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UNITED STATES APPROACHES TO THE SALINITY PROBLEM ON THE COLORADO RIVER*

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The waters of the Colorado River are the mainstay of agricultural activity in the areas of the southwestern United States and northwestern Mexico irrigated by those waters. Any matter affecting the supply and use of these waters has important political and economic as well as legal and technical implications for both countries involved. The issue is an exceedingly complex one.

I shall attempt to explain at some length my views of the problem and to detail some of the approaches being taken by the United States Government in an attempt to find a solution satisfactory to the interests in both countries. The discussion will begin with a brief summary of the events leading to the signing of the 1944 Water Treaty and to its ratification by the United States Senate. This will be followed by a review of the salinity problem and of the measures which have been and are being taken to cope with it. In the course of this progression, and subsequently, I shall be touching on a number of the legal issues with which the two countries are concerned. The views I express are my own and not necessarily those of the Department of State. This is a matter which is presently under discussion between the United States and Mexico; for obvious reasons those negotiations must remain outside the scope of this discussion.

THE 1944 WATER TREATY AND ITS ANTECEDENTS

On February 3, 1944 representatives of the United States of America and Mexico signed the "Treaty Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande."[1] The signing and exchange of instruments of ratification almost two years later (November 8, 1945), represented the culmination of more than 20 years of negotiations between the United States and Mexico concerning an equitable sharing of the

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1. Feb. 3, 1944, 59 Stat. 1219, T.S. No. 994, 3 U.N.T.S. 313 (*effective* Nov. 8, 1945).

waters of the Colorado, Tijuana and Rio Grande Rivers. This discussion is confined to the Colorado.

Irrigation of lands in the Colorado River Basin began before 1900. Development was hampered by the cost and complexity of the storage and conveyance facilities necessary to permit efficient use of natural flows of the river. In the mid-1920's an international commission was formed to study not only the Colorado but the Tijuana River and Rio Grande as well.[2] Mexico, at the time, had insisted that the waters be divided according to the principle of equitable apportionment without regard to current usage. It argued that Mexico, with approximately twenty percent of the total irrigable acreage (1.5 million in Mexico compared with six million in the United States) would be entitled to a similar portion of the total flows.[3] It was contemplated that eventually all or most of the flows of the lower basin would be regulated by storage and diversion dams built in the United States with United States funds.[4] In part because it was absorbing the full cost of controlling the river, the United States had contended that Mexico was entitled only to an allotment based on her actual usage of the waters in their unregulated state, a maximum of about 750,000 acre-feet in 1928. The United States emphasized that a given volume of regulated, predictable flows was economically far more valuable to Mexico than a much greater volume of unregulated flows.[5]

No agreement was reached in these discussions, or through the efforts of a second round of studies authorized in 1935.[6] It was not until 1941 that proposals were exchanged which could be said to have initiated the discussions which ultimately resulted in the treaty of 1944.[7]

The treaty which resulted provided for the guaranteed delivery, except in extreme circumstances, of 1,500,000 acre-feet annually of water of the Colorado River "from any and all

2. Report of the American Section of the International Water Commission, U.S. and Mexico. H.R. Doc. No. 359, 71st Cong., 2d Sess. 10 (1929).

3. *Id.* at 7, 49. *See also*, Memorandum from the Ministry of Foreign Affairs to the Department of State, Feb. 19, 1943, 6 *Foreign Relations of the United States*, 598 (1943).

4. The first major structure, Hoover Dam, was authorized under the Boulder Canyon Project Act, 43 U.S.C. § 617 *et. seq.* (1972). It was sufficiently completed by 1935 for accumulation of water to begin.

5. Report, *supra* note 2, at 45-46, 57.

6. Treaty with Mexico for the Study of the Lower Rio Grande, the Lower Colorado, and Tijuana Rivers, Aug. 19, 1935, 49 Stat. 660 (1935).

