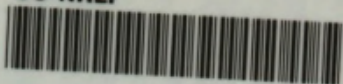


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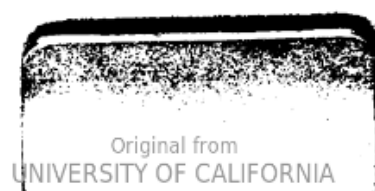
Smith, G.E.P.

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Arizona loses a
water supply.

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Arizona Loses a Water Supply

by

G. E. P. SMITH, C.E., D. Engr.

- Read Page 21 (G.E.P.S.)

Price \$1.00 (Cost—no profit)

TUCSON, ARIZONA

DECEMBER 29, 1956

ARIZONA LOSES A WATER SUPPLY FROM COLORADO RIVER

by
G. E. P. Smith

In *Les Miserables* Jean Valjean meets frustration, obstacles, injustice, disaster. In similar vein, in real life, the State of Arizona has suffered injustice, misfortune, and disaster over a period of three decades, in part due to mistakes on the part of its own officials and spokesmen.

A sad chapter in the dissipation of Arizona's hopes and aspirations is the story of the International (Mexican) Water Treaty, which added much water to the American farmers on the Lower Rio Grande and compensated Mexico with water out of Arizona's share in the Colorado River. The story must make Arizonans hang their heads in shame because the loss of nearly a million acre-feet was accomplished with the aid of Arizona officials including our two senators in Congress.

The story of the Mexican water treaty and Arizona's part in the drama is the principal purpose of this brochure. Preceding the story, however, a brief account of EARLY Colorado River negotiations and developments is presented. Also, some notes on events subsequent to the ratification of the treaty are appended.

Early History of the Colorado River Imbroglio

Much of the course of the Colorado River and its tributaries lies in deep canyons, chasms and gorges. The areas in Wyoming, Utah and Colorado on which it was feasible to divert and use water for irrigation were occupied mostly in the last century, so that there has been very little additional use of water in the last forty years.

The Imperial Valley in California began diversion of water in 1902 and the project grew rapidly until half a million acres were under irrigation. The Yuma project dates from 1909 when the Laguna Dam was completed.

But the Imperial Valley was plagued by floods from the Colorado River during the spring months and loss of crops during the latter part of summer due to falling water supply. The remedy of course was storage. The Bureau of Reclamation picked the site, Boulder Canyon or nearby Black Canyon, and it was estimated that hydro-electric power salable in the Los Angeles area would pay the costs.

At this point in the story there enters the person of Mr. Troublemaker himself, Delph E. Carpenter, Colorado attorney in charge of interstate water negotiations. Mr. Carpenter had just had a grueling experience in the long-drawn-out Laramie River case in the U.S. Supreme Court. He argued that Colorado settlers on the headwaters of the river could use the water *ad libitum* ignoring the older water rights farther downstream in Wyoming, because of Colorado's state sovereignty. When he found that the decision was going against Colorado he obtained a rehearing and argued the fair-shares or equitable division theory but still he lost. The Court wisely held that when both litigant states recognized right of prior appropriation that doctrine should prevail regardless of state boundary lines.

Mr. Carpenter then turned his attention to the Colorado River and to avoid the Supreme Court he adopted the plan of interstate compacts. He organized the four upper basin states into a working unit, although they needed protection from California no more than did Arizona.

The threat, more or less implicit, was no Boulder project could pass the U.S. Senate until a compact on Carpenter's terms was signed and sealed. The final meeting of the Compact Commission was held at Santa Fe, New Mexico, in November, 1922. California's compact commissioner was mum (as ordered). California's aim was to hasten the compact so that the Boulder project could be gotten under way. Unfavorable features might be corrected later.

But Arizona's commissioner, W. S. Norviel, fought the pack single-handed for 14 days. He had promised the home folks to keep the Gila River from being entangled in interstate and International water right problems. And well he might!

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Under direction of Arthur P. Davis, a special comprehensive compilation of data relative to water resources and water use was prepared in 1922 for special use of the Compact commission. It covered all projects from the smallest to the largest, from the headwaters of the tributaries of the upper basin states to the great areas in the Imperial Valley and south of the International border. But no data on the Gila was given. Underneath one of the tabulations, in 6-point type, was this footnote: "The Gila has been given no consideration because it does not affect the general problem." But Carpenter's "pound of flesh" was inclusion of the Gila River.*

Mr. Norviel returned to Phoenix a physical wreck, nervous, dyspeptic. He told me that for 14 days, and long evening sessions, all eyes were focused on him. Finally, he was tricked by a proposal to write into the compact a new section granting an extra million acre-feet of water to compensate for the million acre-feet annually which was considered to be the average flow of the Gila at its mouth under virgin conditions. It was found later that the new clause (Section 3b) as written into the draft of the compact which the commissioners signed does not mention the Gila River but merely raises the allocation of water to the lower basin from 7,500,000 to 8,500,000 acre-feet, but the "lower basin" therefore does include the Gila and its tributaries.

The compact therefore allocates 7,500,000 acre-feet to the upper basin which has legitimate need for not to exceed 4,500,000 acre feet,† and 8,500,000 acre-feet to the lower basin including the Gila which has need of 11,000,000 acre-feet. Vast areas in the lower basin are thus consigned to the desert forever.

People of Utah have many friendly and family ties with Arizonans. Realizing the injustice to Arizona done by the compact, the Utah legislature un-ratified the compact. The next legislature, however, yielded to the pleas of the upper basin states and of California and re-ratified the compact, which became effective without approval by Arizona.

When a bone is thrown to two hounds a lively fight ensues. Likewise the insufficient allotment of water to the lower basin states set up a bitter rivalry which has continued to the present day. The Arizona legislature in 1925 established a commission to deal with a counterpart California commission in an effort to divide the water. But neither side would yield its aspirations to secure the necessary quantity of water for its needs.

I recall one commissioner saying to me, "We can hold a gun at California's head. They want power so much they will give us the water." He was wrong. California had plans and wealth. The All-American Canal provided for increase in irrigable acreage. As soon as Boulder Dam was completed, the Colorado River Aqueduct was built conveying water to all other parts of southern California.

On the east, or Arizona side of the river, the Yuma-Gila project was authorized in the 30's but a mistake was made in building the Yuma Mesa unit first. The Wellton-Mohawk unit was not put in operation until 1954.

With changes in political administration there were new Colorado River commissions (and finally since 1947 an Interstate Stream Commission.)

Efforts to bring Arizona's case before the United States Supreme Court have been made several times and once Arizona almost got its foot in the door, at least an important decision was rendered on a motion to file a suit. (Suit was finally initiated in 1952 and hearings before a master appointed by the Court are being held in 1956.)

In 1930, when Arizona attorneys were attempting to file a suit against Cali-

*At no other time and at no other place did an upstream state or country dictate to a down river state or country regarding the use of the water or limit the use of the water except for the quantity of water to which the upstream state had clear title and could use on its own lands. And later when the Boulder Canyon Act was enacted, the Carpenter forces insisted on a provision in the act requiring a fund of \$400,000 annually out of the profits in the Boulder power to the upper basin for investigations of the irrigation and power projects in the upper basinstates. This was Simon-pure blackmail. Imagine Montana and Idaho dictating to Washington and Oregon regarding Grand Coulee reservoir, or Colorado telling New Mexico how to operate the Elephant Butte dam and reservoir. Never before and never again will an upstream state dictate to downstream states as in the Colorado River compact.

†True to its instincts, Colorado in the division of the 7,500,000 acre-feet allocated to the upper basin states, took a little more than 50 per cent of the total unto itself although the meager irrigable acreage in western Colorado does not justify such division.

The upper basin's development program for the next 25 years includes reservoir and irrigation projects which together will increase the total depletion of river discharge from the present two million acre-feet per year to 3,600,000 acre-feet.

ifornia and were in Washington, I was making a trip to New England. At Harrisburg I swung south to Washington and found the Arizona attorneys in the Willard Hotel. News reports said Arizona would base its contentions on unnavigability of the Colorado River. In studies in connection with writing an Arizona water code I had observed that the U.S. Supreme Court never lost a chance to declare a stream navigable, even a small stream tumbling over rocks unfit even for a rowboat. I urged the attorneys to drop that issue. "If California says the Colorado is navigable (or unnavigable) you say okeh, so be it, what we are seeking is rights to enough water to meet our needs." The Court, in its decision declared the river navigable and Arizona's case collapsed.

The story as told to this point is a cursory history of Colorado River affairs to 1944. Much data available elsewhere has been omitted, and some items relatively unimportant have been included because they are not available otherwise.

The Realignment of 1944

Early in January, on a Saturday, there appeared at the State House in Phoenix three "wise men" from Denver and Salt Lake City. They sought to see the governor. He refused to see them, he was hostile to the upper basin as well as toward California, and besides he had to work on his message to the legislature. Intermediaries implored and he agreed to give the emissaries ten minutes. They stayed all afternoon and much of Sunday—and the governor was a changed man.

The governor, in a message to the legislature, presented an entirely new program, which included the (belated) ratification of the Colorado River compact and support of the Mexican water treaty. In return, the Secretary of the Interior, Mr. Ickes, for the Bureau of Reclamation, gave Arizona a contract, agreeing to deliver Lake Mead water to Arizona projects in the amount which Arizona claimed as her rightful share. The contract was heralded as a great victory; legislators with a flair for oratory and editors painted glowing pictures of the Arizona deserts blossoming as the rose, for this state the millenium had arrived.

By midsummer there were rumors that the contract was a "phoney" and finally when it became possible to secure and read the contract it was found that the Bureau would deliver the water only if there was water in Lake Mead to which Arizona could prove clear title. Since the claims of Arizona and California were at odds, a settlement by negotiation or in the U.S. Supreme Court was necessitated. Meanwhile, the Mexican water treaty, signed February 3, 1944, was pending and would come before the U.S. Senate for ratification the following winter.

An attorney, Mr. Charles A. Carson, Arizona's consultant and spokesman, presented a report to the state administration, dated September 7, 1944. Press reports described it as revealing a vast water supply in the Colorado River available to Arizona. My studies of the hydrology of the river indicated a very tight supply, so I obtained a copy of the Carson report. The report's erroneous features were apparent at once. Recalling the ineffectiveness of some of my past efforts, I determined to write a series of letters, each letter to discuss a single separate falsity in the report. The correspondence is presented herewith in full, and on each letter is a list of those public officials to whom carbon copies of the letters were sent.

Correspondence With The State Land Commissioner Relating to The Carson Report

October 19, 1944

The State Land Commissioner
State House
Phoenix, Arizona
My dear Sir:

I have seen a reference in the press of your request to the Bureau of Reclamation for 5,200,000 acre-feet of water from the Colorado River. I wish to ask if that

figure is inclusive or exclusive of what we get from the Gila, Salt, and Williams rivers.

The news story refers to an analysis of water available for use in this state compiled by C. A. Carson. May I have a copy of that? If you do not have an extra copy, I suggest you loan me a copy and I will return it to you.

Very truly yours,

G. E. P. Smith

Professor of Agricultural Engineering

cm

October 23, 1944

Mr. G. E. P. Smith
Professor of Agricultural Engineering
University of Arizona
Tucson, Arizona
Dear Mr. Smith:

Answering yours of October 19th, I wish to advise that the figure of 5,200,000 acre-feet of water from the Colorado River does not include the Gila or any of its tributaries, but the Williams River may be included therein since it is not a tributary to the Gila. The waters of the Gila were all appropriated and put to beneficial use before the Santa Fe Compact was started and has never been figured in the scope thereof.

I am pleased to hand you, herewith, the desired analysis of our water situation by Mr. C. A. Carson. It is very comprehensive and we are making our fight for water on the basis thereof.

If at any time we can be of service to you, please call on us.

Sincerely yours,

O. C. Williams

State Land Commissioner

OCW:RB

Enc.

