowatts) and the Shoshone Plant of the Central Colorado Power Company on the main stem of the Colorado River upstream from Glenwood Springs, Colorado (10,000 kilowatts). Power generated at Roosevelt Dam helped to fulfill the energy needs of the Phoenix area. The increasing population of the Los Angeles metropolitan area caused a rapidly growing power market, which, together with advances made in the technology of power transmission, created a demand for large blocks of electrical energy greatly in excess of the capability of the hydroelectric resources available. Southern California was badly in need of another source of power for its burgeoning industries.

A large dam with hydroelectric power generators was a logical installation to be superimposed upon the wild Colorado River when harnessing it.

F. Pyramiding Problems

Water resource development in the Upper Basin lagged considerably behind that in the Lower Colorado River Basin in the 1920's. Rapid progress had been made in the Gila River Basin. As we have seen, potential developments on the main stem of the Lower River were impeded by lack of storage facilities. Existing developments suffered frequent water shortages and were threatened by floods aggravated by enormous silt deposits and there were increasing demands for more irrigation in California and Mexico and for large quantities of municipal and industrial water and electrical energy in California. The situation was rapidly becoming tense.
VI. Fall-Davis Report

The U. S. Reclamation Service transmitted to the Congress its comprehensive report entitled "Problems of Imperial Valley and Vicinity" (Fall-Davis Report) in 1922. Three of the six recommendations of this report were of great significance so far as subsequent development of the river was concerned. These recommendations were that:

"1---through suitable legislation the United States undertake the construction with government funds of a high line canal from Laguna Dam to the Imperial Valley to be reimbursed by the lands benefited.

"3---through suitable legislation the United States undertake the construction with government funds of a reservoir at or near Boulder Canyon on the Lower Colorado River to be reimbursed by the revenues from leasing the power privileges incident thereto.

"6---every development hereafter authorized to be undertaken on the Colorado River by Federal government or otherwise be required in both construction and operation to give priority of right and use:

First, to river regulation and flood control.
Second, to use of storage water for irrigation.
Third, to development of power."

It was rapidly becoming apparent that the natural flow of the Colorado River could not supply all of the uses contemplated by the seven Colorado River Basin States. In addition, it was obvious that the Lower Basin States, particularly California and Arizona, were growing much more rapidly in population and water use than were the Upper Basin States. The latter were becoming apprehensive that if the Lower Basin continued to be developed at such a rapid rate, there soon would be no water left for consumption in the upstream States under the western doctrine of fixing the right to use water by prior appropriation. The Lower Basin pressed for river development through the aid of the Federal government. The Upper Basin objected. In 1919 and 1920, Bills were introduced in the Congress to authorize construction of an All-American Canal. In 1922 a third Bill was before Congress to authorize building this canal and a storage reservoir on the main river somewhere downstream from the junction of the Green and Colorado Rivers.
VII. Evolution of the "Law of the River"

A. Colorado River Compact (45 Stat. 1057)

Proposals for storage in the Lower Basin without protective guarantees for the Upper Basin States were regarded by Upper Basin water authorities as threats to establish priorities that would effectively prevent future utilization of the water in the Upper Basin.

It should be remembered that in the 1920's, laws with respect to rights to use water from interstate streams were not well fixed. Each State claimed the exclusive authority to regulate the appropriation of water within its borders. The Federal government claimed jurisdiction of water of interstate streams. The lower end of the Colorado River was considered navigable and subject to Federal laws. At the same time there was wide-spread desire for Federal aid for financing a large multiple purpose development believed to be necessary for optimum use of the waters of the Lower Colorado.

If a stalemate of long duration was to be avoided, some type of agreement allocating the use of the river's waters among the seven Basin States was necessary before a comprehensive plan could proceed. The Lower Basin States wanted an interstate agreement because they needed the political support of the Upper Basin States to secure passage of authorizing legislation by the Congress. The Upper Basin States favored a compact in order to protect their deferred use of water against prior appropriations in the Lower Basin.

On November 24, 1922, the Compact Commissioners of the seven Basin States and Mr. Herbert Hoover, Secretary of Commerce, representative of the United States, signed the Colorado River Compact at Santa Fe, New Mexico. This Compact among the States did several fundamental things necessary before further river development could proceed.

1. The Colorado River Basin was divided into two sub-basins -- the Upper Basin and the Lower Basin -- with the line of demarkation being located
at Lee Ferry, Arizona, which was defined as a point one mile below the mouth of the Paria River which is located a few miles south of the Utah-Arizona boundary. Here the waters of the entire Upper Basin system, including the Paria River and return flows from the Upper Basin projects converge into one stream.

2. The annual beneficial consumptive use of 7,500,000 acre-feet of water was apportioned to each sub-basin -- to the Upper Basin and to the Lower Basin -- with the Lower Basin granted the right to consumptively use another million acre-feet annually if it is available.

3. States of the Basin were aligned into two divisions: The States of the Upper Division include Colorado, New Mexico, Utah, and Wyoming. The States of the Lower Division are Arizona, California, and Nevada.

4. Rights of Mexico to use water were recognized in that each Basin is to provide water for one-half of any deficiency that might occur in any amount granted to Mexico by a future international treaty.

5. The States of the Upper Division are not to cause the flow of the Colorado River at Lee Ferry to be less than 75,000,000 acre-feet in any period of ten consecutive years. Because the State boundaries do not coincide with the drainage basin boundaries of the Upper and Lower Basins, two Upper Division States, New Mexico and Utah, have part of their territory in the Lower Basin, and Arizona, a Lower Division State, has a small portion in the Upper Basin.

6. Under a definitive term of the Compact, the Colorado River Basin includes, "all of the drainage area of the Colorado River system and all other territory within the United States of America to which the waters of the Colorado River system shall be beneficially applied."

7. The Compact negotiators, believing they were equally dividing the use of only a part of the river's flow, provided that at any time after October 1, 1963, if and when either Basin had reached its total consumptive use as apportioned, the use of the remaining waters could be further apportioned between the two Basins.
8. The Colorado was recognized as a navigable river, but "--the use of its waters for purposes of navigation shall be subservient to the uses of such waters for domestic, agricultural, and power purposes."

9. Consumption of water for agricultural and domestic purposes was made dominant over impoundment and use of water for generation of electric energy.

10. Each State was permitted to regulate and control the appropriation, use, and distribution of water within its boundaries, subject to other provisions of the Compact.

The Colorado River Compact was supposed to remove causes for disagreement and rivalry between the two Basins in the development of the river's resources, because prior development in the Lower Basin could create no prior right to the use of water there as against future uses in the Upper Basin; thus, supposedly leaving the latter basin free to develop at its own slower pace. The Compact certainly did clear away road blocks previously precluding passage of legislation by the Congress to authorize major projects in the Lower Basin.

B. Boulder Canyon Project Act (45 Stat. 1057)

Many outstanding people were involved in long strenuous efforts before Congressional authority could be obtained for constructing major water developments on the Colorado River. As early as 1914, Congress had provided funds to the Reclamation Service for reconnaissance studies of reservoir sites, irrigation projects, and water rights. A reclamation engineer named John T. Whistler, made reports in 1918-19 in which he advocated the necessity for 10,000,000 - 12,000,000 acre-feet of storage to supply all future irrigation requirements in the Basin and some flood control and power development. Whistler's principal reservoir sites were located in the Upper Basin.

In 1918, a joint venture by the Imperial Irrigation District and the United States under an All-American Canal Board, planned the construction of an
All-American Canal to head at Laguna Dam. Two Bills to authorize its construction failed to pass the Congress.

The Kinkaid Act of 1920, directed the Secretary of the Interior to report on the condition and possibilities for irrigation in Imperial Valley, with half the cost of the investigations charged to local interests. The Reclamation Service made a detailed survey of dam sites in the Lower Basin in Black and Boulder Canyons on the Colorado River because of the opportunity associated with them to more directly solve the problems in the Imperial Valley than by using dams in the Upper Basin.