7. Memorandum from the Department of State to the Ambassador of Mexico, July 2, 1941 and Memorandum from the Ambassador of Mexico to the Department of State, July 22, 1941.

sources."[8] The treaty made provision for the scheduling of the flows, within certain minimum as well as maximum rates which were designed to permit the United States to receive credit for all of the waters expected to be in the river.[9] However, the treaty nowhere refers to water quality.

Nevertheless, it does contain language which in our view requires Mexico to accept as part of her allotment waters of the Colorado River "*from any and all sources,*" (Article 10) and provides that ". . . Mexico shall acquire no right beyond that provided by this subparagraph by the use of the waters of the Colorado River system, *for any purposes whatsoever,* in excess of 1,500,000 acre-feet. . . ." Article 11, relating to deliveries, states in pertinent part that ". . . Such waters shall be made up of the waters of said river, *whatever their origin,*" and are to be delivered "wherever these waters may arrive in the bed of the limitrophe section of the Colorado River. . . ." [Emphasis added].

The question of water quality and the obligation of Mexico to accept drainage waters as part of her allotment under Article 10(a) of the treaty, were thoroughly explored during the extensive hearings held by the United States Senate on the treaty. Testimony by United States Government officials during those hearings illustrates the meaning of the above-quoted language and sheds considerable light on the negotiations which produced the text. We know from Commissioner L. M. Lawson's testimony that the drainage water question was a major difficulty during the negotiations:

> In negotiating the treaty, Senator, we had difficulty in persuading the Mexican representatives to accept that kind of water that is recovered flow, drainage water, and return flow which would require in the future probably some dilution with fresher water of a less alkaline quality.[10]

Later Mr. Frank Clayton, Counsel for the United States Section of the International Boundary Commission, in response to a request for explanation of the meaning of the "from any and all sources" and "wherever these waters may arrive" language, stated as follows:

> The representatives of the United States insisted upon those words in the treaty. They were objected to by Mexico, for the

8. 59 Stat. 1219, *supra* note 1, art. 10 at 1237.

9. *Id.* at art. 15.

10. *Hearings on the Water Treaty with Mexico,* Before the Senate Committee on Foreign Relations, 79th Cong., 1st Sess., at 7 (1945).

> simple and obvious reason that the United States wanted to secure credit for all water of any kind, wherever it might come from, that actually flowed across the boundary line, whether it was drainage water from projects within the United States or whether it was used for slucing upstream and could not be put to beneficial use below, or floodwaters, or waste waters of whatever kind.[11]

During these hearings United States negotiators estimated that eventually more than 900,000 acre-feet of Mexico's total allotment might be drainage waters from United States projects.[12] In a later appearance, Mr. R. J. Tipton noted his belief that the return flows received by Mexico would be of usable quality, especially when diluted by the other waters Mexico would also receive.[13] When asked if the Mexican negotiators understood the fact that the treaty contained no minimum quality requirements, he replied:

> [T]hat I did have the privilege of participating very actively in the negotiations, and I can say of my own knowledge that this question was a major question, and that Mexico understands very thoroughly what the language of the treaty means.[14]

Thus, the Senate of the United States, the United States negotiators and, it appears, the Mexican negotiators understood that the treaty contained no quality standard concerning the waters to be delivered to Mexico. It also seems clear that drainage waters, as well as any other waters of the Colorado River which reached the limitrophe section, were to be included in the Mexican allocation of 1,500,000 acre-feet annually. Had return flows and other miscellaneous waters in the river not been included, the United States negotiators could not have agreed to a guaranteed quantity of more than twice the water which Mexico used prior to the construction of storage regulation works in the United States. It should also be noted that although it was contemplated that a very large portion of the 1,500,000 acre-feet would be composed eventually of drainage waters, the United States negotiators and, presumably, the Mexicans, believed that such waters would, nevertheless, be usable for agricultural purposes.[15]

11. *Id.* at 107.
12. *Id.* at 84-85, 240. At present Mexico receives about 530,000 acre-feet of return flows annually, including the deliveries at the land boundary near San Luis.
13. *Id.* at 323-24.
14. *Id.* at 324.
15. *Id.* at 321, 343.