October 27, 1944

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona
Dear Mr. Williams:

I am in receipt of your letter of October 23 and the enclosure, which is a report signed by Mr. Charles A. Carson giving hydrologic data and estimates as to the quantities of water which Arizona may expect to obtain under three primary assumptions. I have read Mr. Carson's report to you with great interest, and I thank you for sending it to me.

I would like to discuss a feature of the report with you, and after you have read this letter, it may be that you will desire to refer it to Mr. Don Scott or Mr. Gail Baker for their comments. I refer to the figure which is used at the beginning of the computation—that is, the virgin flow at Lee's Ferry. The figure used is 16,400,000 acre-feet per year.

I think I know about how that figure was obtained. I have myself been accumulating the hydrologic data relating to the Colorado River for many, many years. My compilation of data shows that the reconstructed flow at Lee's Ferry for a 49-year period, 1895 to 1943, inclusive, is 15,900,000 acre-feet per year. However, if we divide the compilation so that the first part includes the year 1923, we have for the 29-year period, 1895 to 1923 inclusive, an average flow of 16,900,000 acre-feet per year. Then for the remaining 20 years, 1924 to 1943 inclusive, the average flow is 14,500,000 acre-feet per year.

My contention is that the number with which your computation should start is 14,500,000 acre-feet per year, which is the average for the last 20 years.

In support of that contention, I offer the following reasons:

(1) The river flow—that is, the discharge of the river—was not really measured at or near Lee's Ferry until June, 1921. The records of flow from 1895 up to that time were estimated by various comparisons to a certain extent, but mostly by guesswork, from measurements that had been taken at Yuma and some few stations on tributaries, and from rainfall data, which as you know is extremely variable from place to place, so that a few stations do not truly represent the whole area.

(2) The station at Yuma where measurements began in 1902 was below the mouth of the Gila, and since the output of the Gila was not being measured separately, it added an uncertain factor which could not be eliminated when trying to utilize the Yuma records to build up a hypothetical record at Lee's Ferry.

(3) The station at Yuma did not have good "control", that is, the bottom was subject to tremendous scouring. I have heard that for every foot of rise in the

water level, the scouring was around three feet. However, this would vary a great deal with the character of the water—whether clear or silty.

(4) Stream gauging equipment 40 years ago was very crude as compared to the equipment used today. I think it was in the early 20's when great advances were made in the design and construction of the equipment.

(5) If the first portion of the compilation were acceptable and we should accept the average of 16,900,000 acre-feet for the first 29 years, even then it should be discarded because we do have absolute faith in the total of 14,500,000 for the last 20 years, and no irrigation project should be built anywhere at any time for an acreage with greater water demand than can be satisfied except for short periods of time, as for instance, one or possibly two years. If the acreage of a project is based on an unwarrantably high estimate of water, it means long periods of time when effort will be made to spread inadequate water supply over too great an acreage, with the result that none of the crops will be profitable. Thereupon, the payment of construction costs, the payment of taxes, and other fixed charges become suspended, and people become discouraged and begin to move away. And this would happen probably before the new lands contemplated were fully settled.

It gives me no pleasure to submit this criticism of Mr. Carson's report. I only wish the situation were different. However, I dislike very much to see you and your associates blinded to the true conditions which are bound to limit our use of Colorado River water.

Very truly yours,

G. E. P. Smith

Professor of Agricultural Engineering

GEPS:aka

Note: The original letter contained an error. It was discovered after the letter was in the mail, and was corrected in another letter the following day. The following is a revision of the first letter into which the second letter has been incorporated.

Revision of Letter of 10/27

October 27, 1944

Mr. O. C. Williams
State Land Commissioner
State House
Phoenix, Arizona
Dear Mr. Williams:

I am in receipt of your letter of October 23 and the enclosure, which is a report signed by Mr. Charles A. Carson giving hydrologic data and estimates as to the quantities of water which Arizona may expect to obtain under three primary assumptions. I have read Mr. Carson's report to you with great interest, and I thank you for sending it to me.

I would like to discuss a feature of the report with you, and after you have read this letter, it may be that you will desire to refer it to Mr. Don Scott or Mr. Gail Baker for their comments. I refer to the figure which is used at the beginning of the computation—that is, the virgin flow at Lee's Ferry. The figure used is 16,400,000 acre-feet per year.

I think I know about how that figure was obtained. I have myself been accumulating the hydrologic data relating to the Colorado River for many, many years. My compilation of data shows that the reconstructed flow at Lee's Ferry for a 49-year period, 1895 to 1943, inclusive, is 15,900,000 acre-feet per year. However, if we divide the compilation so that the first part includes the year 1923, we have for the 29-year period, 1895 to 1923 inclusive, an average flow of 16,900,000 acre-feet per year. Then for the remaining 20 years, 1924 to 1943 inclusive, the average flow is 14,500,000 acre-feet per year.

My contention is that the number with which your computation should start is 14,500,000 acre-feet per year, which is the average for the last 20 years.

In support of that contention, I offer the following reasons:

(1) The river flow—that is, the discharge of the river—was not really measured at or near Lee's Ferry until June 13, 1921. The records of flow from 1895 up to that time were estimated by comparisons, assumptions, and "good judgment" from measurements elsewhere. The flow record was needed by the Colorado River Commission; otherwise Mr. La Rue would not have attempted to synthesize a record for Lee's Ferry. For his purpose he had available a record at Yuma below the mouth of the Gila which had been maintained since 1902, and he had various records on the main branches and smaller tributaries upstream in Utah and Colorado. He chose to base his synthetic record on the upstream records, which were for varying lengths of time, some being quite short. Similarity of watersheds and comparison of areas helped to fill the gaps.

(2) Gains or losses along the river courses were assumed, but, of course, considerable error could be introduced.

(3) Gaging stations in the early days of stream gaging often had poor "control," that is, the bottom was subject to much scouring and shifting, and often after a few years, the station was moved to another location up or downstream. Comparatively few, too few, gagings were made in a year or during a flood. It was not considered that accuracy greater than 10 or 15 percent was obtained. (I know, for I was on the U.S. Reclamation Service payroll for several years and established a station on the Santa Cruz and kept the records for the Service.)

(4) Stream gaging equipment and technique were comparatively crude 40 years ago when compared to the equipment, technique, and care used today. I think it was in the 20's especially when great advances were made in the art of stream gaging.

(5) Even if the synthetic portion of the record, 1895 to 1922, were considered quite accurate, even then it should be discarded. We do have absolute faith in the latter portion of the record which is based on actual measurements at Lee's Ferry. Utilization of water is not designed on the flow during periods (decades) of maximum flow which may not be repeated for a century. Water can be held in storage five years, but not 25 years, without almost complete loss by evaporation and too high cost. No irrigation project should be built for an acreage the water demand for which cannot be satisfied except for short periods of time, say one or two years. If the acreage of a project is based on an estimate of water supply unwarrantably high, it means long periods of time when effort will be made to spread the inadequate supply over too great an acreage, with the result that none of the crops will be profitable. Thereupon, payment of construction costs, taxes, and other fixed charges become suspended and people become discouraged and start to move away.

Mr. La Rue's synthetic tabulation was acceptable as such and served a purpose as an approximate record of flow, but now after we have obtained 23 years' excellent records, we do not need to depend any longer on his records. There may have been more rainfall and runoff, but it is probable that he overshot the mark—that is, his figures are too high.

It gives me no pleasure to submit this criticism of Mr. Carson's report. I only wish the situation were different. However, I dislike very much to see you and your associates blinded to the true conditions which are bound to limit our use of Colorado River water.

Very truly yours,

G. E. P. Smith

Professor of Agricultural Engineering

GEPS:CM

Water Supply Paper 680* contains a tabulation of rainfall from 1881 to 1934, inclusive. The records for Utah, Colorado, and Wyoming show about 3.5 percent above average for 1895-1921 and almost exactly average for 1922-1934. The average for 1881-1894 was 92 percent, suggesting runoff even less than during 1922-1934.

October 28, 1944

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona
Dear Mr. Williams:

I want to make a correction to my letter addressed to you yesterday.

Relying upon my memory, I recall that Mr. LaRue, when he started to concoct a synthetic stream flow tabulation for the period 1895 to 1922, had available to him the long-time record of stream flow at Yuma, dating from 1902, and also some miscellaneous shorter-time records at various points up stream from Lee's Ferry. Because of the very large but uncertain losses of water between the Canyon region and Yuma, Mr. LaRue did not have much confidence that he could make use of the Yuma record, and so he chose to use the scattering short-term records at up-stream stations as material from which he could synthesize a 29-year record at Lee's Ferry, beginning with the year 1895.

I had forgotten these details. After mailing your letter, I got to browsing in LaRue's publications, and I quickly recalled the fact that he chose to use the up-stream records rather than the Yuma records.

Therefore, the points numbered 2 and 3 in yesterday's letter should be rewritten to cover the fact that the up-stream records were entirely inadequate to use for a trustworthy record at Lees Ferry. Of course, Mr. LaRue was in a tight

*Drouths of 1930-1934 by John C. Hoyt

spot, because at the time of writing his second publication he had only two years of good records. However, it was very essential to have something to offer. His synthetic tabulation was acceptable as such, but now after we have obtained 23 years of excellent records, we do not need to depend any longer upon his records. I think the comparison shows that for one reason or another, he overshot the mark. That is, he arrived at an average annual stream flow larger than it should have been.

Yours very truly,

G. E. P. Smith

Professor of Agricultural Engineering

GEPS:CM

cc: H. H. d'Autremont. P. S. Debler and Tipton, both good hydrologists, have made synthetic records of flow year by year at Lees Ferry. Their annual flow figures differ from each other and from LaRue's by considerable percentages.

December 2, 1944

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona

Dear Mr. Williams:

On October 27 and 28 I wrote you regarding the report of Mr. C. A. Carson relative to the probable quantities of water from the Colorado River which will be available to Arizona in the future. I have not received any reply from you as yet.

Probably you are conferring as to the issue raised in my letter with Mr. Carson and your other advisors and possibly you have taken the matter up with the U.S. Bureau of Reclamation.

While waiting for your reply and advice regarding the issue presented in my former letters, I have been thinking a good deal about another important feature of the Carson report, and frankly I feel much apprehension regarding it, inasmuch as it also, like the issue discussed in my previous letters, affects vitally our prospects for obtaining water from the Colorado River. I shall now present this second issue in some detail for consideration by yourself and your advisors, and I should be very much pleased to know what your reaction may be. Quoting from the Carson report:

"Likewise, it is necessary to assume some quantity of water of the Colorado River as that to be ultimately consumed in the Upper Basin States of Wyoming, Colorado, Utah, and New Mexico. Under the Compact they together have the right to use 7,500,000 acre-feet annually. Some engineers estimate they will use that full quantity; some estimate their ultimate annual use will not exceed 6 million acre-feet; other engineers estimate their ultimate use will not exceed 5 million acre-feet annually.

"Accordingly, this estimate is calculated to show quantities available for diversion in Arizona in three alternatives, based upon the above estimates of use in the Upper Basin.

"My own estimate is that the uses in the Upper Basin will not diminish the flow of the Colorado River at Lee's Ferry more than 5 million acre-feet annually.

"I think these estimates will not be exceeded because of the physical and economical conditions, although of course the Upper Basin has the legal right, which no one should attempt to dispute or obstruct, to consumptively use 7,500,000 acre-feet annually. . . .

Suggestions

"It appears to me now that the Upper Basin will not for at least fifty years reach a total consumptive use of 5 million acre-feet per year. I do not think they will ever exceed that, but certainly it appears now that they will not for 100 years reach a total consumptive use of 6 million acre-feet.