The Fall-Davis report previously mentioned above on p. 18 demonstrated the feasibility of a dam in Boulder Canyon from an engineering standpoint. This report also presented data on flood control, water supply, upstream water uses, and hydroelectric power. It showed conclusively that construction of a dam at Boulder or Black Canyon was the key to future downstream river development. This report was the first to recommend construction of a dam to such an unprecedented height as 600 feet.

Immediately after the Fall-Davis Report reached the Senate, Congressman Phil D. Swing and Senator Hiram Johnson of California introduced Bills to authorize the construction of a Colorado River Development Project. Swing-Johnson Bills were introduced in the 67th, 68th, 69th, and 70th Congresses, the last of which became the Boulder Canyon Project Act.

Influential citizens of the Lower Basin continued urging the construction by the Federal government of Boulder Dam and an All-American Canal. These proposals were strongly opposed by those who were against public power development.

In 1924 a report by F. E. Weymouth, Chief Engineer of the Reclamation Service, stressed the need for flood protection and for storage of water to prevent shortages and losses of crops in Imperial Valley. The Weymouth Report urged construction of a dam in Black Canyon with capacity of 34 million acre-feet. Also in 1924, the flow of the Colorado River dropped to such a low stage.
that for several weeks Imperial Valley received barely sufficient water for domestic and stock watering purposes and suffered severe crop losses. The immediate construction of a dam was demanded.

During the Committee Hearings on the third Swing-Johnson Bill in 1926, testimony was offered for the first time on the proposal to construct an aqueduct from the Colorado River to Los Angeles and use the river for domestic water supply for southern California. Such a scheme required a large amount of electric energy and thus provided a potential market for power to be generated. This proposal resulted in substantial support in the Congress. The Boulder Canyon Project Act became part of the "law of the river" when it was signed by President Coolidge on December 21, 1928, after a special Colorado River Board had reported that a dam on the Colorado at either Black or Boulder Canyon was feasible, but that the Black Canyon site was preferable.

The Boulder Canyon Project Act also created the Colorado River Dam Fund as a special fund to accomplish provisions of the Act. An appropriation not to exceed $165 million was authorized to be repaid with 4% interest, except $38.5 million to be used for construction of the All-American Canal. The law also provided that the Act could not take effect, nor any work be done, unless and until within six months all seven States had ratified the Colorado River Compact or, as an alternative, unless and until California and five of the other States had ratified the Compact, and the State of California had agreed to limit its annual consumptive use of Colorado River water to not exceed 4,400,000 acre-feet of the water apportioned to the Lower Basin by the Colorado River Compact, plus not more than one-half of any excess or surplus waters unapportioned by the Compact.

Arizona refused to ratify the compact. On June 25, 1929, President Hoover proclaimed the Act in effect since the other six States had ratified it, including California, whose legislature had also adopted the limitation provision of a consumptive use not to exceed 4,400,000 acre-feet per year. Contracts having been executed guaranteeing disposition of the firm energy
to be generated at the dam, construction was started after President Hoover signed an appropriation act in 1930 carrying $10,660,000 for the Boulder Canyon Project. The first water was stored in Lake Mead behind Boulder Dam in 1935.

The United States leased the power privileges to the Department of Water and Power of the City of Los Angeles and the Southern California Edison Company. These two entities operate the power facilities at the dam.

Under a 1930 contract, United States agreed to deliver 1,100,000 acre-feet of water per year from storage in Lake Mead to the aqueduct of the Metropolitan Water District of Southern California. The delivery is made in accordance with priorities fixed in a 1931 seven-party agreement, the seven parties being Metropolitan Water District of Southern California, Palo Verde Irrigation District, Imperial Irrigation District, Coachella Valley County Water District, City of Los Angeles, and City and County of San Diego. A charge of 25¢ per acre-foot is made for water delivered to the Metropolitan Water District of Southern California and to the City and County of San Diego.

Under another contract executed in 1933, the United States constructed Parker Dam on the Colorado River with money supplied by the Metropolitan Water District of Southern California. Parker Dam is owned and operated by the United States and provides a regulated forebay for diversion of water into the Colorado River Aqueduct which was constructed by the Metropolitan Water District to convey water to the Southern California coastal plain.

All contracts for water and power are subject to their availability and to the terms of the Colorado River Compact and the Boulder Canyon Project Act.

C. Boulder Canyon Project Adjustment Act (54 Stat. 774)

The Boulder Canyon Project Adjustment Act of 1940 reduced the interest rate from 4% to 3%; removed competition as the basis for establishing power rates; specified that power income must be sufficient to operate and maintain the Boulder Canyon Project, and to provide payment of certain annual amounts
to Arizona and Nevada and into the Colorado River Development Fund. Monies advanced by the United States to the Colorado River Dam Fund were to be repaid during a 50-year period, except for $25 million allocated to flood control and deferred until after the end of the repayment period.

The Colorado River Development Fund of $500,000 per year authorized by the Adjustment Act was established to pay for "studies and investigations by the Bureau of Reclamation for the formulation of a comprehensive plan for the utilization of the waters of the Colorado River system for irrigation, electrical power, and other purposes in the States of the Upper Division and the States of the Lower Division ---."

D. Mexican Water Treaty (Treaty Series 994; 59 Stat. 1219)

As late as the time of the Gadsden Purchase in 1854, the Colorado River was regarded as being valuable only for navigation. As the west was settled, thriving communities were established in the United States and in Mexico. Many of these were primarily dependent upon diversion of water from the river for irrigation. Their continued existence and growth were limited by the extent water might be diverted and consumed by irrigated crops.

Irrigation developments had been made without any agreement between the United States and Mexico providing for consumption of the waters of the international river. Neither country insisted upon maintenance of navigability in the border reaches of the Colorado River as had been contemplated in early treaties. Both countries appeared to acquiesce to the concept that irrigation benefits were superior to benefits that might be derived from river transportation.

As previously noted, the Colorado River Compact among the seven Colorado River Basin States recognized that if an international treaty was executed between the two nations, United States and Mexico, the Upper and Lower Divisions would each be called upon to make up one-half of any deficiency that might exist in the amount of water agreed to be delivered annually to the Republic of Mexico.
A treaty between the United States of America and the United Mexican States pertaining to the division of waters of the Colorado and Tijuana Rivers and of the Rio Grande became effective after an exchange and ratifications of the treaty and protocol in 1945. This treaty established an International Boundary and Water Commission with a United States section and a Mexican section. Each Commissioner is granted diplomatic status. The treaty allotted to Mexico from the waters of the Colorado River a guaranteed annual quantity of 1,500,000 acre-feet to be delivered in accordance with certain conditions and specifications as to place and rate. If it is determined by the United States section of the International Boundary and Water Commission that a surplus exists over the amount necessary to supply users in the United States, the delivery to Mexico can provide a total quantity of not to exceed 1,700,000 acre-feet per year. Mexico can acquire no rights by use of the waters of the Colorado River system for any purpose whatsoever in excess of 1,500,000 acre-feet annually. In the event of extraordinary drought or serious accident to the irrigation facilities in the United States making it difficult for the United States to deliver 1,500,000 acre-feet per year, the water allotted to Mexico will be reduced in the same proportion as the consumptive use in the United States is reduced. The treaty also provides that the water of the Colorado River to be delivered to Mexico "shall be made up of the waters of the said river, whatever their origin" and shall be delivered by the United States in the limitrophe portion of the river. Under other terms of the treaty, the two nations agreed to construct certain diversion works, measuring devices, and flood control works in the two countries under specified divisions of responsibilities and cost sharing.