EXPERIENCE UNDER THE 1944 TREATY, 1945-1965

Until late 1960, no serious problems arose concerning the operation of the treaty as it affected deliveries of Colorado River waters to Mexico. The United States completed additional facilities on the lower Colorado and increased the number of irrigated acres, but none of these activities had a significant effect on the salinity of the waters delivered to Mexico. The average salinity of deliveries remained within about 100 parts per million of the level at Imperial Dam. This was partly because the total annual quantities of Colorado River waters reaching Mexico during most of the 1950's ranged from a maximum of 8.6 million acre-feet to a minimum of about 400,000 acre-feet above the volume required under the terms of the treaty. There was some rise in salinity over the period, reflecting increased usage upstream.

In 1961 a pump-type drainage system was completed in the Wellton-Mohawk Irrigation and Drainage District in southern Arizona, where irrigation of some 50,000 acres (now over 60,000 acres) had been initiated in 1952.[16] The waters pumped from Wellton-Mohawk had an average salinity of about 6000 parts per million of dissolved solids.[17] As a result of these discharges and the fact that for the first time the United States' annual deliveries to Mexico were necessarily reduced to a level near the guaranteed allotment of 1,500,000 acre-feet annually, the average annual salinity of the waters received by Mexico increased from about 850 to nearly 1500 parts per million.[18]

After the winter of 1961-62 provisional measures were taken by the two governments so that peak salinities of the waters being delivered for irrigation were reduced to amounts which Mexico was willing to accept on an interim basis during negotiations for an agreement.

EXPERIENCE UNDER MINUTE NO. 218

In March 1965, the two governments agreed to attempt to resolve the problem through a practical solution known as Minute 218 of the International Boundary and Water Commis-

16. U.S. Dep't of Interior, Reclamation Project Data 242-43 (1961).

17. This is by American measure. The Mexican measurement system results in salinities which are, on the average, about 70 parts per million higher.

18. International Boundary and Water Commission, A Report on the Increase in the Salinity of Colorado River Waters Delivered to Mexico, Appendices B-1, B-2 (June 10, 1963).

sion.[19] Under this agreement the Department of the Interior constructed, at a cost of about $6 million, an extension channel which would permit the discharge of the drainage from Wellton-Mohawk either above or below Mexico's diversion structure in the limitrophe section, Morelos Dam, as Mexico might request.

Simultaneously, the Department of the Interior installed additional wells in the Wellton-Mohawk District. These wells were to be pumped selectively, so that the salinity level of the drainage water could be adjusted according to whether Mexico was using the drainage or bypassing it, and whether there was sufficient flow in the river to dilute it. These and related works cost an additional $5 million.

The United States agreed to release additional quantities of water from storage as necessary to substitute for a part of the Wellton-Mohawk drainage waters which were to be bypassed to the river below Mexico's main point of diversion, Morelos Dam. This was to be done in the winter months, when Mexico's demands were at the treaty minimum rate of 900 cubic feet per second. The effect has been that during each of the years in which the Minute has been in force, the United States substituted about 50,000 acre-feet of water from storage for Wellton-Mohawk drainage.[20]

In addition, Mexico under the agreement had and exercised the right to waste some of the drainage water in the extension channel to the river below Morelos Dam even when the United States was not making the substitutions noted above. This right was made available in order to obtain the quality of water Mexico desired, although this meant foregoing a part of its treaty allotment. However, it must be emphasized that it is the view of the United States soil and water scientists that this wasting of water by Mexico was not necessary to assure that all waters reaching Morelos Dam were usable by Mexican farmers.

Minute 218 also provided that: "[t]he provisions of this Minute not constitute any precedent, recognition, or acceptance affecting the rights of either country, with respect to the Water Treaty of February 3, 1944, and the general principles of law."[21] In other

19. Recommendation on the Colorado River Salinity Problem, Minute No. 218 of the Int'l Boundary and Water Comm'n (effective Nov. 16, 1965).