"I would suggest, therefore, that projects be planned and set up for utilization of main stream water upon the basis of four priorities, clearly understood and agreed by the users of the water. The first priority based on column 1 would be for 3,550,000 acre-feet per year; the second priority based on column 2 would be for the next 950,000 acre-feet per year; and the third priority based on column 3 would be for the next 700,000 acre-feet per year, and the fourth priority would be for any additional water available.

"As to priority numbered 2, it is firm for all time in so far as I can see now, but it should be clearly explained to the users of the water, and it might be well for them to consider whether or not provisions should be made for eventual withdrawal from cultivation of lands utilizing water of this priority after 100 years, if necessitated by water shortage, and to provide means of accumulating a fund to compensate the then owners of land in the event of their withdrawal at that time.

"As to proposed priority numbered 3, it runs a greater risk than priority 2, and

it seems to me should contemplate a possible water shortage at the end of fifty years."

(Signed: C. K. Carson)

I wish to discuss the items of additional water shown in the second and third alternative computations and based on the assumptions that the Upper Basin will use less water than the 7,500,000 acre-feet allocated to that basin. Is this an example of wishful thinking?

In my long experience I have never known of a case in which a project has been predicated on the use of water which legally belongs to other lands. The nearest approach to it was a custom in Casa Grande Valley before the construction of Coolidge Dam. On rare occasions a flood would run in the Gila River for a few days, and the Zanjero would divert a canal full the better to scour the canal, much more water than the limited number of farmers under the canal could use. A few other farmers without water rights would take and use some of the water with no assurance that the next flood would be big enough to allow them any water. I used to hear project farmers refer to this practice, and they spoke derisively of the out-of-project farmers having "slop-water rights." Such rights were considered valueless, as indeed they were.

In 1910 I studied the highly-developed irrigation practices and irrigation institutions in Italy, and in 1927 I visited Spain to study the irrigation systems and practices, for which credit is given chiefly to the Moors. And I have read much about irrigation in Egypt and other countries. Never once have I learned about a project being developed on the basis of using water to which other lands or other people held title.

I cannot believe that the Upper Basin will ever approve of our use, even though temporarily, of their allocated waters, of which they have repeatedly shown the utmost jealousy and tenacity. They would be justified in assuming that after use was established in the Lower Basin and was continued through several or many generations, it would be impossible to recover those waters, and most certainly the waters would not be surrendered without a struggle.

The necessity for obtaining the approval of the Upper Basin states for such "temporary" use is realized when we recall that the western states must present a united, vigorous, determined front in order to obtain appropriations for western irrigation. This has been proved many times in the past. Efforts of Arizona alone, unsupported by the Upper Basin states, and especially the state of Colorado, the bellweather of that group, would be unavailing.

It is my understanding that Arizona has no commitments of support by those states, that is, support for projects to use temporarily a portion of the water supply allocated to the Upper Basin. (If I am wrong about this, I hope you will inform me.) Unilateral contracts and planning are not effective and might cause this state to "miss the boat" completely at the time when appropriations are being determined. I think such commitments should be sought at once, unequivocal commitments by responsible agencies. I think such commitments should be obtained before Arizona gives its approval to the pending treaty with Mexico. (I have believed that it is Arizona—not California—that will be injured by increasing the treaty rights of Mexico. California has clinched its rights to water by means of contracts, concerning which there is no controversy. Arizona is in the position of "remainder-man" and our contract for water is so debatable that the Bureau of Reclamation proposes that it be submitted to the U.S. Supreme Court for interpretations.)

Arizona cannot anticipate much, if any, help from the Bureau of Reclamation. Spokesmen of the Bureau have indicated that the Bureau will be neutral.

I cannot believe that Congress will ever vote funds for construction in Arizona to utilize water allocated to the Upper Basin, especially when it is admitted that the use may be temporary. If the consent of the Upper Basin states, expressed by legislative action, were obtained, and if the projects were of low cost, Congress might conceivably do so. But admittedly the Central Arizona project is excessively expensive, whether on a acreage basis or on any other basis, more expensive than any projects that have come to my attention except perhaps very small projects in proven citrus districts, and beyond the capacity of the new lands to repay.

Land reclamation, or subjugation, as the Indian Service officials phrase it, is costly. To the cost of land preparation must be added that of homes, highways, schools, churches, and the villages that spring up at crossroads. It would be extremely difficult to convince the settler that a great irrigation project when constructed is not a permanent going concern, and that it is subject to gradual abandonment beginning in fifty years.

The conception of temporary use of the waters belonging to the Upper Basin, to me, seems chimerical. I think that consideration of the second and third alternatives in the Carson report should be shelved.

Yours very truly,
G. E. P. Smith
Irrigation Engineer

GEPS:aka

cc: H. H. d'Autremont, Hayden, Grieg Scott, Frauenfelder and Alf. Atkinson.

December 8, 1944

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona
Dear Mr. Williams:

In further reference to the report of Mr. C. A. Carson on the quantity of water from the main stream of the Colorado River available for diversion and use in Arizona under ultimate conditions under the terms of the Arizona Contract and various enacted laws, I desire to raise a third issue. It concerns the so-called return waters, the waters which sink into the beds of canals and which percolate below the reach of roots in irrigated fields. I shall state my views and try to fortify them with argument. I hope that you and your advisors will reply in kind.

In the report, Mr. Carson assumes that one-fourth of the total water diverted for use on Arizona lands will return to the stream system and be available at the international boundary for diversion to lands in Mexico.

I concede that this expectancy of return flow is true for water used along the Colorado River in projects such as the Parker Project and also for water used on the Gila Project. It would not be true for the waters diverted to the Central Arizona Project—to be used in the Salt River Valley, Paradise Valley, the Queen Creek District, and the San Carlos District—for which the tabulation shows 2,050,000, 3,000,000, and 3,700,000 acre-feet respectively under the three alternatives. Very little, if any, of those waters would ever "return" so as to be available below Yuma. Each irrigation project recovers a good deal of its return waters by pumping; indeed, the continuing groundwater supply in each project is dependent on the downward percolation from canals and fields. Such parts of the return waters as are not recovered within the projects where applied are utilized by smaller projects and individuals on lower lands adjoining or down the valley.

The records of flow and data on use of water in the Salt River Valley show that of the water applied in irrigation, only 4 or 5 percent reaches Gillespie Dam, and practically all of that is diverted into the Gillespie and Enterprise canals. Practically none of it reaches Yuma. There is a long stretch of valley between Gillespie Dam and Roll in which the stream flow is absorbed into the river bed, and it will be impossible to keep land owners from recovering such waters by pumping.

The situation on the San Carlos project is similar. The return water from that project is recovered by pumping, though possibly a very little of it is picked up at times by the Buckeye Canal.

In the Carson report, therefore, the item "Return flow from Arizona-gross, estimated at 1.1/4.5, should be 375,000 acre-feet, which is 525,000 acre-feet less than shown in the first alternative computation.

If my contention is correct, then the effect of the reduction, together with changes in the estimates suggested in my previous letters, is to eliminate all possibility of a Central Arizona Project. The outlook seems very discouraging. My objective in bringing the matters to your attention is to present facts and to prevent the introduction of fanciful assumptions into the computation.

Yours very truly,
G. E. P. Smith
Irrigation Engineer

GEPS:CM

December 14, 1944

Prof. G. E. P. Smith
University of Arizona
Tucson, Arizona
Dear Professor Smith:

I understand that you acquired answers to your October 27th letter in your talk with Mr. Gail Baker, when you were in Phoenix two or three weeks ago; therefore I delayed answering.

As you suggested I am referring the issues raised in your three letters to the U.S. Bureau of Reclamation.

For the past six months the Bureau of Reclamation has been preparing a "Comprehensive Report on the Control, Improvement and Utilization of the Water Resources of the Colorado River Basin." This report should be completed near the first of March, 1945. All the issues raised by you and many others should be handled quite completely in the Bureau's report. One of our important jobs is to pass on to

the Bureau for their consideration and study all points raised by interested Arizona engineers.

When the Bureau's report is completed I will see that a copy is made available to you.

Yours truly,
O. C. Williams
State Land Commissioner

January 17, 1945

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona
Dear Mr. Williams:

Have you received a reply from the U.S. Bureau of Reclamation with regard to the three issues which I raised in letters to you some weeks ago? If you have, I should be glad to know what attitude they take, especially regarding the new basis of estimating the average annual discharge of the Colorado River.

Yours very truly,
G. E. P. Smith
Irrigation Engineer

GEPS:CM

January 20, 1945

Mr. G. E. P. Smith
Irrigation Engineer
University of Arizona
Tucson, Arizona
Dear Mr. Smith:

In answer to your letter of January 17 regarding questions raised in your previous letters, please be advised that I have been informed that it will be sometime in March before this Bureau report is completed.

Very truly yours,
O. C. Williams
State Land Commissioner

bg

March 24, 1945

Mr. O. C. Williams
State Land Commissioner
Phoenix, Arizona
Dear Mr. Williams:

I feel that I should keep you fairly well informed as to my attitude toward the Mexican treaty and my rather vigorous efforts to convince our two senators in Washington that Arizona should oppose the ratification of the treaty.

I enclose herewith a letter dated March 5 to the Regional Director of the U.S. Bureau of Reclamation. It shows that I have accused the proponents of misrepresentation. In the first place, they have claimed the present use in Mexico is 1,800,000 acre-feet, and the actual use is nearer to 1,000,000 acre-feet. In the second place, they have claimed that most of the water at the boundary will be returned water, and that is so ridiculous it is silly.

I should have sent you copies of some other letters, but I know that Mr. Carson, who is in consultation with Senators Hayden and MacFarland, has been keeping you informed regarding my activities. Mr. Carson no doubt has read my letters to these senators.

Yours very truly,
G. E. P. Smith

GEPS:CM
Enc.

March 26, 1945

Mr. G. E. P. Smith
Prof. of Agricultural Engineering
University of Arizona
Agricultural Experiment Station
Tucson, Arizona
Dear Mr. Smith:

I appreciate your letter and the information contained in a copy of your letter to Mr. Moritz. It is well that we obtain the facts and pattern our program accordingly.

I will appreciate your keeping me advised from time to time on any information you might have, and also on your thoughts regarding our future development through the Colorado River.

Sincerely yours,
O. C. Williams
State Land Commissioner

OCW:rb

Correspondence with Senator Carl Hayden Relating to the Carson Report and the Mexican Water Treaty

December 20, 1944

Honorable Carl Hayden
U. S. Senator
Washington, D. C.
Dear Senator Hayden:

This letter deals with a matter of profound significance to one of the Colorado basin states. That state is our State of Arizona. It does not have serious implications regarding the welfare of the other six states. I am writing you because now, as on various previous occasions, I feel that because of your position, you should be accurately informed.

At the request of Mr. O. C. Williams, State Land Commissioner, Mr. C. A. Carson with the aid of other Phoenix men prepared a report on the water supply of the Colorado River which will be available to Arizona. You probably received a copy of that report. The report was made necessary by the statements of Bureau of Reclamation officials that a decision of the U.S. Supreme Court regarding interpretations of the Colorado River Compact and the Boulder Canyon Act will be required before the water supply available for delivery to Arizona under the terms of the Arizona Contract can be known.

I have written Mr. Williams three letters, in which I have raised three separate issues regarding the data and the conclusions in the Carson report. Mr. Williams informs me that, acting on my suggestion, he has forwarded copies of my letters to the Bureau of Reclamation.

I enclose herewith copies of my letters to Mr. Williams.

With regard to the first issue, no hydrologist will maintain that synthetic records of river discharge at a river station based on measurements at distant stations can have the accuracy inherent in a record of flow based on measurements at the station itself. In 1922 there was no record at Lee's Ferry and Mr. LaRue did the best he could to estimate a record based on various and sundry measurements farther upstream. Of course, those estimated figures were approximate. They could be used until a good record became available. As long as ten years ago I suspected that those LaRue estimates probably erred on the high side and I foresaw that we should have to lower our estimates of the Colorado River water resources.