The Mexican Water Treaty was supposed to be a step forward in international cooperation and to settle for all time the almost century-old dispute over allocation of the waters of the Colorado River. One cannot help but speculate upon what kind of diplomatic chicanery, sell-out by treaty negotiators and politicians representing the United States, or international trade-offs
resulted in giving to Mexico a guaranteed annual delivery of twice as much water as had ever been used (750,000 acre-feet) in that country prior to the construction of Hoover Dam by the United States, from a river well known to be water deficient, at the expense of the citizens of the seven Colorado River Basin States, and over the protestations of eminent California water authorities. Increased consumptive uses of Colorado River water by Mexico between 1935 and the Mexican Water Treaty in 1944 were made possible because Lake Mead behind Hoover Dam could store the erratic flows of the river.

E. Basin-wide Comprehensive Planning

1. Inventory of Water Resources and Potential Water Uses

During the 1940's, engineers, economists, and political leaders in the Upper Basin States, particularly in Colorado and Utah, began to realize that development of the water resources of the Colorado River was needed to relieve economic distress in local areas, stabilize highly developed agriculture, and create opportunities for agricultural and industrial growth and economic expansion. They advocated comprehensive, basin-wide planning designed to lead to the ultimate development of all water resources of the Basin. A similar movement was on foot in the Lower Basin, especially in California and Arizona. Before detailed planning could take place, it was necessary to have a basin-wide inventory of potential irrigation projects, power generating projects, and possible municipal and industrial uses of water. Emphasis was still on the development and utilization of water for irrigated agriculture. The realization that the cost of such developments would be beyond the capability of water users to repay, even under the liberal reclamation laws, because of the rugged terrain, short growing season in some areas, and other factors, including high cost of ponderous storage and diversion works, crystalized the support behind the concept of using excess revenues from the sale of hydroelectric power for paying portions of the costs of irrigation.

The advantages of having an abundant supply of low-cost electric energy were not overlooked by proponents of water projects. Such energy would stimulate industry in the entire power market area, create new taxable values, new opportunities, and increased purchasing power.
2. "Blue Book" of the Secretary of the Interior

Under the constant urging by the States, the Bureau of Reclamation in 1946 published a comprehensive departmental report by the Regional Directors of the two regions in the Colorado River Basin on the development of the water resources of the Colorado River Basin called "The Colorado River" and often referred to as the "blue book" whose theme was "a natural menace becomes a national resource." This report was sent to the interested States and Federal agencies for comments, and in 1950, as a report of the Secretary of the Interior, was transmitted to the Congress where it became House Document 419 of the 80th Congress, 1st Session.

One of the far-reaching conclusions found in the Bureau of Reclamation's report was that there was not sufficient water available in the Colorado River system for full expansion of projects then existing and authorized for construction and for all potential projects studied. The report presented an array of 134 potential water use projects or units of projects, mostly multiple purpose in nature, within the Colorado River drainage basin. Possible diversions of water out of the Colorado River Basin to adjacent basins were also considered in the report. The potential estimated annual average depletion of those projects within the natural drainage basin, plus exports to other basins, was estimated to be about 20.2 million acre-feet, considerably more than the available supply.

3. Recommendation: States Determine Legal Rights

Probably the most pertinent recommendation in the report was "that the States of the Colorado River Basin determine their respective rights to deplete the flow of the Colorado River consistent with the Colorado River Compact." The Secretary of the Interior and the President refused to recommend authorization of any projects until such a determination had been made.

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5/ The Upper Colorado Region office of the Bureau of Reclamation is located in Salt Lake City, Utah. The Lower Colorado Region office is at Boulder City, Nevada.
F. Early Litigation Attempts by State of Arizona

1. Three Lawsuits Filed

Although the Colorado River Compact had apportioned the use of waters of the river system between the Upper and Lower Basins, agreement among the States relative to how much Colorado River water each could consume consistent with the Compact appeared unattainable. In the Lower Basin, Arizona and California were constantly at odds over how much water each should have. California early in the game, starting in the early 1930's, obtained contracts for delivery of an aggregate quantity of 5,362,000 acre-feet annually. Arizona's exclusive use of the Gila River, without including it as a part of the Compact allotment was a point in dispute. In 1930, Arizona brought suit against the Secretary of the Interior and the other six States to enjoin enforcing or carrying out of the Boulder Canyon Project Act which was supposed to effectuate the Compact. In 1934 and 1936 Arizona instituted two more suits against California and the other five States seeking to perpetuate testimony of negotiators of the Colorado River Compact and seeking judicial apportionment of the unappropriated water. These two suits were initiated by Arizona after all of the California water storage and delivery contracts had been executed. None of the three lawsuits reached the hearing stage.

2. Early Attempts to Authorize Central Arizona Project

During the 79th, 80th, 81st, and 82d Congresses, Arizona sought Congressional authorization for construction of her vast Central Arizona Project under which 1,200,000 acre-feet of water would be diverted from the river. Some of the Bills were passed by the Senate. None were passed by the House of Representatives. In 1951 the House Committee on Interior and Insular Affairs adopted a resolution that consideration of Bills relating to the Central Arizona Project "be postponed until such time as use of the water in the Lower Colorado River Basin is either adjudicated or binding or mutual agreement as to the use of the water is reached by the States of the Lower Colorado River Basin."
G. Upper Colorado River Basin Compact (63 Stat. 31)

Instead of using the Courts to apportion the consumptive use of water allocated to them by the Colorado River Compact, the five States (Arizona, Colorado, New Mexico, Utah, and Wyoming) having interests in the Upper Basin, negotiated and signed the Upper Colorado River Basin Compact in 1948. After each State's legislature had ratified this Compact, Congress gave its consent to it in 1949.

The Upper Colorado River Basin Compact apportioned a fixed quantity of 50,000 acre-feet of consumptive use of water per year to Arizona for use in the small portion of that State in the Upper Basin. Of the remainder, 51.75% was apportioned to Colorado, 11.25% to New Mexico, 23% to Utah, and 14% to Wyoming. This Compact created the Upper Colorado River Commission as an administrative agency for the four Upper Division States, Colorado, New Mexico, Utah, and Wyoming. Arizona is not a member of the Commission. A Federal representative appointed by the President serves as chairman. The Upper Basin Compact contains rules and regulations for determining curtailment of water uses during any year in which such curtailment is deemed necessary by the Commission to meet delivery requirements under the Colorado River Compact to the Lower Basin. It also recognizes certain agreements as to the use of water of interstate streams between its member States within the Upper Basin, and specifies that consumptive use of water in the Upper Basin and in each State thereof shall be measured by the inflow-outflow method in terms of man-made depletions of the virgin flow at Lee Ferry, as contrasted with the method of diversion of water less return flows used in the Lower Basin.

H. Colorado River Storage Project Act (70 Stat. 105)

1. Premature Attempts by Utah to Authorize the Central Utah Project

The Bureau of Reclamation's "blue book" report "The Colorado River" that inventoried the potential opportunities for river regulation, irrigated agriculture, and power generation in the basin was the catalyst that stimulated
the technical and political leaders in the Upper Colorado River Basin to accept and aggressively promote the concept of comprehensive Upper Basin-wide development. The Upper Colorado River Basin Compact, signed in 1948, provided the vehicle for formulating the plan of development known as the Colorado River Storage Project and participating projects. As early as 1948 and 1949, members of Congress from the State of Utah introduced Bills to authorize the Federal government to construct the Central Utah Project which would use waters from the Colorado River system. These Bills could not be enacted into law because they lacked the support of the other Upper Basin States, and because they were introduced prior to approval of the Upper Colorado River Basin Compact which did not occur until April 6, 1949. In 1950 a Bill was introduced to authorize the Colorado River Storage Project—about six months prior to the publication of an interim report on such a project by the Regional Director of the Bureau of Reclamation.