20. International Boundary and Water Commission, Report on the Fifth Year's Operations for Solution of the Colorado River Salinity Problem. Minute 218 of the Int'l Boundary and Water Comm'n, at 5 (Jan. 8, 1971).

21. Minute 218, *supra* note 19, at paragraph 11.

words, in agreeing to this practical solution, each party reserved its legal position.

In concluding this agreement, the United States recognized that a serious problem had arisen and determined that it would do what it could, consistent with the 1944 Treaty and the rights of its own citizens, to resolve the issue in a satisfactory manner.

Operations under Minute 218 have generally taken place as expected. Mexico's water has gradually improved, from an average of about 1375 parts per million in 1965 to about 1245 parts per million in 1971.[22]

Since 1964, the United States has substituted without charge to Mexico about 325,000 acre-feet of water over and above the treaty allotment largely from above Imperial Dam for an equal volume of Wellton-Mohawk water. Since 1964, Mexico has voluntarily wasted approximately an additional 312,000 acre-feet of Wellton-Mohawk waters.[23] In addition, during the past ten years, including the six under Minute 218, the United States has spent more than $11 million to alleviate the Wellton-Mohawk problems and provide better quality water for Mexico. Water and soil scientists consulted by the Department of State indicate that water of the quality made available to Mexico is usable for irrigation of the crops grown in the Mexicali Valley, taking into account the nature of the soils there.[24]

PRELIMINARY AGREEMENT ON ADDITIONAL MEASURES

Since Minute 218 was originally to expire on November 15, 1970, the United States and Mexico began in that year to discuss the possibility of a new agreement which would further improve the quality of waters being delivered to Mexico. Because the Diaz Ordaz administration was reluctant to commit its successor administration to a new agreement on such an important matter, Minute 218 was extended for a year in November 1970[25] and for another year in November 1971,[26] when the parties decided to

22. Report, *supra* note 20, at 2. These figures are based on waters made available to Mexico and do not reflect the voluntary additional bypasses by Mexico, which reduced the average salinity by an additional 100 ppm. *Id.*, Exhibits 2 and 3.

23. *Id.* at 5.

24. Statement by Dr. Charles A. Bower, Director of U.S. Dep't of Agriculture Salinity Laboratory, Riverside, Cal. (unpublished June 28, 1971).

25. Agreement Extending the Provisions of Minute No. 218 of the International Boundary and Water Commission concerning the Colorado River Salinity Problem. Nov. 16, 1970, 21 U.S.T. 2478, T.I.A.S. No. 6988.

26. *Id.*, November 15, 1971, U.S.T. , T.I.A.S. No. 7214.

continue discussions for a longer period. In general, the United States had indicated its willingness to provide significantly better water to Mexico, in order to reach more rapidly a practical, effective solution to the Wellton-Mohawk problem. Like Dr. Sepúlveda, I strongly believe that litigation is not the best means for solving this problem. Mexico and the United States have had a long history of resolving difficult problems, such as the Chamizal, through negotiations, and I agree with Dr. Sepúlveda that the two countries should be able to reach a mutually satisfactory solution to the salinity problem in the same manner.

On June 17, 1972, a major step was taken in this direction when President Nixon and President Echeverria of Mexico agreed on a procedure for seeking a permanent solution. In the Joint Communique of the Presidents, President Nixon noted:

> [h]is sincere desire to find a definitive, equitable and just solution to this problem at the earliest possible time because of the importance both nations attach to this matter.
>
> As a demonstration of this intent and of the goodwill of the United States in this connection, he was prepared to:
>
> (a) undertake certain actions immediately to improve the quality of water going to Mexico;
>
> (b) designate a special representative to begin work immediately to find a permanent, definitive and just solution to this problem;
>
> (c) instruct the special representative to submit a report to him by the end of the year;
>
> (d) submit this proposal, once it has the approval of this Government to President Echeverria for his consideration and approval.[27]

The Communique continued:

> President Echeverria said that he recognized the goodwill of President Nixon and his interest in finding a definitive solution to this problem at the earliest possible time. . . .
>
> Both Presidents agreed to instruct their Water and Border Commissioners to prepare and sign a Minute containing the above program and commitments as soon as possible.