Now we have 23 years' measurements at Lee's Ferry. This good, long, continuous record includes the period 1921-1930 with a high average, 1931-1937 with low average, and 1938-1944 with a medium average. That provides an overall average for the years 1921-1944 which is reliable and which should be used to the exclusion of the early synthetic records.

Now please do not stigmatize me as a calamity howler. I have given very little publicity to this matter, but have circulated it only to officials who should have the truth. This is not propaganda; we are dealing with facts. It should not be right to leave our State officials with their heads in the clouds.

We should not think that the other basin states can be deceived or misled. I have examined the tabulations made by their hydrologists and I note that their records are dissected in such a way as to show clearly the deficiencies in flow. It is advantageous to the Upper Basin at the present time to continue to include the synthetic records.

You can use your own judgment as to showing this letter to Senator McFarland. I have not had any correspondence with him regarding Colorado River problems, but have kept in close touch with you ever since the winter of 1922-23 when I was in Washington and talked with you a couple of times. At that time I conferred, after the text of the compact became available, with the director and the counsel of the Reclamation Service, the secretary of the Power Commission, and officials of the Water Resources Branch.

The conclusions which I reach are that there is no Central Arizona Project, because there is no water for it; surveys for that project are a waste of public money; and the fact that Arizona cannot get much water out of the Colorado River has a direct bearing on the pending Mexican treaty. You recall that last spring I wrote you that it is Arizona, not California that should object to the treaty.

Very truly yours,
G. E. P. Smith
Irrigation Engineer

GEPS:MB

December 29, 1944

Professor G. E. P. Smith
College of Agriculture
University of Arizona
Tucson, Arizona
My Dear Professor Smith:

I thank you for your letter of December 20th and have carefully read the enclosures. As you have always done, you have performed your duty by stating the facts as you see them so that those charged with responsibility will not be denied an opportunity to evaluate them properly. I am glad that Mr. Williams forwarded copies of your letters to him to the Bureau of Reclamation because Congress will be largely guided by the ultimate findings of that Service.

I have been insisting for years that the only way to find out what it is feasible and practical to do with respect to the various suggestions that have been made respecting the use of the Colorado River water for the irrigation of Arizona lands was for the Federal and State Governments to unite in making a thorough investigation by competent engineers. About eight years ago, shortly after his election, Governor Stanford came to Washington with Fred Colter and I took them to see John H. Page, then the Director of the Reclamation Service, who agreed to join with the State of Arizona in such an investigation, but nothing came of it. The appropriation of \$200,000 by the last Legislature for cooperative surveys is a long delayed step in the right direction.

The general rule is that it takes as long to prepare for a bid engineering undertaking as it does to do the job itself. There will be no new major reclamation projects adopted for construction until after the defeat of Japan and from the way both they and the Germans are fighting there should be time for the Reclamation Service to arrive at a sound conclusion as to what should be done about the Colorado River problem in Arizona. I shall continue to insist that the engineering studies which are now going on be pursued with all possible diligence.

When the hearings before the Senate Committee on Foreign Relations take place, I shall be in attendance so as to inform myself thoroughly on the controversial issues. I am not a Member of that Committee, but will have the privilege of questioning the witnesses which I have found to be the best way to get at the facts.

With best regards, I am,

Yours very sincerely,
Carl Hayden

January 5, 1945

Honorable Carl Hayden
United States Senator
Washington, D. C.
Dear Senator Hayden:

Your recent letter relative to the available quantity of water out of the Colorado River for our State of Arizona and also relative to the proposed Mexican Treaty was duly received.

You state that the hearings on the Mexican Treaty will be held very soon and that you are planning to attend those hearings.

I would like to present a phase of the discussions which will probably be emphasized a good deal so that you may be well prepared for it in advance. It will be claimed or at least the proponents will try to leave the impression, that the Mexican lands are using, or have been using, 1,500,000 acre-feet of water per year. I have heard statements of that sort.

It is not true. I was told recently by a high Government official, who does not like to be quoted, that he was informed by the hydrologists and other officials at Calexico that the Mexican lands have never "used" over 750,000 acre-feet of water.

We have some records of flow that are pertinent, including the records of flow at Andrade where the Alamo Canal crosses the International Boundary Line. Of course, the flow was around 3,000,000 as long as that canal was supplying the Imperial Valley, but since February, 1942, the All American Canal has been in service. The flow crossing the International Boundary in the water year 1943 was 1,167,000 acre-feet, and in the water year 1944, it was 1,084,000 acre-feet. Not all of that, however, was diverted into the laterals flowing south from the Alamo Canal, and quite a bit of it was wasted back into the United States near Calexico. A separate tabulation shows the delivery to the Mexican laterals in 1943 to have been 978,000 acre-feet.

So we may say that the diversions to the Mexican lands the last two years have been around 1,000,000 acre-feet per year, and prior to those two years, the total was running about 900,000. However, that does not mean that all of that water was being beneficially used by any means. Great quantities of it probably ran into sloughs and was wasted at the lower ends of laterals. Also, since bountiful water supplies were available, no doubt the lands were irrigated wastefully and were given far

more water than was necessary, in many cases far more water than was really beneficial for the crops. As you know, beyond a certain point, any additional irrigation supplies may reduce the yields.

I am writing this so that you can fend against the arguments which may be presented claiming the use of 1,000,000 to 1,500,000 acre-feet per year.

Yours very truly,
G. E. P. Smith
Irrigation Engineer

GEPS:CM
cc: H. H. d'Autremont

January 16, 1945

Honorable Carl Hayden
Washington, D. C.
Dear Senator Hayden:

The Arizona Star reporter, Mrs. Cosulich, states that our legislators sat spell-bound while Mr. C. A. Carson discussed the Mexican water treaty. I cannot imagine what affirmative arguments were advanced, but the reporter does mention the statement that Mexico last year used 1,800,000 acre-feet of Colorado River water. I cannot imagine Mr. Carson's source of information, and I certainly challenge it. Possibly he included some water pumped from wells, but the total quantity pumped is insignificant compared with the amount he would have to add to the gravity supply in order to get the figure 1,800,000. As per my last letter, the figure should be less than 900,000—probably 750,000.

Furthermore, the pumped water should not be included anyway. It will continue and will be available in addition to the quantity stated in the treaty.

It seems to me that Mr. Carson's credibility should be questioned. Possibly he does not have a clear conception of hydrologic data. Either on the witness stand or in private you may be able to determine the basis of his assertions. As stated in my letter to you a month ago and in my letters to Mr. O. C. Williams, State Land Commissioner, I think that his report on water supply made to Mr. Williams is weird and untenable.

Would you have the kindness to send me a copy of the hearings on the treaty?

Yours very truly,
G. E. P. Smith
Irrigation Engineer

GEPS:CM
cc: Frauenfelder

P.S. It is unfortunate that such an erroneous statement should not be challenged before it gains wide publicity. The leading engineering periodical said, in effect, fine for Texas, but on the Colorado, Mexico wins.

January 31, 1945

Honorable Carl Hayden
United States Senator
Washington, D. C.
Dear Senator Hayden:

The newspaper reported that Mr. Carson told the Senate Committee the use of Colorado River water in Mexico is now 1,800,000 acre-feet, 300,000 more than is asked for in the treaty. That is a forceful argument, and very likely it would be convincing to many unprejudiced senators. But it is unqualified misrepresentation. As I have told you in previous letters, the quantity used for irrigation in Mexico is around 750,000, and I am convinced it is not over 800,000.

I requested that you ascertain from Mr. Carson the basis for his statement. He had made the same statement to our legislature. The Arizona Star, and probably other papers, repeated it, and thus the people of this state are grossly misinformed. If Arizona cannot obtain its objectives without falsifying recorded facts, the State does not deserve any water.

Perhaps you would like a birds-eye summary of the water supply and the way it will be divided according to present indications. I shall attach the summary to this letter. I allowed for California, not the 5,362,000 acre-feet covered by the contracts of 1931, but only her share of the compact 3a water plus one-half the compact surplus minus her contribution to make up the deficiency at the international boundary line. If any of my figures are challenged, please let me know, for I can defend them all.

Can any friend of Arizona detect from this study of the water supply and its distribution any advantage to this state to be derived from the "good-neighbor" policies toward Mexico and Texas? It is incomprehensible to me that Arizona should fight for the treaty.

The general averages afford no hope of future agricultural development in this

state. But if we study the decade 1931-1940, we find the situation immeasurably worse—drouth for California projects and a vacuum for Arizona.

Now for a warning. Some Smart Aleck will say, "Oh, we shall use some of California's water or some Upper Basin water." Possibly we might if we had hundreds of millions of dollars of our own for construction work. But, when we ask Congress, knowing the jealousy and the tenacity with which those states guard their apportionments and how easy it is to block appropriations, we have no more chance than the fabled snowball in hell.

Yesterday's paper reported the testimony re quantity of return flow at boundary. Again, the reasonable estimate had been doubled! For refutation, see my letter to O. C. Williams dated December 8, a copy of which you have.

Perhaps someone insists that the "estimates" of LaRue for 1897-1921 be kept in the record. Then I insist that consideration be given to the period preceding 1897 which, according to records, was a long period of deficient rainfall (92 percent) in Utah, Colorado, and Wyoming where the water comes from.

Yours very truly,
G. E. P. Smith

GEPS:CM

cc: Senator E. W. McFarland
Mr. H. H. d'Autremont
Mr. William Mathews
Senator Austin
A. Atkinson
Frauenfelder
C. A. Stauffer

February 6, 1945

Professor G. E. P. Smith
College of Agriculture
University of Arizona
Tucson, Arizona

My dear Professor Smith:

I have your letter of January 31 and am enclosing a copy of the statement which Mr. Carson submitted to the Senate Committee on Foreign Relations last week. The figure of 1,833,000 acre feet of Colorado River water used in Mexico last year is based upon a compilation made by L. M. Lawson, the United States Boundary Commissioner. One source is the record kept by the Imperial Irrigation District of water delivered into Mexican laterals from the Alamo Canal aggregating over 1,000,000 acre-feet each year during the past two years. A record is also kept of the drainage water from the Yuma Reclamation Project delivered into Sonora by gravity and pumping. There is also a considerable quantity of land in Lower California now irrigated by pumps. It is my understanding that Don Scott has checked the Boundary Commission figures relating to the present use of Colorado River water in Mexico and it might be well for you to go over them with him.

Whatever the correct number of acre feet may be, it is reasonable to assume that with modern engineering it is entirely possible that the annual use of water in Mexico can be increased to over 3,000,000 acre-feet during the next decade. More than twice that quantity of water is now going into Mexico each year in an equated flow from Boulder Dam where firm hydro-electric power must be produced every day in the year.

The testimony before the Senate Committee on Foreign Relations is that the only reason why the annual Mexican use of Colorado River water is not more than 1,800,000 acre-feet is lack of funds to build the necessary canals and level the land. Mexico's financial position is being greatly improved by sale of materials useful to the war effort and there is the other possibility that American private capital might readily be induced to underwrite further irrigation developments in Sonora and Lower California. The probability is that with ample water and in the absence of natural obstacles, development will proceed with greater speed in Mexico than in the United States.

I am satisfied that those who drafted the Colorado River Compact overestimated the total quantity of water that will be available for irrigation in the Colorado Basin, but am not prepared to say that the extremely low estimate which you have made is correct. I am also convinced that the estimates of return flow to Mexico are too high because I cannot see that any part of the water used to irrigate lands in central Arizona will ever get to the Colorado River.

The table attached to your letter shows no return flow at all which cannot be correct because drainage water from the Yuma Project is now being used in Sonora, the quantity of which will undoubtedly be increased when lands near Well-ton and on the Yuma Mesa are supplied with water from the Colorado River.