2. Support by Executive Branch of Federal Government

It was not until December of 1952 that the Department of the Interior finally submitted its report to the Congress proposing a basin-wide plan of development for the Upper Colorado River Basin to be known as the Colorado River Storage Project and participating projects. Numerous Bills were introduced in the House of Representatives and the Senate of the United States Congress. It was not until January of 1955 that any of these Bills received solid support of the Executive Branch of the Federal Government. This first occurred when President Eisenhower urged passage of a Colorado River Storage Project Bill in his State of the Union Message in January, 1955, followed by a request for $5 million in his Budget Message to initiate construction, contingent upon favorable actions by the Congress. In spite of the bitter opposition of certain water and power interests in California, a group of vociferous conservation organizations, and anti-reclamation members of Congress from the eastern part of the United States, the Colorado River Storage Project Act became part of reclamation law in April, 1956. This Act was the result of many compromises between and among the member States of the Upper Colorado River
Commission, and with conservation organizations with respect to a proposed
dam at Echo Park on the Green River, which was withdrawn from the legislation,
and with respect to the Rainbow Bridge National Monument in southern Utah on
an arm of Lake Powell, behind Glen Canyon Dam.

3. Pertinent and Unique Terms of CRSP Act
   a. Basin-wide Project Authorizations
      The Colorado River Storage Project Act authorized the con­
struction of four large storage units capable of holding 33,583,000 acre-feet
of water for river regulation, power generation, and consumptive use by
exchange with downstream water users. These storage units are Glen Canyon
Dam and Lake Powell on the Colorado River in Arizona and Utah, Navajo Dam
and Reservoir on the San Juan River in New Mexico and Colorado, Flaming
Gorge Dam and Reservoir on the Green River in Utah and Wyoming, and the
Curecanti Storage Unit on the Gunnison River in Colorado consisting of three
dams and reservoirs—Blue Mesa, Morrow Point, and Crystal. (Crystal Dam
is still under construction.) The authorizing act also provided for the con­
struction of 11 participating irrigation projects. Ten additional participating
projects have been added by enactment of subsequent amendatory laws in
1962, 1964, and 1968.6/

   b. Basin Fund
      There were several unique features in the Colorado River
Storage Project Act related to repayment, accounting, and funding require­
ments not found in previous reclamation law. Some of these innovations
are having great influence on natural resource development in the Colorado
River Basin.

      This law provided:

6/ San Juan-Chama and Navajo Indian Irrigation Projects Act (76 Stat.
96); Savery-Pot Hook, Bostwick Park, and Fruitland Mesa Projects Act (78
(1) for the creation of an Upper Colorado River Basin Fund to which all appropriations from the General Fund of the U.S. Treasury shall be credited as advances, except those for recreational purposes which are nonreimbursable;

(2) that all revenues (power, municipal water, irrigation, or other) derived from storage units or water-using participating projects shall be credited to the Basin Fund and shall be available for paying operation, maintenance, and repair and emergency costs, and costs of power and municipal water features within 50 years with interest;

(3) that each participating consumptive-use project must pay its own operation, maintenance, and emergency charges from its own revenues;

(4) that costs of storage units allocated to irrigation shall be returned from revenues in the Basin Fund within 50 years;

(5) that revenues in the Basin Fund in excess of amounts needed to defray costs under (2), (3), and (4) above shall be apportioned within the Basin Fund to the credit of the States as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
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</tr>
<tr>
<td>New Mexico</td>
<td>17.0%</td>
</tr>
<tr>
<td>Utah</td>
<td>21.5%</td>
</tr>
<tr>
<td>Wyoming</td>
<td>15.5%</td>
</tr>
</tbody>
</table>

for the purpose of returning the cost of irrigation allocations of participating projects within 50 years that are beyond the capacity of repayment by water users;

(6) that if a participating project has power and/or municipal water facilities in addition to irrigation facilities, it must pay from its own revenues the operation, repair, and maintenance and emergency charges for all of its own facilities, repayment of its power costs and its municipal water costs, and interest on the power and municipal water investment;

(7) that after all the costs under (6) are paid from the revenues of a given participating project, if there are excess revenues
remaining in the Basin Fund that were derived from its own power and/or municipal water facilities, the excess is credited within the Basin Fund for use within that State wherein the project is located before the percentage apportionments are made to the four States;

(8) that excess power revenues credited within the Basin Fund to each State may be used for repaying costs of irrigation projects only within that State and may not be used within another State unless appropriate consent is obtained; and

(9) that business-type budgets must be submitted each year to the Congress.

c. Costs of Indian Project Nonreimbursable

Among other innovative features of this law, was the manner of treating costs of a project that benefits the Navajo Indians. In recognition of the fact that assistance to these Indians is the responsibility of the entire Nation and not of any one State or group of States, the law specified that when the Navajo Indian Irrigation Project was authorized the cost of irrigation allocation beyond the capability of the land to repay should be nonreimbursable. Another part of the law provides that payment of construction costs within the capability of the land to repay will be deferred for so long as the land remains in Indian ownership. In addition, the Navajo Dam and Reservoir, required for the irrigation of Indian lands, without hydropower generators and having limited value in river system regulation, was classified as a Storage Unit. By virtue of this classification, and because its cost has been allocated mostly to irrigation, the cost of this dam and reservoir will be almost entirely paid by power revenues from other Storage Units.

d. Costs of Recreation Features Nonreimbursable

This Act also placed emphasis upon the potential recreational values of the Upper Colorado River Basin. For the first time the development of recreational facilities as a valuable social asset for the
for the general welfare of the citizens of the nation was specifically recognized by making the costs of such facilities constructed in conjunction with the water resource development nonreimbursable. In this sense, this part of the law evinced a recreational consciousness on the part of its proponents and helped to pave the way for passage by the Congress of subsequent laws relating to Federal responsibility with respect to outdoor recreation.

I. Fryingpan-Arkansas Project Act (76 Stat. 389)

1. East-West Slope Controversy in Colorado

For the past fifty years there has been a heated intrastate controversy in Colorado between water interests on the two sides of the continental divide. The root of the argument is over the diversion of water from the Colorado River and its tributaries from the west slope of the Rocky Mountains where there are few people but plenty of water to east slope municipalities and irrigation projects where there is a very limited natural water supply and most of the population of the State is located. For instance, a number of important cities including Aurora, Colorado Springs, Pueblo, and the sprawling Denver metropolitan area are dependent upon importation of large quantities of water from western Colorado. The Colorado-Big Thompson Reclamation Project in northern Colorado near the cities of Greeley and Loveland obtains a large supply of excellent quality water of the Upper Colorado River System through a tunnel extending from the western slope.

2. Intrastate Agreement Made Project Possible

The Fryingpan-Arkansas Project is mentioned here because it represents the result of agreement after prolonged and painful negotiations between representatives of water interests on the two slopes of Colorado. It also incorporated into the authorizing legislation an historic agreement between water authorities of eastern and western Colorado reached many years before known as Senate Document No. 80 of the 75th Congress, and project operating principles adopted by the State of Colorado and published in House
Document No. 130 of the 87th Congress. The Fryingpan-Arkansas Project which was badly needed to supply supplemental water to the Pueblo, Colorado area and the Arkansas River Basin is also the last transmountain diversion project to be authorized by the Congress in the Upper Colorado River Basin.

J. Last Arizona v. California lawsuit

In 1952 the State of Arizona initiated the last Arizona v. California lawsuit in the U.S. Supreme Court in compliance with the mandate of the House Committee in 1951 to obtain an adjudication of a water supply for the Central Arizona Project. The decision in this famous case did not come until 12 years later, in 1964. Arizona won the case in that she had her right confirmed for the delivery of water by the Secretary of the Interior from the lower mainstem of the Colorado River.

This suit was not decided under the Colorado River Compact, but under the Boulder Canyon Project Act. The four Upper Division States, as such, were not parties in the case. (The States of New Mexico and Utah were parties, but as Lower Basin States only.) The highlights of the Supreme Court's decree (376 U.S. 340) included:

1. Control of the river below Hoover Dam was given to the Secretary of the Interior who was authorized to deliver from the mainstem of the river 4.4 million acre-feet of water per year to California, 2.8 million acre-feet to Arizona, and 300,000 acre-feet per year to Nevada, when 7.5 million acre-feet were available, with any surplus to be divided between Arizona and California.