Pursuant to these instruction, Minute No. 241 of the IBWC was signed on July 14, 1972. Under this Minute, which runs until

27. Joint Communique Following Talks Between Richard Nixon, President of the United States of America, and Luis Echeverria Alvarez, President of the United Mexican States at Key Biscayne, Florida (June 17, 1972). In this communique, President Echeverria also reiterated Mexico's position that it is entitled to waters of "the same quality as those derived from Imperial Dam," and stated that "his Government, while reserving its legal rights, had decided to stop using waters from the Wellton-Mohawk project for irrigation purposes while waiting for receipt of the U.S. proposal for a definitive solution."

December 31, 1972, Mexico will experience an improvement of about 100 parts per million in the waters made available to Mexico, from the 1971 average of 1245 parts per million to about 1140 ppm. The improvement is to be accomplished through the substitution by the United States of 118,000 acre-feet annually of better quality waters (from above Imperial Dam and from wells of the Yuma Mesa) for equal volumes of Wellton-Mohawk drainage waters. In Minute 241, as with Minute 218, the legal positions of both parties are reserved.

However, as Mr. Reynolds has indicated, the Wellton-Mohawk is not the only cause of increasing concentrations in salt in the Colorado River. Because of increased use upstream the salinity of the system appears to be gradually rising. This increase, perhaps a more serious long-term problem than Wellton-Mohawk, represents a danger not only for Mexico but for all United States water users in the Lower Basin, including the Wellton-Mohawk and Yuma Irrigation Districts in southern Arizona and the Imperial Irrigation District of California, as well as the municipal users in the Los Angeles and San Diego metropolitan areas.

Because of the potential impact on Mexico, the United States has assured Mexico that a salinity control program for the purpose of preventing further increases in salt content of the Colorado River is being planned with the objective of quickly undertaking an action program. In accordance with this assurance, and at the insistence of United States water users, the Bureau of Reclamation has begun the studies and plans shortly to seek funds for the construction of necessary works. The Bureau's program would be designed to prevent the salinity of the river from becoming higher and, eventually, perhaps, lead to a reduction in salinities.

Some measures have already been taken to reduce fluctuations in water quality in the lower basin. The studies will evaluate sources and causes of salinity, determine feasible methods of salt load reduction and control methods, and produce feasibility reports on special projects. Among the methods anticipated are elimination or amelioration of major point sources and diffuse sources, improved efficiency of irrigation operations, plus allied reclamation programs, including weather modification, development of geothermal resources, vegetation management, and the Western United States Water Plan. The total program will require at least a decade and hundreds of millions of dollars, but

it is hoped that appreciable effect can be realized within five to ten years.

SOME THOUGHTS ON THE LEGAL ISSUES

As indicated earlier, the United States is of the view that the 1944 Water Treaty requires Mexico to accept drainage and other waste waters as a part of the 1,500,000 acre-feet guaranteed to Mexico under Article 10(a). At the same time, the United States had indicated it is prepared to act with due regard for Mexico's interests, and will be expending considerable effort during the coming months to develop a practical, long-term solution that is mutually acceptable.

In the past, the Government of Mexico has cooperated in these efforts, while reserving its legal position. Regarding that position, it has been suggested at various times that Mexico must accept drainage water only to the extent that water represents the return flows from an irrigation district operating under conditions of salt balance (removal in drainage waters of the same weight of salts contained in waters being used for irrigation of the land); that it is not required to accept pumped drainage water; or that regardless of the source of water Mexico is entitled to water of the same quality as is diverted from United States users at Imperial Dam.[28] In my view, the drainage water question is not open to serious challenge, given the clarity of the negotiating and legislative history and the language of the treaty. I would argue as well that whether drainage is accomplished by ditch, tile drain, or pump is immaterial, as long as reasonable irrigation practices are followed. The question of parity is only a function of the drainage issue and would appear to be settled by the treaty. Moreover, it is to be expected that a downstream user must, within reasonable limits, accept water of poorer quality than the next upstream user, if the upstream user is to enjoy the benefits of the stream to which it is entitled. This is consistent with correlative rights and obligations of coriparians.[29] The issue would appear to be that of reasonable use.