The question that I would like to have answered is: Unless Mexico agrees to

limit her use of water from the Colorado River, who can guarantee that a way will be found to use even the reduced quantity of water now estimated to be available from the Colorado River for the production of crops within the United States on projects which the United States Reclamation Service declares to be feasible?

With best regards, I am,

Yours very sincerely,
Carl Hayden

February 12, 1945

Honorable Carl Hayden
United States Senator
Washington, D. C.

Dear Senator Hayden:

Your letter of February 6 with a copy of Mr. Carson's testimony just received. This will be a **partial** reply. I am going to obtain some more basic information this week.

Regarding your statement that I did not allow anything for return flow, I did not need to do that. It is included in the item of 1,500,000. If I had allowed 300,000 acre-feet for return flow, then the item for Mexico would be 1,200,000, and the balance for Arizona would still be "only" 130,000.

I have direct information that the upper basin is vigorously hostile to the proposal that the lower basin make "temporary" use of water allotted to the upper basin.

It is wrong to include the quantity now pumped in Mexico in the total required as surface flow. I mentioned this in a previous letter.

Several witnesses (according to Arizona Star) testified that present use in Mexico is 1,800,000 acre-feet. Was any testimony introduced to the effect that that figure is too high?

I am not at all anti-Mexican; rather I am pro-Arizona. Is this State going to get any water over what is now actually in use? Bureau of Reclamation men are coming to think as I do.

Yours very truly,
G. E. P. Smith

GEPS:CM

February 17, 1945

Professor G. E. P. Smith
College of Agriculture
University of Arizona
Tucson, Arizona

My dear Professor Smith:

Your letter of February 12 is just at hand and I have also received the copy of your letter addressed to Mr. Moritz at Boulder City. Mr. Carson says that the American Section of the International Boundary Commission estimated that 191,700 acres were irrigated under the Alamo Canal in Lower California in 1943 for which 1,152,000 acre feet of water was diverted. Other lands irrigated that year in Mexico aggregated 101,400 acres for which 653,000 acre feet were diverted. This makes a total of 293,100 acres of land under irrigation in Sonora and Lower California that year and 1,805,000 acre-feet of Colorado River water, which, as I figure it, would be about 6 acre feet per acre at the points of diversion.

Mr. Carson also says that according to a compilation made by Mr. Don Scott for the Arizona Colorado River Commission, the total use of Colorado River water by Mexico in 1943 was 1,833,000 acre-feet. Mr. Scott based his estimate on figures obtained from reports of the U. S. Geological Survey, the Bureau of Reclamation, the Imperial Irrigation District and the American Section of the International Boundary Commission.

Because of other pressing duties, I have been unable to attend all of the hearings before the Committee on Foreign Relations which have been going on almost every day, morning and afternoon, since the 22d of January and it now looks as if another week or ten days may be consumed. Whenever this large amount of testimony is printed, I shall send you a copy. From some of the California testimony one can assume that they are making a record which may induce the Mexican Senate to reject the treaty because it requires that country to absorb too much salty, alkali water from the Colorado River.

With best regards, I am,

Yours very sincerely,
Carl Hayden

March 19, 1945

Honorable Carl Hayden
United States Senator
Washington, D. C.
Dear Senator Hayden:

I am trying to keep informed on the Mexican treaty debate, but do not get much help from the morning paper. It would help if I had the Congressional Record for a short time, beginning with March 15. Arizona seems to be the "forgotten-man" state in this controversy, though Arizona's interests which are in jeopardy are more vital than are California's. California may lose power and revenue, but Arizona will lose water which the State has hoped would reclaim a small part of the States' arable land. Arizona seems to have been outwitted pretty nearly to the vanishing point, and there will be loud lamentations when it becomes known to what low level our prospects have sunk.

In one of your letters you referred to Don Scott's compilation of use of water in Mexico. He merely accepted the Boundary Commission's estimates but did not add anything to their accuracy.

You mentioned also the bugaboo that Mexico will greatly increase its use of water in the coming years, even though that country has been put on notice that the United States will eventually need the water. The answer to that is: with the Parker and Bullshead re-regulating reservoirs we can hold water for a four-weeks' period in July or August and deliver at the boundary only the limited supply which we believe Mexico is entitled to have. That will put a stop on the continued colonization of the delta lands south of the border.

If the Bureau of Reclamation continues to include the synthetic "estimates" of stream flow from 1897 to 1921 in their planning, it means that reservoirs are built to store the great floods of 1907, 1909, 1917, and 1921 for use all through the 1930's and 1940's. Is it good business to build storage capacity which will be filled and emptied once in 25 years? Even if it were, the water would be lost by evaporation.

You may wonder why I did not oppose the contract-compact program consummated by our legislature a year ago. I think I should tell you. The newspaper stories gave us to understand that the contract was for 2,800,000 acre-feet firm water from Lake Mead. I considered that a fair arrangement. It was not until August (I have other work and responsibilities) that I learned that the contract is for Lake Mead water, if, as, when, and maybe. That of course necessitates that we study the whole water supply system to determine whether there is any water for Arizona after prior claims and contracts are satisfied. There is none.

My estimate of the total "return water" after the Yuma Mesa and Wellton-Roll projects are completed and in use is 270,000 acre-feet.

I sent you a copy of my letter to the Regional Director, U. S. Bureau of Reclamation, at Boulder City dated March 5.

Yours very truly,
G. E. P. Smith

GEPS:CM

cc: Hon. E. W. McFarland
Grieg Scott

P.S. It is Arizona's "last chance" water which Wyoming and Colorado are merrily giving away to Mexico. Their purpose is plain. If accomplished now, it will not cut into their 7,500,000 acre-feet. If the treaty is postponed until our Arizona projects are clinched, the burden would fall on the upper basin states.

April 25, 1945

Professor G. E. P. Smith
College of Agriculture
University of Arizona
Tucson, Arizona

My dear Professor Smith:

I should have made an earlier acknowledgment of the receipt of your several letters relative to the Mexican Water Treaty, but so much has been happening here that it became impossible to keep up with my correspondence.

I supported the Treaty because it limits the quantity of water which Mexico will have the right to use for irrigation from the Colorado River, and I am satisfied that the reservations adopted by the Senate adequately protect the interests of the United States.

With every good wish, I am,

Yours very sincerely,
Carl Hayden

Correspondence with Section Director, Bureau of Reclamation, Relating to the Carson Report and the Mexican Water Treaty

February 9, 1945

Mr. A. E. Moritz, Regional Director
U. S. Bureau of Reclamation
Boulder City, Nevada
Dear Mr. Moritz:

The Bureau of Reclamation has given currency to some **terribly** important and **terribly** untrue misinformation. I believe it has been done unwittingly, but nonetheless, the effects are bound to be far-reaching; the United States Senate is likely to take unwise action, and injustice to certain areas of the United States and to the United States as a whole will result.

I was in Phoenix yesterday and saw a copy of the Bureau's confidential report on the water supply of the Colorado River and the proposed development projects, issued about three months ago. Regarding the use of Colorado River water below the international boundary, the report states in effect that the use did not exceed 750,000 acre-feet per year prior to building of Boulder Dam, but that since the Dam was built the use has increased rapidly until in 1943 it reached 1,800,000 acre-feet. Wow! That is worse than misleading; it is grossly untrue!

This statement that the use of water has reached 1,800,000 acre-feet per year is the strongest argument in favor of pending water treaty with Mexico. It would appear that our boundary commissioner is very "sharp" and has secured Mexican approval of a treaty giving Mexico 300,000 acre-feet less than that country is now using; and that we should make haste to get the treaty fully ratified before Mexico renigs. Not a day, not a minute, should the Senate lose!

Now, what are the facts? Fortunately we have long hydrologic records that bear on the question. The flow at the head of the Alamo (or old Imperial) Canal has been measured, the flow from the Canal into the Mexican laterals has been measured, and the flow back into the United States near Calexico has been measured. By subtraction the canal losses are known. The tabulation presented herewith gives the deliveries into the Mexican laterals and the canal losses charged to the Mexican portion of the canal discharge. (Before the All-American Imperial Canal was put into service, in February, 1942, most of the canal losses were charged to that part of the flow destined to Imperial Valley.)

The tabulation shows for 1943 a total of about 1,100,000 acre-feet. That is an outside figure. Not all of that was used; probably two-thirds to three fourths of it was used. With bountiful supply in the river, without the close regulation at the head such as in Salt River Valley, with the big Alamo Canal relieved of carrying Imperial Valley supply and subjected to less silting by increasing the flow, it was natural that a generous supply should be run in the Canal and the laterals and the excess wasted at the lower (south) ends of the canals.

Water Deliveries of Colorado River Water to Mexican Canals
and Losses in Alamo Canal
(Acre-feet)

| Year | Deliveries | Canal Losses | Total |
|------|------------|--------------|-----------|
| 1922 | 539,971 | 15,988 | 555,959 |
| 1923 | 606,276 | 13,496 | 619,772 |
| 1924 | 613,667 | 34,056 | 644,161 |
| 1925 | 728,529 | 16,210 | 744,739 |
| 1926 | 679,387 | 10,491 | 689,878 |
| 1927 | 573,588 | 24,231 | 597,819 |
| 1928 | 712,255 | 9,001 | 721,256 |
| 1929 | 615,934 | 2,452 | 618,386 |
| 1930 | 484,919 | 18,353 | 503,272 |
| 1931 | 380,627 | 8,738 | 389,365 |
| 1932 | 217,534 | 10,315 | 227,849 |
| 1933 | 402,441 | 12,523 | 414,964 |
| 1934 | 426,153 | 26,489 | 452,642 |
| 1935 | 746,484 | 38,405 | 784,889 |
| 1936 | 870,768 | 68,220 | 938,988 |
| 1937 | 878,086 | 53,741 | 931,827 |
| 1938 | 794,403 | 55,073 | 849,476 |
| 1939 | 774,581 | 53,409 | 827,990 |
| 1940 | 856,397 | 78,164 | 934,561 |
| 1941 | 768,737 | 68,915 | 837,652 |
| 1942 | 734,381 | 119,154 | 853,535 |
| 1943 | 987,049 | 116,035 | 1,094,084 |

How did the misstatement find its way into the confidential report? I do not know, but I surmise that it came from a conversation with Mr. M. J. Dowd, consulting engineer of the Imperial Irrigation District, which was misunderstood. You will be able, I presume, to determine the origin of this "accident." Usually such matters are discovered and eliminated, but this one got by somehow.

To the 700,000 or 800,000 acre-feet used in the area south of the Alamo Canal should be added about 50,000 acre-feet used on the east side of the River south of Yuma Valley.

A prominent official of the Bureau of Reclamation told me about seven weeks

ago that he had been in Imperial Valley not long before and was taken down through the Mexican irrigated lands, and so far as he could learn from officials of Imperial Irrigation District, the use of water in Mexico does not exceed 750,000 acre-feet a year.

Mr. Charles A. Carson, attorney for the Colorado River Commission of this State, told our Legislature a month ago that the use of water in Mexico is now 1,800,000 acre-feet a year. The newspapers so quoted him. Everybody is now misinformed. Later he repeated the statement in his testimony before the Senate Foreign Relations Committee. I have watched the local newspaper to see if the hydrologic records were placed in evidence, but have not seen reference to those records. I could not imagine where Mr. Carson got such information until I saw the Bureau's confidential report. Now I think it is a fair assumption that Mr. Carson was basing his assertion on the statement in the report.

What can you do to correct the error before any further damage is done? I think you should at least write the chairman of the Foreign Relations Committee stating that the confidential report is in error and that the error got in through some inadvertence, and unfortunately the error has not previously been called to your attention.

It makes a startling difference, psychologically and practically, whether the actual use is on the high side or the low side of the 1,500,000 acre-feet which is the basis of the treaty.