2. The Federal reservation theory of reserved water rights for Indian lands and other Federal reservations, such as national forests, etc., was fully recognized.

3. A determination was made of water rights on the Gila River between New Mexico and Arizona.
The decision in the last Arizona v. California lawsuit was destined to have far-reaching effects, not only in the Colorado River Basin but in all river basins where there are Federal reserved or Indian-owned lands.

K. Colorado River Basin Project Act (82 Stat. 885)

1. Nevada and Arizona Water Contracts and California Opposition to Arizona Water Development

In 1942 and 1944, contracts were executed between the Secretary of the Interior and the State of Nevada for the delivery of water to Nevada from Lake Mead, subject to its availability for use in Nevada under the Compact and the Boulder Canyon Project Act.

Not until 1944 did the State of Arizona enact a statute which purported unconditionally to approve, ratify, and confirm the Colorado River Compact. By contract in that same year the United States agreed to deliver certain quantities of water from storage in Lake Mead for use in Arizona, subject to its availability for use in Arizona under the Compact and Project Act. As we have seen above, Arizona earlier made several attempts to persuade Congress to authorize the construction of a Central Arizona Project but without success because of strong opposition from California under whose interpretation of the "law of the river" there was not enough water available for such a development in Arizona.

2. Bills to Authorize Central Arizona Project

In 1963, preceding the United States Supreme Court's 1964 decision in Arizona v. California, members of Congress from Arizona introduced Bills which, if enacted, would have authorized the Secretary of the Interior to construct the Central Arizona Project.

a. California's Interest

California, having lost the lawsuit, immediately served notice that unless a priority were to be given to her consumptive use of 4.4 million acre-feet of water per annum over the uses by Arizona, she would again oppose authorizing legislation.
b. Upper Basin's Interest

The Upper Division States, Colorado, New Mexico, Utah, and Wyoming, too, had a vital interest in the Central Arizona Project Bills.

For the longest period of streamflow records (1896-1973) for the Colorado River at Lee Ferry, the annual average virgin flow is only 14.8 million acre-feet. In only one decade (1941-1950) following signing of the Colorado River Compact (1922) did the ten-year average virgin flow exceed this figure. This phenomenon is of particular importance to the Upper Basin because of the compact requirement to deliver to the Lower Division States 75 million acre-feet in every period of ten consecutive years. The trend in river flow for more than 40 years at the time the last Central Arizona Project legislation was pending in the Congress had been downward. For the total period since signing of the Compact, the annual average had been only 13.8 million acre-feet, and in two unrelated ten-year periods, 1931-1940 and 1954-1963, the annual average virgin flow for each ten-year period amounted to only 11.8 million acre-feet. The annual average for one 12-year period, 1953-1964, amounted to only 11.6 million acre-feet. It was obvious to the four Upper Division States that if the Compact-required delivery to the Lower Basin of 75 million acre-feet in each ten years was to be met, the annual average amount remaining for consumptive use in the Upper Basin was about 20% less than the 7.5 million acre-feet apportioned by the Colorado River Compact.

The Upper Division States had received more than their share of opposition and harrassment from both Arizona and California during the initial filling period of the storage units of the Colorado River Storage Project, especially during the filling of the dead storage space in Lake Powell behind Glen Canyon Dam.

The Upper Basin water users could also plainly see that if a full supply of water were to be given to the Central Arizona Project, a large
proportion of that water, especially in low water years, would have to come from the Upper Basin, which had not yet put its allocation to beneficial consumptive use. Protection of the rights of the Upper Division States against excessive consumptive uses in the Lower Basin that would encroach further into their Colorado River Compact allotment was of vital concern. After Arizona agreed to give a priority to California's 4.4 million acre-feet per year the danger to the Upper Basin became even more critical. The Upper Division States feared that if their water were used by Arizona and California, they might forever be precluded from using their legal entitlement by superior political pressures from the Lower Basin States, in spite of the terms of the Compact. They also had learned from experience that the Secretary of the Interior could not be trusted to operate the river in their best interest if left to manipulate according to his own whims and desires or under the influence of political forces stronger than their own from the outside. The Upper Division States wanted the Secretary to be controlled in his river operations by definite guidelines.

The pending Central Arizona Project legislation was viewed by the Upper Division as an opportunity for effective interstate cooperation in resolving several outstanding operational problems involving all of the Colorado River Basin States.

In order to protect their future interests in the use of water and the generation of power, the Upper Division States insisted upon having a number of their projects authorized for construction at the same time the Central Arizona Project was authorized, and demanded that the legislation contain specific parameters for operating criteria for governing the actions of the Secretary of the Interior in order to provide equitable operations of Lake Powell and Lake Mead.

3. Pertinent Terms of CRBP Act

After several years of negotiations between the States of the Upper and Lower Divisions, the Colorado River Basin Project Act became
law on September 30, 1968. This Act accomplished the primary purpose of authorizing the construction of the Central Arizona Project. Among the other interesting facets of this Act are the following:

a. It gave a priority to California for the consumptive use of 4.4 million acre-feet per year of lower mainstream water over uses by the State of Arizona, thus requiring the Central Arizona Project to assume shortages when the annual supply of water for use downstream from Hoover Dam falls below 7.5 million acre-feet. In effect, California gained by legislation what had been lost under the decision in Arizona v. California in 1964.

b. A Lower Colorado River Basin Development Fund was created which was patterned after the basin fund authorized in 1956 for the Upper Basin's Colorado River Storage Project.

c. Five participating water-use projects were authorized to be constructed in Colorado. One potential project in Utah received a conditional authorization and another Utah project in the Lower Basin was authorized to participate in the use of revenues of the Lower Colorado River Basin Development Fund for repayment purposes. The Secretary of the Interior was directed to expedite feasibility studies of several other projects in the Upper Basin.

d. The new law described explicit guidelines for the formulation of long-range operating criteria for Lake Powell and Lake Mead.

e. The Secretary of the Interior was directed to "conduct full and complete reconnaissance investigations for the purpose of developing a general plan to meet the future water needs of the Western United States."

Proponents of the legislation, due to opposition of the northwest States, failed to have included any kind of scheme to import water into the Colorado River Basin. In fact, their opponents managed to have a provision included in the Act that prohibits the Secretary from even studying an importation of water for a period of ten years, or until after September 30, 1978.
f. Congress declared that satisfaction of the requirements of the Mexican Water Treaty from the Colorado River constitutes a national obligation that will become the first obligation of any effective water augmentation project authorized by Congress in the future.

g. The purpose of the Colorado River Development Fund that originally, under the Boulder Canyon Project Adjustment Act, was designated to be used for investigating water resource projects in the Basin was changed to repaying the Upper Colorado River Basin Fund ($500,000 per year) for deficiencies in power generation charged against it during the filling period of reservoirs of the Upper Basin's Colorado River Storage Project.

4. CRBP Act Product of 7-States' Cooperation

The Colorado River Basin Project Act more than any other law on the river, including the earlier Colorado River Storage Project Act, is a truly basin-wide comprehensive law. It could never have come into existence except as a result of intensive negotiations by capable, dedicated water statesmen representing each of the seven Colorado River Basin States. It is hoped that it will prove to be the forerunner of future seven-State, basin-wide endeavors to solve mutual problems of the entire Colorado River Basin.

The Colorado River Basin Project Act was the last of the major reclamation laws aimed directly at the Colorado River Basin and having great impact upon the historical development of its water resource. For all practical purposes, if all of the water utilization contemplated under this Act were to occur, there would be very little unused water left available for future development. The bulk of what would be left would be in the two States, Wyoming and Utah.
VIII. Recent Influences on Water Development

A. Colorado River Development Confused

If we were to ask, "where are we?" and "how did we get here?" with respect to water development in the Colorado River Basin, we would certainly have to acknowledge that the events described above, culminating with the Colorado River Basin Project Act of 1968, provide historical background; but they do not reflect all of the reasons for the present order. Today water development is in a state of chaos, confusion, and frustration. Even an informed observer who is working on water problems every day finds himself in the position of a blind referee at a baseball game. He doesn't know who is on first base. Sometimes he is lucky if he knows there is a game still in progress.