Another way of analyzing the problem would be to ask whether the upstream use is so unreasonable, taking into account the 1944 Water Treaty and all other circumstances, as to

28. Memorandum by Cesar Villalobos L., for the CCI, the Independent Farmers' Central, reported in *La Voz de la Frontera*, Mexicali, B.C., Feb. 10, 1971; Committee in Defense of Mexicali Valley, in statements reported at various times in the press of Mexicali and Tijuana.

29. *See* M. Whiteman, 3 Digest of International Law 924-25 (1964).

constitute pollution. There is some question whether the 1944 Water Treaty leaves any scope for application of other principles of international law, but for purposes of this discussion I shall set that reservation aside.

Various international law standards of pollution have been suggested during the past few years.[30] In addition a number of states, including Arizona and California, have their own legislatively-enacted standards.[31] However, as Anthony Lister noted several years ago, "International decisions and state practice are too sparse to provide detailed rules of international law and remedies governing the pollution of international rivers."[32] Nevertheless he states that "Most definitions of the general duty of a state not to pollute the waters of an international drainage basin flowing within its territory prohibit such pollution if it causes injury—usually substantial injury—to another state."[33] Water pollution is often defined in terms of "detrimental" change; usually the obligation to abate, even where the situation *is* technically defined as "pollution," exists only where there is "substantial" injury or harm and is limited to "reasonable measures."

Initially, it would seem evident in light of the various qualifications that an increase in the salts returned to a river through drainage from irrigation projects is not in itself a basis for complaint; it results from an appropriate use of the waters and not from the introduction of extraneous deleterious matter.

30. *See* Int'l L. Ass'n, Helsinki Rules (1966). Article IX of the Rules defines water pollution as "any detrimental change resulting from human conduct in the natural composition, content, or quality of the waters of the international drainage basin." Article X provides in pertinent part as follows:

> 1. Consistent with the principles of equitable utilization of the waters of an international drainage basin, a State
>
> (a) must prevent any new form of water pollution or any increase in the degree of existing water pollution in an international drainage basin which would cause substantial injury in the territory of a co-basin state, and
>
> (b) should take all reasonable measures to abate existing water pollution in an international drainage basin to such an extent that no substantial damage is caused in the territory of a co-basin state.

A. Garretson, R. Hayton & C. Olmstead, The Law Of International Drainage Basins 779-830 (1967).

See also Dep't of State, Legal Aspects of the Use of Systems of International Rivers 88-91, Senate Doc. No. 118, 85th Cong., 2nd Sess. (1958). Digest, *supra* note 29, at 920-34.

31. Arizona Water Pollution Control Act, Ariz. Rev. Stat. Ann. § 36-1851-59 (1967) and Porter-Cologne Water Quality Control Act, Cal. Stat. Ann., Water Code, § 1300 *et seq.* (1970).

32. Lester, *Pollution*, in The Law of International Drainage Basins 109 (1967).

33. *Id.* at 112.

Unlike some forms of water pollution, which can be completely or almost completely eliminated without seriously affecting continued operations, it is impossible to irrigate an area over a period of time without taking drainage measures which increase the concentration of salts in the river. There is much evidence, for example, that the decline of some of the ancient civilizations in the arid areas of the world was a direct result of their failure to understand the necessity of drainage measures to remove salt deposits from the soil and to prevent subsurface waters containing highly concentrated dissolved salts from rising into the root zone and killing the growing plants. It should be obvious that if a given weight of salts is applied along with the irrigation waters on the land, and the same weight of salts must be removed from the land in the greatly reduced volume of water which becomes drainage, the concentration of salts in that drainage water will be correspondingly higher.