Yours truly,
G. E. P. Smith

GEPS:CM

cc: Senator Carl Hayden
Senator E. W. McFarland
State Senator H. H. d'Autremont
Mr. Henry Frauenfelder, Pres., Yuma Co. Water Users' Ass'n.
Mr. William H. Matthews, Arizona Daily Star
Mr. Grieg Scott, Attorney at Law
Also, Chas. M. Stauffer
Dr. A. Atkinson

Footnote 1. Mr. Mathews. With great deference to your usual probity, you have taken an unfortunate position on this issue.

2. Mr. Stauffer. Please read this in connection with the letters I left in your office last Wed. I was sorry to miss seeing you.

3. Senator Hayden. If there is still opportunity to do so, I think Mr. Carson should correct his testimony before the committee.

/s/ G.E.P.S.

/s/ G.E.P.S.

/s/ G.E.P.S.

February 9, 1945

Mr. A. E. Moritz
Regional Director
U. S. Bureau of Reclamation
Boulder City, Nevada
Dear Mr. Moritz:

I note that in the confidential Basin Report the virgin flow of the Colorado River at Lees Ferry is placed at 16,271,000 acre-feet per year.

Recently I took Debler's 1934 tabulation and incorporated Dickinson's revisions of the early LaRue estimates which do not amount to much, and brought the tabulation down to date through 1944 and came out with 15,850,000 acre-feet.

We ought to agree better than that. I have not yet had my tabulation typed and you may not care to take time to check it against your own. If you have an extra copy of yours and will send it I will make the check and report back to you.

For a long time I have suspicioned that we were using figures that are too high. There are people in this State who are due for disappointment and a lot of it.

Yours very truly,
G. E. P. Smith
Irrigation Engineer

March 1, 1945

Dr. G. E. P. Smith
Irrigation Engineer
University of Arizona
My dear Dr. Smith:

Reference is made to your letter of February 9th concerning your estimate of the virgin flow of the Colorado River at Lees Ferry.

The figures on virgin flow as contained in the Colorado River Basin Report were furnished by the Branch of Project Planning of the Denver office of the

Bureau of Reclamation. For that reason, I am forwarding a copy of your letter to that office.

The 16,271,000 acre-foot figure is based entirely upon an extension of the tabulation incorporated in Mr. Debler's 1934 report entitled "Stream Flow of the Lower Colorado River and its Tributaries". The figure presented represents the average for the period from 1897 to 1943 inclusive. The inclosed table summarizes the results of the computations.

It is further noted that the figure which you computed is only 2.6% less than that listed in the Colorado River Basin Report. While admittedly, if both figures were computed on the same basis, they should check, the difference involved is very slight.

I trust that the information contained in this letter will serve to answer your questions. Should you feel that this office can be of further assistance to you at any time, please do not hesitate to call on us.

It would be appreciated if you would furnish this office with a copy of your computations so that we may have the opportunity to compare them with ours.

Very truly yours,
E. A. Moritz
Regional Director

Incls.

CC:—Dir. Proj. Planning

(W/Incls.)

Phoenix Office w/o Incl.

March 1, 1945

Dr. G. E. P. Smith,
University of Arizona,
Tucson, Arizona

Dear Dr. Smith:

The statement in the first draft of the Colorado River Basin Report, about which you expressed concern in your letter of February 8, 1945, is probably that in the last paragraph on Page 42; namely, "In 1943 she (Mexico) diverted in excess of 1,800,000 acre-feet."

Chapter 3 of the Colorado River Basin Report, containing the statement with which you are concerned, has been given extensive review and is now being revised in Salt Lake. Questions such as you have raised are being carefully weighed as to their appropriateness and accuracy.

I am wondering if you considered in your assembly of data, the extent of Mexico's pumping below the International Boundary line. I understand there are approximately twenty-five plants pumping directly from the Colorado River, and over double that number of plants pumping from sloughs along its flood plain.

The Regional Office has not the facts with which to check the irrigated acreage from the Colorado River in Mexico. The Commissioner's Office, however, has been supplied data by the International Boundary Commission to the effect that Mexico, in recent years, has used 1,800,000 acre-feet of water on 300,000 acres of land commanded by the Colorado River. The data of the International Boundary Commission would, I think, carry more weight in Washington than would the statements appearing in the **confidential** and **preliminary** issue of the Basin Report.

I hope you may consider this an adequate reply to your letter pending the issuance of the final basin report, which will be made available for general distribution.

Very truly yours,
E. A. Moritz
Regional Director

March 5, 1945

Mr. A. E. Moritz, Regional Director
U. S. Bureau of Reclamation
Boulder City, Nevada
Dear Mr. Moritz:

Your two letters, both dated March 1, were received Saturday, and I wish to thank you for them.

Taking up first the letter relating to the use of water in Mexico, I may say that from your letter and from other correspondence, I am convinced that it is the International Boundary Commission which should be held responsible for the gross misstatements that have been made regarding present use of water in Mexico. There is a distinction between diversions and use. In some instances, as in the Salt River Valley, the difference is negligible, but in a case like that of the Alamo Canal, it is very great. I am of the opinion that the item covering the use under the Alamo Canal should be cut down about one-third.

The second item in the Boundary Commission's breakdown is for 90,000 acres

of cotton lands for which water is pumped direct from the river. They have allowed a duty of 6 acre-feet per acre. The duty should be not over $3\frac{1}{2}$ acre-feet per acre. We consider the duty for short-staple cotton as 3 acre-feet and for long-staple cotton as $3\frac{1}{2}$ acre-feet.

The third item relates to the water received from the lower end of the Yuma Valley project. That water aggregates 7,000 to 8,000 acre-feet per month during the months of cotton irrigation, and 9,000 to 10,000 acre-feet per month in the winter. Cotton uses water about a month in the spring, and then after a considerable period of nonuse it uses water heavily for 3 or $3\frac{1}{2}$ months in the summer. The Boundary Commission counted all 12 months of the waste water from the Yuma project as being used. The figures should be somewhere between 40,000 and 50,000 acre-feet per year instead of 103,000.

I wish to repeat the last paragraph of my letter to you dated February 9 as follows: "It makes a startling difference psychologically and practically whether the actual use is on the high side or the low side of the 1,500,000 acre-feet, which is the basis of the treaty."

Your other letter deals with the measured flow and virgin flow in the Colorado River at Lees Ferry, and you enclosed with your letter a tabulation of the past flow, depletions, and the virgin flow for the period 1897 to 1943. You suggest that I furnish you with a copy of my tabulation so that you can compare it with yours.

I found that my figures for depletion for the last 7 or 8 years were lower than yours and probably because there has been some additional transmountain diversion that I did not know of. I have corrected my figures to agree with yours so that the whole record for upstream depletions will not differ from yours at all. The differences, therefore, are in the column of past flow at Lees Ferry.

After studying the new record in Water Supply Paper 918 I wrote to the author and asked him why he had made changes in the original data and called his attention also to the record used by Mr. Debler. In his reply he states that he did a great deal of research and went back to original data, and while in most cases he confirmed the old LaRue figures as published in Water Supply Paper 556, yet he did find some errors which he had to investigate in the field. The most serious one was for the years 1898 and 1899. The measurements at Green River, Utah, were taken from a skew bridge and the length of the spans was used instead of the distances at right angles to the piers. The proper correction reduced the discharge for 1898 from 12,400,000 to 10,200,000, and for 1899 from 20,300,000 to 17,400,000.

Also he found errors in the measurements at Fruita, Colorado, for the winter of 1912-13, which changed the discharge for those two years.

I consider that Dickinson's strenuous work in preparation of Water Supply Paper 918 should make his tabulation acceptable to everyone. Just why Mr. Debler increased the figures for a good many years I cannot imagine, but the Geological Survey, which secured the data, should have the right to interpret the data. Then if Mr. Debler wishes to change them, the burden of proof is on him, and his tabulation should be accompanied by a statement of reasons for the changes. Therefore, I shall stick to the records as published last fall in Water Supply Paper 918, and I have a feeling that the Bureau of Reclamation should do the same. The record is as follows, the values being in 1,000 acre-feet:

| | | | | | |
|------|--------|------|--------|------|--------|
| 1895 | 13,200 | 1911 | 14,710 | 1927 | 17,510 |
| 1896 | 12,800 | 1912 | 17,080 | 1928 | 14,710 |
| 1897 | 17,700 | 1913 | 12,640 | 1929 | 19,590 |
| 1898 | 10,200 | 1914 | 18,900 | 1930 | 12,390 |
| 1899 | 17,400 | 1915 | 11,670 | 1931 | 6,218 |
| 1900 | 12,700 | 1916 | 17,880 | 1932 | 15,130 |
| 1901 | 13,500 | 1917 | 20,470 | 1933 | 9,733 |
| 1902 | 8,850 | 1918 | 14,080 | 1934 | 3,948 |
| 1903 | 12,800 | 1919 | 10,480 | 1935 | 10,270 |
| 1904 | 12,100 | 1920 | 19,160 | 1936 | 12,110 |
| 1905 | 13,600 | 1921 | 20,440 | 1937 | 11,980 |
| 1906 | 17,400 | 1922 | 16,070 | 1938 | 15,640 |
| 1907 | 21,100 | 1923 | 16,950 | 1939 | 8,839 |
| 1908 | 11,100 | 1924 | 11,690 | 1940 | 7,589 |
| 1909 | 21,200 | 1925 | 12,340 | 1941 | 17,860 |
| 1910 | 12,500 | 1926 | 13,060 | 1942 | 14,790 |
| | | | | 1943 | 11,410 |

In addition to lowering the average figure for the long period, I think that we should give much less weight to the period during which the figures are merely "estimates" derived from various and sundry records on the upstream reaches of the river. Granted that the flow might be expected to be above normal from a study of the rainfall, yet perhaps not all of the excess was due to that factor, and if the

estimated flow for that period is to be given consideration, we should also take into consideration the fact that the rainfall averages for Utah, Colorado, and Wyoming for the previous two decades were very low—much lower than the general average. The deficiency in rainfall from 1881 to 1897 was much more than the excess of rainfall for 1897 to 1921.

Certainly we have been counting on much more water in the Colorado River system than we were justified in doing. This situation is unpalatable, but it is better to face it now than to have it held against us later that we made unwarranted assumptions and used incorrect figures.

Yours very truly,
G. E. P. Smith

GEPS:CM

P.S. Since dictating the above letter, the morning mail has arrived and in it is a copy of the report of the Senate Foreign Relations Committee to the Senate on the Mexican water treaty. In going over the pages rather hurriedly, I noted one thing that caused me to gasp. It appears that the Bureau of Reclamation is held responsible in large part for the statement that there will be 900,000 to 1,100,000 acre-feet of return water at the International Boundary Line. This is an exaggeration to the Nth degree. It must assume that a vast quantity of water from the Colorado River is going to be applied to Arizona lands, and the answer to that is that it can't be done for there is not sufficient water supply in the river after satisfying the claims of the upper basin states and the California contracts which were dated in 1931. I occasionally hear it stated that Arizona will be allowed to use temporarily the waters allocated to the upper basin. That is a ridiculous assumption. The upper basin people know that once supplied, the water would never be severed from the lands, and I have direct information that the officials in the upper basin states were incensed at the idea of using their water in Arizona.

Even if Paradise Valley and other Central areas could be irrigated, return water would not reach Yuma. If it were not re-used it would be lost thru evaporation and transpiration of salt cedar, batamote, etc.

cc: Carl Hayden
Ernest W. McFarland

REQUIEM

In my letters to the State Land and Water Commissioner, as shown above, I dissected, deflated and demolished Mr. Carson's report on water supply. Despite this, the state officials and Arizona's two U. S. senators clung to the Carson report and even brought Mr. Carson to Washington to testify in favor of the pending Mexican water treaty.

The total effect of my efforts through a six-month period was nil.*

But Arizona's chances of obtaining 1,200,000 acre-feet of water for the Central Arizona Project was now vanished, lost and gone forever.