B. Changes in the Social Order

The disarray into which all types of resource development have been thrown is due to a great extent to the extremely rapid social changes of the past five to ten years, compared to the more predictable expanding progress of the previous 50 years. There has been an abrupt wide swing of the pendulum by society from the earlier emphasis on an economic ethic to a social ethic with emphasis on such things as environment and ecology. Whether we regard this pendulum swing as "good," "bad" or "indifferent" is beside the point. The point is that the change in thinking has affected the actions of members of Congress, State legislatures, and even the Courts, which are being accused of making laws as well as interpreting them. As in all new social movements in history, the proponents of a new ethic become zealous and sometimes push the pendulum until the clock either overturns or a more reasonable equilibrium is assumed. We may have reached this point already with respect to water development in the Colorado River Basin. Somebody must pay the charges for the new social changes. A good example of these costs is reflected by one utility in the area that is currently asking for
a 25.5% increase in rates due in large part to new environmental restrictions. It will not take long to ascertain how willing the public will be to pay the price demanded by those who are beating the drums for preservation of natural resources in lieu of their wise utilization and conservation by a society that has attained a comfortable standard of living by dynamic action.

C. New Federal Laws

Within recent years, and particularly within the last ten, at least four new nation-wide laws have been passed by the Congress and a number of events have occurred that have had, and are having, impacts upon history related to water development in the basin. Limited time and space will not permit even a short discussion of each of these laws and events, or of their influences, but a few of them will be briefly mentioned with the idea of provoking the reader to further contemplation.

Among prestigious laws having great influence are:

1. Water Resources Planning Act (79 Stat. 244)

The Water Resources Planning Act of 1965 created the Water Resources Council at presidential cabinet level to provide for the optimum development of the nation's natural resources through the coordinated planning of water and related land resources. This Act also provided for the establishment of Federal State River Basin Commissions and endowed the Water Resources Council with the authority to establish principles, standards, and procedures for Federal participants in the preparation of comprehensive regional or river basin plans and for the formulation and evaluation of Federal water and related resource projects. For the Colorado River Basin, no river basin commission has been authorized under the Act. The principles, standards, and procedures enunciated by the Council have been so rigid and restrictive that

[1] The Water Resources Planning Act provides that in the event the Upper Colorado River Basin is involved, at least three of the four States of Colorado, New Mexico, Utah, and Wyoming must concur.
projects already authorized by the Congress for construction are being re-studied and reformulated. It may prove to be impossible to continue Federal water development in the Basin. There is reason to believe that the Office of Management and Budget of the Executive Branch of the Federal government dominates the thinking and actions of the Water Resources Council. It is well known that under the present administration the Office of Management and Budget is infamously opposed to Federal water development.


The National Water Commission Act of 1968 established the National Water Commission to study present and anticipated water resource problems and to make recommendations related thereto. The Commission's report had 290 conclusions and recommendations that for the most part were ill-conceived and not conducive to the promotion of water development. The Commission concluded that all increased demands for United States' agricultural products can and should be met by intensified management on non-irrigated farms. It suggested that non-agricultural water needs (domestic, municipal, industrial, etc.) in the arid West can be provided from a substantial reduction in irrigated agriculture. The Commission recommended that, in the main, future water resource development be the responsibility of State and local entities. Future federal water programs, including irrigation, for the most part would be completely reimbursed with interest.

In short, the National Water Commission recommended that our nation repudiate basic principles that in the public interest have guided water resource programs since they were initiated in this country.

3. National Environmental Policy Act (P.L. 91-190)

The National Environmental Policy Act of 1969 intended by the Congress to protect and enhance man's environment is being used by advocates of zero population growth, destroyers of our American way of life with its high standard of living, and those dedicated to the preservation of the natural resources for the benefit of a few individuals of wealth and superb physical
capacity as a vehicle in Court actions to delay and prevent water development. The Colorado River Basin has been a favorite target. The Central Utah Project in the Upper Basin and the Central Arizona Project in the Lower Basin have been two bulls eyes receiving the most high velocity bullets of the so-called environmentalists.

4. Federal Water Pollution Control Act (P.L. 92-500)

The Federal Water Pollution Control Act Amendments of 1972 were enacted by the Congress to make possible the badly needed protection and improvement of the quality of water in the Nation’s rivers and streams through Federal-State cooperation administered under the jurisdiction and authority of an Environmental Protection Agency. The intent of the Act certainly has merit, but some of the specific goals and procedures may be questionable. So far as the Colorado River is concerned, the principal application of this law will be to enforce the maintaining of reasonable levels of total dissolved solids in the Lower Basin. See "Special Problems" below.

D. Special Problems

1. Salinity Above Imperial Dam
   a. Causes of Salinity

   The Colorado River has become the most highly regulated major stream in the world. It is also a river with a very small water supply in relation to the size of its watershed, the other natural resources of its drainage basin, and the number of people in seven States and Mexico that it must serve. Presently, all of the water resources of this famous stream are either being used or are committed for reasonably early utilization in the various States. For all practical purposes there has been no water spill into the Gulf of California for about 10 years, and unless a serious accident occurs to major upstream

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8/ Salinity as used herein refers to the concentration of total dissolved solids in the water and is measured in milligrams per liter (mg/l), which is approximately equivalent to parts per million (ppm) to concentrations of 7000 mg/l.
storage facilities no further discharge of large magnitude into the ocean is likely to occur in the future.

Increasing concentrations of salts from headwaters to the mouth of the river is not a problem that is unique to the Colorado River. It is found on every river where man has put water to use—and even on rivers where man has not used the resource. The removal of water from the stream concentrates the remaining salts in a smaller body of water; hence, an increase in salinity. The loading of salts into the river from natural salt springs and seeps and from precipitation flowing over saline soils, or by discharges into the river of waste water from irrigation or other activities of man also loads salts into the river. Preliminary estimates indicate that for the Colorado River System about half the salt loading may be from natural sources and half from man's influence.

b. An Economic Problem

Fortunately on the Colorado River pollution of its water by natural or man-made salt discharges into it or by the removal of water from it have caused no health problems. The salinity problem is an economic one.

The fact that increases in salt concentration would cause economic problems was recognized early by water users in California. Certainly, well prior to the Mexican Treaty negotiations of the 1940's Californians were aware of the implications of using the last drop of water from the river system and increasing the salt concentration.9/

At its headwaters, the average salinity in the Colorado River is less than 50 mg/l and progressively increases downstream until, at Imperial Dam below Lake Mead in the Lower Basin, the present modified condition

9/ Quality of water was discussed by the Colorado River Commission of the State of California in its publication The Boulder Canyon Project, 1930.