Thus, some salt content, in spite of its potential detrimental effect, is necessary if the waters of the Colorado River are to be committed to their primary beneficial use, irrigation. Such return of salts is essential to efficient use of these water resources. This practice in our view could not properly be characterized as "pollution," certainly not unless or until it could be shown that the resulting salinity was seriously impairing the use of waters by downstream users (either in the United States or in Mexico).

Thus the pollution approach seems generally consistent with the broader international law principle of international river usage which holds that a riparian state must use its share of the resources of an international river in a just and reasonable manner with due consideration for the effects of its use on usage by other riparian states.[34] To my knowledge, the United States Government has not taken a formal position regarding the application of these principles to the matter of Colorado River salinity or the effect, if any, which such principles might have on the 1944 Water Treaty. In my opinion, however, the United States has attempted to follow a "just and reasonable" policy to reach a practical solution to the problem of Wellton-Mohawk, consistent with its own rights of usage, by reducing the effect of that drainage on deliveries of water to Mexico.

34. Department of State, Legal Aspects of the Use of Systems of International Rivers, *supra* note 30, at 89-90; N.Y.U. School of Law, Research Project on the Law and Uses of International Rivers (June 30, 1959); and Digest, *supra* note 29, at 924-25.

As suggested earlier, a key question in both "pollution" and "just and reasonable" use terminology is the effect of given salinity levels on the territory of the downstream riparian. Uses by the upstream riparian could not be characterized as "pollution" under international pollution standards, or as "unreasonable use" under some general principle of international river law, until a substantial adverse effect were shown on the downstream user. The indication from experts who have reported to the United States Section of the International Boundary and Water Commission and to the Department of State is that given the soil conditions and nature of crops grown in Mexicali Valley, waters of salinities in the range of waters presently being delivered to Mexico can be successfully used for irrigation with no large loss of yield or irrigable acreage provided that proper irrigation practices are observed.[35] It has been estimated that an increase in salinity of 100 parts per million (in the 1000-1500 ppm range) results in no more than a 1-2 percent decline in crop yields. Thus, a difference of a few hundred ppm is a far less significant factor than normal fluctuations in climactic conditions, seed quality, eradication of insect pests such as the pink bollworm, and other causes including proper farm and water management.[36] And regardless of the effects of Wellton-Mohawk drainage on Mexicali Valley lands salt saturation in some of those formerly desert lands has been a recognized problem since well before the 1944 Water Treaty was negotiated.[37] Thus there remains considerable doubt whether the 400 ppm difference in salinity between waters at Imperial Dam and those delivered to Mexico has caused significantly reduced crop yields or damage to substantial acreage in the Mexicali Valley.

35. Dr. Bower, *supra* note 24.

36. Recently, for example, Mexican Engineer Humberto Villarreal, considered to be an authority on salinity, stated that:

> the crisis which confronts Mexicali Valley as a result of a decrease in cotton production is compounded by many factors which complicate the problem of its solution.

He also stated that:

> the growing salinity of the land in the valley is not a phenomenon which is exclusively a consequence of the water received from the Wellton-Mohawk. The salt build up has its geological origin thousands of years ago when the delta of the Colorado River began to accumulate salts. The salinity which has been observed the past 30 or 40 years in the poorer soil of the valley is the same, except for slight variations, as that presently found. El Mexicano (Tijuana, B.C.), Mar. 21, 1972.

37. Memorandum from the Mexican Embassy to the Department of State. 6 Foreign Relations of the United States, 549 (Mar. 19, 1942).

Obviously, the fact that the United States has attempted to act reasonably in its use of its share of the waters of the Colorado River, and in seeking to improve the quality of those waters which are delivered to Mexico for use in the Mexicali Valley, does not mean that additional measures are not needed for the control of salinity of the Colorado River both below and, especially, above Imperial Dam. The Department of State recognizes that measures such as those described earlier by Mr. Reynolds should be put into effect to prevent any significant continued increase of the salinity of the waters arriving at Imperial Dam. We also realize that salinity control above Imperial Dam should be accompanied by practical measures designed to assure improvement in the quality of the waters being delivered to Mexico under the 1944 Water Treaty.