My efforts had studiously avoided publicity because of my position in the University of Arizona, the policy of which is to avoid controversy with state officials.

WHAT THE ARIZONA SENATORS SHOULD HAVE DONE

The two senators from Arizona should have addressed themselves to the eight senators from the upper basin states, as follows:

"You fellows are pushing persistently for the ratification of the Mexican water treaty. You know full well that the treaty gives Mexico a huge quantity of water annually and that it depletes the supply of water for the lower basin. You know that California has built her canals and aqueduct and that the water already in use in the California projects will never be taken away. You know that therefore the state which would be despoiled of its supply is Arizona, where the need for supplemental water (in central Arizona) is extreme. You know that the upper basin has water supply reserved by the compact far in excess of its needs. Why do you not offer some of your excess water for use in Mexico? When you arrange for the substitution of upper basin water instead of Arizona's water, we will support and vote for the Mexican water treaty."

PROFESSIONAL PAPER

In the spring of 1945, I prepared my studies of Colorado River water supply as

*The scant consideration given to my letters has puzzled me. It was the report of a recognized hydrologist against the report on hydrology made by a lawyer. I have thought in this and other cases that statements, reports and verbal advice emanating from the University have been brushed aside hastily as being "academic" and therefore probably impractical. In contrast, the advice which I have given as consulting engineer (always outside of Arizona) for generous fees has been seized and acted upon at once in each case.

a professional technical paper and read it at the spring meeting of the Arizona Section, American Society of Civil Engineers. The paper concluded with the words, "The Central Arizona Project is as dead as Banquo's ghost." Later the paper was published in a technical journal. It was not answered or criticized.

Extract from a Letter Received July 29, 1956

(The following is an excerpt from a letter dated July 29, 1956. The writer's name will be furnished on request.)

"In response to your letters, you are entirely correct as to the Mexican Water Treaty—lies and "skulduggery". At the hearing on it at Washington, D. C. before the Senate's Foreign Relations Committee in 1944, we both testified against it at considerable length, and also worked hard against it.

"I can recall getting a letter from you then, agreeing with the substance of my testimony, but wanting to know why I had not used stronger language cursing the crooks and villains.

"As to the 1,800,000 acre feet nonsense, you are certainly correct. Mr. Lawson testified as to its correctness and in answer to our questions explained its source. He had sent an assistant across the border to Anderson-Claytons (cotton brokers) office, where he was told that the Mexican irrigated area was 300,000 acres and the annual use of water 6 acre feet per acre. The true area was little if any more than 200,000 acres then and with cotton the chief crop, the use was not over 3.0 to 3.5 acre feet per acre, so we testified the Mexican total was less than half Lawson's figure.

"The problem was that the Administration (Pres. Roosevelt) had ordered the Treaty completed, ahead of the United Nations (organization) meetings, so that no discord could then arise, or disturb the Mexican help to our war activities. The Upper Basin officials and Senators were determined to have the Treaty, to protect their own water rights. They promised the Arizona officials and Senators that it was only California water that was being given to Mexico.

"Mr. Lawson also testified definitely that Texas was to receive 800,000 acre feet per year more, as a result of the Treaty, than would have been otherwise available on the Lower Rio Grande. This was exactly the excess amount that was given to Mexico from our Colorado River, as I figured things out. So in spite of all the pious denials, the Treaty was really just a crude "horse-trade", as we all claimed."

PROJECT PLANNING BY BUREAU OF RECLAMATION

The projects, promising and otherwise, in the entire Colorado River basin which had been examined and studied by the Bureau of Reclamation were presented in a publication of limited circulation in the spring of 1946. The total number of projects was 134, 100 of which were in the upper basin. The publication was bound in a dark blue flexible cover and is often referred to as the Blue Book.

The publication was tentative. It was submitted to the governors of the seven basin states for study and comment. After the comments of governors were received, the report, inclusive of the governors' reports was submitted to Congress.

The governor of Arizona responded with a long letter in which he analyzed the water supply and irrigation demands of the lower Colorado River basin. His conclusions were that there is 8,500,000 acre-feet of water available for the lower basin as designated in the Compact, which is untrue, and that after deducting the shares of the other states and the 1,407,000 acre-feet in use in Arizona, there is 2,262,000 acre-feet remaining for future Arizona projects including the 1,200,000 acre-feet for the Central Arizona project—and that conclusion also is untrue.

That the governor of Arizona should reach such unwarranted conclusions needs explanation. He based his computations on the average river discharge at Lees Ferry and increments to the stream flow from Arizona tributaries as tabulated in the Bureau of Reclamation's "blue book". Those data were in error. Why?

The compact commission wanted a stream flow record at Lees Ferry. E. C. LaRue of the Geological Survey prepared a synthetic record beginning in the nineties, but for most of the period to 1922, he had very scanty information confined mostly to the upper parts of tributaries. His "record" was mostly guesswork. LaRue himself said the figures might well be 20 percent or more too high. Beginning in the summer of 1922 the river discharge at Lees Ferry was actually measured. As soon as 15 or 20 years record had been obtained the earlier LaRue "guesswork"

record should have been discarded, but the Bureau was still using the old records in 1947 and has been deceiving itself and others. Also, the average annual inflow or contributions of tributary streams below Lees Ferry as synthesized by Debler some 15 years earlier was double what it should have been.

In his official statement, the governor used 1,135,000 acre-feet as the consumptive use of water on the Gila River, including Salt River. That is a hypothetical figure evolved by somebody in the Bureau of Reclamation as an estimate or guess of the average annual discharge of the Gila River at its mouth before the coming of the white man. Its four significant digits indicate a degree of accuracy which is entirely false. The figure should be 1,000,000 acre-feet more or less (California hydrologists, however, contend that the depletion caused by storage and irrigation in the Gila River basin is approximately 2,000,000 acre-feet.)

The governor of Arizona should have said to the Director of the Bureau of Reclamation, "A year ago, Professor Smith published a study of the Colorado River water supply and irrigation demand and showed far less water for the lower basin and none at all for the Central Arizona Project. Please show me, if you can, any error in his analysis, which seems to be much more up-to-date than yours." The Director would have had to admit correctness of my figures. Indeed, the Bureau has now (1956) corrected its estimates in part.

Poor Arizona, in the role of the "last man on the ditch," had been deceived again. There are still people in Central Arizona who believe there is a water supply for the Central Arizona Project.

The Bureau of Reclamation, indeed, in 1946 was proposing three possible routes from the river to central Arizona. One was the route starting at a point on Marble Canyon, by tunnel under the Arizona plateau to the Verde River above Clarkdale. Another route led from Bridge Canyon by tunnel to Big Sandy Valley, and the third began with a high lift from Lake Havasu and thence by canal to a proposed reservoir at the mouth of the Verde River. Although unable to study the routes in detail, I "hoped" the all-gravity route from Bridge Canyon would be found most feasible. Also I mistrusted that it would be more feasible to apply the water in western Arizona and move some farmers to the new lands. However, after Arizona's water had been given to Mexico there was no point in discussing the routes further.

THE ARIZONA INTERSTATE STREAM COMMISSION

The legislature of 1947 established the Arizona interstate stream commission to replace the earlier river commissions. It consists of seven members appointed seriatim, one each year to serve seven years. Their meetings are infrequent, but activities are carried on by the staff.

The commission appointed as its consulting engineer, on full time, a Coloradoan, who through the twenties was Delph Carpenter's consulting engineer and understudy. It was inevitable that the interests of the upper basin would be well observed and might even prevail over Arizona's interests.

"Hate California"

With the new orientation which was initiated in 1944, there began a "Hate California" campaign. It was reflected in many articles, usually written carelessly, with assorted mis-statements of fact, a favorite one being that the Colorado River compact grants to Arizona 2,800,000 acre-feet of main stream water.

A suit in the United States Supreme Court was initiated in 1953, although, the residue of water after firmly established rights are satisfied is little or nothing. There is no water at the end of the rainbow for either state.

It is true that California in submitting to the Delph Carpenter blackmail in 1922 dragged Arizona into a helpless and hopeless position. But since the early thirties the interests of the two states have been parallel and consisted in inducing or forcing the upper basin to relinquish some of its unneeded allocation of water.

The Painted Rock Flood Protection Dam

Here is another example of a project planned by the International Water Commission without Arizona's participation. It was primarily for protection of delta lands in Mexico which are easily overflowed by high water in the Colorado River. Of course, it would protect also the Yuma projects.

The dam when built will be a monstrosity, the reservoir will seldom have water in it. The design was based on impossible conditions.

All of Central Arizona needs reasonable flood protection and the protection should be designed at one time.

Three or four years ago, I wrote to Senator Goldwater urging a study of flood protection for central Arizona in connection with the Painted Rock project, and suggested multiple-use reservoirs on the Hassayampa, at the mouth of the Verde, and at the Buttes site. I found that the manager of the San Carlos irrigation project had become interested similarly, had written Senator Goldwater. The manager requested me not to write the governor of Arizona, since he hoped to secure agreement between the parties in interest. A year later he released me from that request. I wrote the governor asking for an appointment. Some two months later I received an apologetic reply promising an interview "after his vacation."

The following year we had a new governor. I addressed a letter to him, in part as follows:

"For two-and-a-half years I have been making efforts to secure a reconsideration of the flood control problem of the Gila River and its tributaries. The study should be broadened to include flood protection to central Arizona as well as protection for Yuma County and the delta lands in Mexico south of the international border. If we wait until Painted Rock dam is built, it will then be too late. . . . "If the flood protection is obtained (in part) farther upstream the projects can be designed as multiple-purpose projects, conserving a part or at least much of the water on most of the years for irrigation use, and at the same time preventing disastrous flooding. . . ."

Four months later I received an acknowledgment, expressing great interest. And then I gave up.

RECENT BUREAU OF RECLAMATION PUBLICATIONS

About 5 or 6 years ago the Bureau of Reclamation prepared compilations on water supply and the irrigation and power projects in the upper basin for the information and use by Congress. About the same time the Bureau prepared a super-voluminous report on the water supply of the lower Colorado River basin. Both were submitted to Congress in 1952. The latter report included stream measurement data to September 30, 1945. It could be criticized for not including the subsequent years. Therefore a supplement giving records of the years 1946-1951 was prepared and submitted in 1953.

In both reports the record of stream discharge at Lee Ferry is the crucial one. In the upper basin report the records begin with the 1895 water year, although the measurement of stream flow did not begin till summer of 1921. In the lower basin report the Lee Ferry tabulation began with the 1913-14 year. In the upper basin report the annual discharge figures are given to five significant digits, in the lower basin report to six significant figures indicating a very high degree of precision. No such precision was attainable, especially in years preceding 1922, when records were estimated by correlation with records at a few upstream points, which records themselves were of a low degree of accuracy. Water-supply paper 918 of U. S. Geological Survey gives records to only three significant figures.

The use of five or six significant figures indicates accuracy which does not exist, and is intellectually dishonest, unworthy of the great federal bureau founded by Frederick H. Newell and Arthur P. Davis.

The presentation of the data in those tables, especially in the Supplement, makes no distinction between the years when flow was actually measured and the earlier years. The general reader would infer that all records back to the earliest ones were measured flow. That is intellectual dishonesty.

Stream gaging in Arizona prior to 1922 was extremely sketchy, with one man and a clerk, and bad, muddy roads to prevent reaching a gaging station before the flood subsided. I accompanied C. C. Jacob, the Arizona representative of the Water Resources Branch, on a trip in 1913. It was expected to take 4 or 5 days; it took 14. All we got was some low-stage stream measurements, ruined tires and a narrow escape from being murdered by fugitives escaping from Fort Apache. In 1918 the representative of the Water Resources Branch lost his clerk and office but retained his salary and automobile. Stream flow data of the period are subject to error up to 50 per cent or more. When the unreliable discharge data preceding 1922 were used to synthesize a record for Lee Ferry the errors were compounded. Why the Bureau does not discard the synthetic records has no explanation unless

it is that retention of the old records increases the average river discharge at Lee Ferry by about one million acre-feet per year.