10/ Present modified refers to historic conditions for the period 1914-1968 modified by the effects of all present upstream projects as if they were in operation for the entire period.
averages about 865 mg/l. Projections of future salinity levels with a control program indicate that values of 1200 mg/l or more may occur at Imperial Dam by year 2000. Should these increases in salinity levels happen, agriculture in the Imperial, Coachella, Gila, and Yuma Valleys would be further threatened. A poorer quality water would also be diverted to the coastal cities in California by the Metropolitan Water District of Southern California and by the Las Vegas Valley Water District in Nevada causing further economic losses. Upon completion of the Central Arizona Project, water users in the Tucson and Phoenix areas would be similarly affected.

c. Studies by Various Agencies

Several agencies, including the U.S. Geological Survey, Bureau of Reclamation, Colorado River Board of California, and Environmental Protection Agency have analyzed this problem. Obviously, one way to prevent further increases in salinity would be to use no more water from the river. It is also obvious that this solution is both physically and politically impossible.

d. Seven Basin States and Federal Government Cooperating

As the result of the "Conclusions and Recommendations" of the Reconvened Seventh Session of the Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries held on April 26-27, 1972 under the authority of the Federal Water Pollution Control Act and approved by the Administrator of the Environmental Protection Agency a salinity policy objective has been unanimously adopted by the seven Colorado River Basin States and the Federal government for the Colorado River System. Under this policy "the salinity problem must be treated as a basin-wide problem that needs to be solved to maintain Lower Basin water salinity at or below present levels while the Upper Basin continues to develop its compact-apportioned waters." A salinity control scheme conceived by the Department of the Interior entitled "Colorado River Water Quality Improvement Program" has been designated to implement basin-wide salinity control. The program is now awaiting enactment of the necessary authorizing law and funding by the Congress.
Under the Federal Water Pollution Control Act Amendments of 1972 water quality criteria are to be established for the Colorado River System at various points on the river and its tributaries. Obviously, if the criteria are too severe, further use of water from the river would be precluded absent an effective program of salinity control. Criteria can be formulated by the States and approved by the Environmental Protection Agency. If the States fail to do the job, the EPA is required by law to promulgate water quality standards. Presently the seven States through an ad hoc Colorado River Basin Salinity Control Forum are working with officials of the EPA to write standards that will effectuate the "Conclusions and Recommendations" of the State-Federal agreement of April 1972 which described the salinity policy objective for the river system and approved its effectuation.

2. Salinity of Mexican Waters
   a. The 1961 Problem

Although the Mexican Water Treaty became effective on November 8, 1945, operations under the Treaty started in November, 1950. The annual deliveries of water to Mexico from 1950 to 1962 ranged from about 1,780,000 acre-feet to about 10,186,000 acre-feet. The amount of this water actually used by Mexico is not known.

Prior to 1961, Mexico, without protest, accepted the water as scheduled and delivered. In August, 1961, the drainage conveyance channel for the Wellton-Mohawk Project, a Federal reclamation enterprise in Arizona near the Mexican border, was placed into full operation, and the storage of river flows in Lake Mead was increased in anticipation of filling Lake Powell upstream. During the 1961-1962 winter, the water delivered to Mexico showed a marked increase in dissolved solids because of the smaller amount of water left in the river to dilute the dissolved solids including the highly concentrated return flows from the Wellton-Mohawk area.
b. Minute No. 218, International Boundary and Water Commission, United States and Mexico

Mexico protested that the water was not "usable." For a time, pending a solution by other measures, the Secretary of the Interior released 50,000 acre-feet of stored Colorado River waters in excess of the Treaty allotment in order to reduce the concentration of salts. As the result of negotiations, the two governments in 1965 approved Minute No. 218 of the International Boundary and Water Commission, United States and Mexico. Under the agreement of this Minute, the United States spent approximately $11.25 million dollars for main conveyance channels, collector lateral drains, drainage wells, tile drainage, electric power facilities, and a by-pass channel to convey water around the point of diversion to Mexico.

c. Minute No. 241, International Boundary and Water Commission, United States and Mexico

In 1972 under another agreement embodied in Minute No. 241, the delivery of water by the United States in excess of the treaty allotment was increased from 50,000 to 118,000 acre-feet per year.

d. Minute No. 242, International Boundary and Water Commission, United States and Mexico

By 1972-73, Mexico noted that the Environmental Protection Agency and the seven States of the Colorado River Basin had entered into an agreement in April, 1972 under which efforts would be made under a "Colorado River Water Quality Improvement Program" formulated by the Department of the Interior to maintain the salinity of the Colorado River at Imperial Dam at water quality levels as of that date, while the Upper Division States would proceed with developing their compact apportionments of water use. Mexico was then not satisfied with the agreement and operations under Minutes No. 218 and 241, and again objected, demanding that the quality of water delivered to Mexico should be as good as that delivered to other Lower Basin water users.

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11/ Cost estimates obtained from U.S. Bureau of Reclamation, Upper Colorado Region office.
A State Department negotiator, Mr. Herbert Brownell, appointed by President Nixon with diplomatic status, for all practical purposes ignoring the most pertinent and important points of advice of a Committee of 14 representing the seven Colorado River Basin States, negotiated with his Mexican counterpart another agreement embodied in Minute No. 242, International Boundary and Water Commission, United States and Mexico.

Under Minute No. 242, which is supposed to constitute "a permanent and definitive solution of the international problem of the salinity of the Colorado River," the United States would be required to:

(1) adopt measures no later than July 1, 1974 to deliver to Mexico upstream from Morelos Dam 1,360,000 acre-feet of water of the 1,500,000 acre-feet treaty allotment with the salinity of no more than 115 ppm, ± 30 ppm, over the annual average salinity of water at Imperial Dam;

(2) from September 1973 until the United States adopts such measures, discharge 118,000 acre-feet of Wellton-Mohawk drainage waters to the river downstream from Morelos Dam and substitute therefor an equal volume of other waters from reservoirs in the United States;

(3) pay the cost of extending the concrete-lined, Wellton-Mohawk by-pass drain from Morelos Dam to the Santa Clara slough near the Gulf of California in Mexico, and to operate and maintain that portion of it in the United States;

(4) limit pumping of ground water within five miles of the Arizona-Mexico border to 160,000 acre-feet of water per year pending an agreement on groundwater (Mexico is already pumping 160,000 acre-feet per year);

(5) support the efforts of Mexico to obtain financing for improvement and rehabilitation of Mexicali Valley; and
(6) provide nonreimbursable assistance to Mexico for those aspects of rehabilitation of Mexicali Valley related to the salinity problem, including tile drainage. (The Imperial Irrigation District, across the border in the United States, has installed tile drains at a cost to date of $40.5 million, lateral lining at a cost of $10.3 million; while the landowners themselves have spent $15.9 on lining farm ditches.)

e. Implementation of Minute No. 242

Among the measures that the Nixon Administration has recommended to the Congress to implement Minute No. 242 will be the world's largest desalination complex to remove salt from Wellton-Mohawk Project drain waters, lining of 49 miles of the Coachella Canal, and purchase of approximately 25,600 acres of land on Yuma Mesa at a cost, including interest during construction, of about $152,000,000. Operation and maintenance costs of the desalination plant have been estimated to be almost $10 million per year. For a 50-year period at 5 5/8% interest the annual equivalent costs are estimated to be almost $18 million. Not included in legislation proposed by the Administration is the pumping of 160,000 acre-feet of water per year on the United States side of the border, which most certainly will become necessary for self-protection of American water users' interests.

f. Effects of Minute No. 242

Again we see the machinations of the Department of State in the give away to another country of water assets of the Colorado River Basin States and millions of dollars of the nation's money in capital costs of facilities; not to mention a multi-million dollar obligation annually.

for operation, maintenance and replacement costs saddled on the backs of future generations of Americans in perpetuity.

g. Minute No. 242 - A New Treaty?

If Minute No. 242 does not constitute a new treaty, the best that can be said for it is that it is a serious amendment of an existing treaty. It incorporates ground water which is not covered in the original treaty. It changes, at least for an indefinite period, the amount of water to be delivered to Mexico, and would cause the Secretary of the Interior to violate the reservoir operating criteria of the Colorado River Basin Project Act of 1968. It gives a water quality (salinity) guarantee to Mexico which was specifically omitted from the Treaty, and for all practical purposes precluded by the inclusion of the language saying that the water to be delivered to Mexico "shall be made up of the waters of said river, whatever their origin." In addition, Minute No. 242 provides for a unilateral unspecified amount of foreign aid commitment without prior approval of the Congress, which may be a violation of the treaty itself.

Certainly Minute No. 242 goes far beyond the definition of a Minute describing operations to implement a substantive agreement. As a new Treaty, or as an amendment to an old one, Minute No. 242 should go before the United States Senate for ratification before it can be implemented, if for no other reason than to provide a hearing for interested parties.

The Administration on February 7, 1974 sent its proposed legislation (H.R. 12634 and S. 3091) to the Congress to Implement Minute No. 242. Its legislation did not include a salinity control program for United States citizens using Colorado River water. Whether the Administration’s Bills can be supported by the Colorado River Basin States will
probably depend to a large extent upon the measures the Federal government is willing to take to protect interests within those States.

3. Pending Salinity Control Legislation in the Congress

Because of lack of support by the Nixon Administration for legislation to authorize implementation of a Colorado River Basin salinity control effort for the seven Basin States, twelve Members of the House of Representatives from those States have introduced a Bill (H.R. 12165) in the Second Session of the 93d Congress. This Bill, if enacted, would implement Minute No. 242 of the International Boundary and Water Commission, United States and Mexico (the "Brownell agreement"), and provide for a salinity control program upstream from Imperial Dam in the United States. A counterpart Bill (S. 2940) has been introduced in the Senate. Hearings on the House Bill have been scheduled for March 4, 5, and 7, 1974 by the Interior and Insular Affairs Committee. The seven Colorado River Basin States are prepared to carry the fight for protection of their interests to the U. S. Congress.

4. Legal Problems


In November 1970 an organization known as Friends of the Earth, et al., filed a compliant in the U. S. District Court for the District of Columbia seeking to restrict the Secretary of the Interior to filling Lake Powell behind Glen Canyon Dam to not exceed elevation 3606 feet above sea level in order to keep water from entering Rainbow Bridge National Monument, later stipulating that there would be no damage to Rainbow Bridge. Such a restriction would destroy the use of approximately half the 27,000,000 acre-feet of water storage capacity in the reservoir. On February 27, 1973, Judge Willis Ritter of the U.S. District Court for Utah ordered the removal of 1,900,000 acre-feet of water above elevation 3606 feet from the reservoir and further ordered the Secretary of the Interior to prevent the water from exceeding that elevation.
On August 2, 1973 the Tenth Circuit Court of Appeals, after having stayed the order of the District Court on May 1, 1973, decided that the reservoir could be utilized to its full design capacity of 27,000,000 acre-feet at elevation 3700 feet above sea level, but left the issue of damages to the Rainbow Bridge under the jurisdiction of the District Court for 10 years.

On January 21, 1974 the U.S. Supreme Court refused to grant a writ of certiorari to the plaintiffs and allowed the decision of the circuit court to remain in effect.

This lawsuit and its effects cost the taxpayers millions of dollars and has delayed filling of Lake Powell to its maximum storage capacity and power generating efficiency.

There may be further action in the courts or in the Congress with respect to the Rainbow Bridge issue.

b. Central Utah Project (Sierra Club, et al., v. Commissioner, Bureau of Reclamation, et al.)

On January 7, 1974 the Sierra Club, et al., filed a suit against the Commissioner of Reclamation seeking to prevent construction of certain facilities of the Central Utah participating project of the Colorado River Storage Project. The plaintiffs allege inadequacy of the Environmental Statement required under the National Environmental Policy Act. This suit is pending in the U.S. District Court for Utah.

This lawsuit combined with the one and one-half years lost in construction while the Environmental Statement was in preparation has cost, and is continuing to cost, many millions of dollars of taxpayers' money.

c. Reservation Theory Water Rights

Recognition having been given by the U.S. Supreme Court in Arizona v. California to the reservation of water rights dating from the time Indian reservations or other Federal reservations such as national forests were
created has thrown a legal cloud over many existing water uses in the Colorado River Basin. Federal agencies having jurisdiction are in the process of quantifying potential water uses for Indian and other Federal reserved lands, presumably for submission to the courts for adjudication. What the ultimate effects of the Supreme Court's decision will be on present and future water developments in the Colorado River Basin are unknown.

IX. New Regional Trends

A. More Water Required for Municipalities, Recreation, Industries

One cannot leave a discussion of water development in the Colorado River Basin without recognizing that in the last twenty years, and at an accelerated rate during the last decade, many water projects have been oriented towards the conservation and utilization of water for purposes other than irrigation. Navigation as a commercial transportation business was long ago abandoned. Recreational, municipal, and industrial purposes have come to the forefront, and in many instances have evolved into paramount purposes supporting water project development.

Although we have already noted how the Los Angeles-San Diego coastal metropolitan area obtained water at an early date from the Colorado River, more and more municipal water has had to be developed for people congregated in other growing cities and rural areas. Large population centers such as Phoenix, Arizona, Denver, Colorado, Albuquerque, New Mexico, Salt Lake City, Utah, and others of smaller size require more water for consumption by more people. Many of the water projects authorized for construction by the Congress in recent years have included works for the development of municipal water supplies. The Central Utah Project, the San Juan-Chama Project of New Mexico, and the Central Arizona Project are prime examples of this trend.

More people with more money to spend have discovered the beauty and space prevalent in the Colorado River Basin. Hundreds of millions of dollars are spent every year on recreational pursuits. Hunting, fishing, boating,
camping, etc. have become the backbones supporting multi-million dollar businesses. A large proportion of recreational activities revolve about water. Consequently, in response to public demand, many water developments in recent years have incorporated recreational facilities as part of the projects involved. This trend received its greatest impetus from the Colorado River Storage Project Act which provided for nonreimbursability of costs of certain recreation features of water projects.

Within the past decade many new industries have either moved to the Colorado River Basin or have originated there. Water that thirty years ago would have been developed only for irrigation is being conserved and utilized by industries that show higher economic and social returns. Water presently being used for agriculture is also being seriously considered for transfer to uses by other industries. This trend has been particularly noticeable where chemical or electric industries have needed water supplies for manufacturing plants or thermal-electrical powerplants and for people in the area to operate them.

B. Water and the Energy Crisis

There is a great imbalance in the amount of water available in the Colorado River Basin when compared with other natural resources needing water either directly or indirectly for their extraction or production. As has been mentioned before, in each of the seven States the water of the Colorado River System has either been put to use or has been committed to future uses of which there are considerably more potentialities than there is water to supply them. This does not mean that there is no water now unused or available. Some of the commitments have not materialized, and, in some instances projects that have been authorized for construction by the Congress, principally for irrigation, have not been initiated or completely constructed. Today this water is available for other uses if the States and/or the Congress should decide not to fulfill the original commitment.
With the nation in the grips of an energy crisis and the Upper Basin abundantly supplied with such energy resources as coal, oil shale, natural gas, oil, and radioactive elements, it is anticipated that some of the presently contemplated future uses of water will be changed in order that these resources can be converted to usable forms of energy to fulfill national requirements. It is also anticipated that some of the water now being consumed in marginal production of irrigated crops will be transferred relatively soon to such higher uses in the general welfare as thermal-electric energy generation, coal gasification, oil extraction from shales, production of radioactive elements, etc. and demands of associated people. In the national order of priorities there are many reasons to believe that the production of energy may override the priorities associated with irrigation, recreation, and many manufacturing industries. We may find sometime in the future that only domestic and municipal consumption of water will demand a higher priority than energy—and some of the municipal uses of water may be forced to lower positions on the list of preferred uses.

Water will be on hand from the Colorado River System for meeting the energy requirements of U.S. citizens simply because of the national interest involved. Water will continue to be used in food and fiber production in the basin for so long as such production is essential and competitively efficient.

C. Water Development Becomes Water Management

Because there is no certain method of augmenting the limited water resource of the river system within the foreseeable future, it is apparent that future water development in the basin will depend upon sophisticated, intensive management. Its goal will be the best conservation and utilization of water in order to get the greatest economic and social values from it for the welfare of society.

In the Colorado River Basin exploitation of water resources is as extinct as the dinosaur. Superior water management is the order of the day. It has become an integral part of current water development history.
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