The retention of 1914 as a starting point required the build-up of other key station records backward to Oct. 1, 1913, usually by the flimsiest correlations since the intensity of precipitation is widely erratic. For example, the stream measurements at Grand Falls and near the mouth of Williams River began with the water year of 1925. Thus, the Records were "guessed" backward for 11 years. But as presented in the tabulation the early records are given to four significant digits, although not more than two were justified. This is rank intellectual dishonesty.

The report on the water supply of the lower basin is not carried through to a conclusion. The reader's questions are still unanswered.

The effect of magnifying the average annual discharge of the Colorado River is to condone the excessive quantity of water allocated to the upper basin, while misleading Arizona and California by suggesting there is a big unused residue of the lower basin allocation for which they should fight in the courts. In truth, there is no unused surplus. Nothing can be gained by either litigant.

A Golden Opportunity Scorned and Lost

A news story with dateline "Denver, Dec. 15, 1953" was published in Arizona papers. It stated that the Governor of Arizona had been approached by agents of California with a proposal to join with California in an effort to obtain for the lower basin states some of the excessive quantity of water allocated to the upper basin states in the Colorado River Compact. The newsstory stated that as soon as possible after the offer, Arizona's governor flew to Denver to apprise the Governor of Colorado of the suggestion by the agent of California. The offer apparently stirred much excitement and the Governor of Colorado is quoted as saying he would allow no dealing under the table. Another Colorado official, virtual head of strategy and plans, admitted the upper basin was using only about two million acre-feet, not much more than in 1922 when the Compact was written. It was clear that the upper basin spokesmen would prefer to waste millions of acre-feet into the ocean forever rather than permit its use in the lower basin.

If the Governor of Arizona had been acting zealously for Arizona's welfare, he would have welcomed the suggestion to cooperate with California (and Nevada) in the effort to right the wrong done to the lower basin states in the original compact. Such effort would not be "under the table"; by the widest open educational propaganda the upper basin states should be shamed into releasing some of the water reserved for the upper basin in 1922.

ABJECT SURRENDER

While the bill to authorize construction of the Glen Canyon project and several projects within the upper basin states was being debated by Congress in March 1956, I prepared the following memorandum and sent copies of it to some officials including Senator Goldwater and Congressman Udall.

Is Arizona a Sovereignty or Not?

I have visited the circus and looked down on the alpine glaciers from high up on the Jungfrau, but the most amazing thing to me is the supineness and indifference of the people of Arizona to the bold daylight theft of the Glen Canyon dam-site by the four Colorado River upper basin states.

Glen Canyon damsite is a natural resource of Arizona just as much as the copper deposits of Morenci. Thirty years ago there was a proposal backed by a majority of the people of this State to utilize that damsite as the first unit of a great project to provide central and southern Arizona with water supply for irrigation. It languished because the State could not finance it alone.

California wanted the Boulder Canyon project, and did not object to paying \$600,000 a year in perpetuity for the privilege, one-half to Arizona and one-half to Nevada, in addition to the permanent allocation of a large block of power to each state. The upper basin states likewise should compensate Arizona for use of the Glen Canyon damsite. The promoters of a billion dollar project should not gag at a payment of \$300,000 for ground rent in lieu of taxes.

Some months ago our Congressman (rather meekly) requested of the upper basin states an allocation of power to Arizona. The request was refused peremptorily. He should have demanded it and opposed the project bill in Congress until

an allocation of power for Arizona was inserted in the bill. No one has the right to sign away, or vote away, what belongs to the people of this State.

Just at present we are blessed with an adequate supply of natural gas for power purposes. But the price of gas will go upward and eventually the supply will be exhausted. Looking to the future we shall need the perpetual (water) power from Glen Canyon, and our future growth and development may be thwarted if we fail to obtain it now.

Some of us with long memories recall that about thirty years ago the attorney general of Utah wrote an elaborate opinion to show that the State could tax irrigation works located within the State which served to irrigate lands in some other state. It was feared at that time that our own Glen Canyon project would be taxed heavily because of the water backed up onto Utah soil. We are led to inquire if the dam and power plant now contemplated on Arizona soil could be taxed by Coconino County and the State of Arizona. Or is Arizona just a fairy godmother?

It should be needless to add that since my retirement I am on my own and do not involve the University of Arizona in any way in my statements.

Letter to Senator Goldwater

March 17, 1956

Dear Senator Goldwater:

Enclosed is a short memorandum of tremendous importance to Arizona. It is an indictment not alone of Congressman Udall, but of all of our Congressional representatives. * . . Do you realize that the controversy between Maricopa County and Yuma County over the Governor's water development plans for the Power Commission is due to Arizona's blunder eleven years ago? When we gave up a million acre-feet of water to Mexico in furtherance of the good neighbor policy and to help secure rights to (additional) water for the lower Rio Grande Valley, it was stupidity. . . .

Senator Goldwater's reply was brief and non-committal.

Letter to Congressman Udall

March 19, 1956

Dear Congressman Udall:

I am greatly intrigued by the present controversy between Maricopa and Yuma counties regarding water rights in the Colorado River. I foresaw this situation eleven years ago when the Mexican Water Treaty was signed. I said at the time, "There goes the Central Arizona project (down the drain)." That extra million acre-feet of water given to Mexico in furtherance of the Good Neighbor policy was Arizona's water, because we are what the farmer calls "the last man on the ditch" in location and priority. If Arizona officials and editors had shouted, "That is our water, and it is our last hope," then the U.S. Senate would not have taken it from us and given it to Mexico.

Sensing the danger in the fall of 1944, I began a study of the hydrology of the Colorado. The study took many weeks because of my other duties, but from time to time as I reached new conclusions I wrote another letter to Senator Hayden and sent copies to other officials and to two editors. My letters were of no avail. Sen. Hayden chose to follow Governor Osborne and Charles Carson. Why did he not follow Grieg Scott, attorney of the Salt River Valley Water Users Association and Lin Orme who were fighting the treaty, as was California? As a member of the University family I could not take a position openly hostile to the Governor who is also a member of the Board of Regents.

We are now faced with another situation where both the sovereignty and the future welfare of our State are at stake. Our sovereignty is being violated without even politely saying, "By your leave." We shall need that water power in the future when natural gas is too high-priced or is exhausted; in fact, we need it now. I asked the President of the Tucson Gas, Electric Light and Power Company

*Before the upper basin storage projects report was transmitted to Congress, it was submitted, as required by law, to each of the seven governors for comments and approval or criticism. The governor of Arizona, in his letter of comments, dated June 19, 1951, made an eloquent plea that Arizona be given the same consideration in the delivery of power as Denver and Albuquerque. Thereafter changes were made in the report so that it had to be submitted to the seven governors again. In his second letter of comments, dated January 16, 1954, the governor of Arizona repeated his plea. His pleas were ignored. He should have DEMANDED special consideration instead of pleading for it.

why he purchased so little of the cheap Colorado River power. He replied rather tartly, "We take all we can get, but it is not very much." I regret that a few months ago you did not make a definite demand for 30 per cent of the power produced and stick to it regardless of refusal or ridicule. People like myself would come to your support. That would be easier for us than to assume leadership on such a proposal.

Letter from Congressman Udall

March 28, 1956

Dear Mr. Smith:

I appreciate receiving your recent letter concerning the Colorado River. And I hope it will not surprise you to learn that I agree with many of your conclusions.

At the time the Upper Colorado Project Bill came before the House Committee last year it was immediately apparent to me that Arizona should receive direct benefits from the proposed Glen Canyon Dam. However, when I brought this matter to the attention of other members on the congressional delegation I was told that there had been a "gentlemen's agreement" between Arizona and Utah officials that our state would not receive such benefits. This agreement was supposedly entered into at the time the Central Arizona Project was pending before Congress.

Also, by the time the House Committee got around to voting on the Upper Colorado Bill, the Senate had already enacted a bill which gave no recognition to special rights for Arizona. I am still of the opinion that we surrendered a valuable damsite without receiving our just due in return.

What a horse-trade!! A natural resource of great value which we may need at some time bartered away for a dead horse! The "plant" in the office at Phoenix had done his work well.

IN CONCLUSION

I, the author, do not harbor animosity toward anyone. I withheld publication of this paper, or any part of it, until after the primary of 1956 and until after the election.

But the story of how Arizona lost a water supply has not been told adequately in the press. During much of the past 34 years the public has not been properly informed and has not understood the real problems and the state's manuevering. It is for the historian that the discussions in this paper are intended.

I feel sorry for the State of Arizona, which has been deceived, out-smarted, and despoiled by other states. I feel humiliated that Arizona leaders sometimes fawned on the oppressors and usually showed poor judgment or neglect in protecting Arizona's vital interests.

A point that needs emphasis is that the politicians of Arizona—elected officials and some appointed officials—shied away from the presumed egghead at the University, although, I kept fully informed of issues and underlying motives, beginning in November, 1922.

If perchance, a slight error of fact appears in the paper, it is because of my loss of vision and reliance on memory instead of checking sources of information.

Arizona should have, of course, a program. The state should make an about-face. The four-point program should be as follows:

1. Endeavor in spite of the late start, to obtain a \$300,000 a year payment in lieu of taxes for use of the Glen Canyon damsite, and also a reservation of a definite block of power as in the Boulder Dam project.

2. Join with California and Nevada in an all-out effort to use some of the unused upper basin allotment, on a reasonable schedule not inimical to the upper basin, and before Mexico obtains "squatter's rights" to the water.

3. Bridge Canyon damsite is the finest power damsite on the river. It will be a money-maker for whoever builds it. The state, aided by local interests should be the proprietor, even though construction is by the Bureau of Reclamation. The dam should be constructed during the first filling of the Glen Canyon reservoir.

4. The personnel of the Arizona Interstate Stream Commission should be improved. Each member should be a citizen who is not "deadwood" but can contribute. Each member should ask himself if he has ever made a diligent, searching study of the Colorado River problems, the technical hydrologic problems as well as the political and legal problems.

Water Supply and Water Demand in Lower Basin of Colorado River Under Ultimate Conditions

Water Supply

| | Acre-feet per year |
|---|-----------------------|
| At Lee Ferry, by Compact Clause 3-c | 7,500,000 |
| Tributaries, Lee Ferry to Yuma | 400,000 |
| Gila River above Sentinel | 1,135,000 |
| | <u>9,035,000</u> |

Water for Mexico

| | |
|---|-----------|
| Surplus above 8,500,000 acre-feet per year, by Compact Clauses 3-a and 3-b, 535,000; | |
| Therefore, additional delivery at Lee Ferry, by Compact Clause 3-d, ca. | 600,000 |
| Burden on lower basin for delivery to Mexico, ca. | 1,100,000 |

Demand for Water

| | | |
|---|------------------|------------------|
| Evaporation from reservoirs and stream beds | | 900,000 |
| Mexico, Bureau of Reclamation Estimates | | 1,700,000 |
| Consumptive use: | | |
| California | 4,400,000 | |
| Nevada | 300,000 | |
| Arizona: | | |
| Mohave | 100,000 | |
| Colorado Indian Reservation | 350,000 | |
| Yuma Valley | 250,000 | |
| Yuma Mesa | 400,000 | |
| Wellton-Mohawk | 350,000 | |
| Gila above Sentinel | 1,135,000 | |
| | <u>2,585,000</u> | |
| | | <u>7,285,000</u> |
| | | 9,885,000 |

Conclusion: There is no water for Central Arizona Project

RIVER DISCHARGE AT LEE FERRY

The historic discharge at Lee Ferry since 1921, when measurements were begun, has averaged 12,150,000 acre-feet per year. This is about two and a half million acre-feet per year less than the assumed annual discharge 30 to 35 years ago.