Presentation to the Western States Water Council
on
Implementing the Regional Planning Provisions of
the Colorado River Basin Project Act
by
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I have been asked to discuss with you today the plans of the Bureau of Reclamation for complying with the provisions of the Colorado River Basin Project Act with respect to regional planning. This I am happy to do but my discussion necessarily will be general. As of now we have not decided upon any detailed order of procedure, principally for the following reasons:

First, the Act was approved quite recently, barely two months ago.

Second, except for some general funds, we are not financed to conduct the required studies.

Third, the final report is not due until June 30, 1977, and the first progress report until June 30, 1971. Hence, we have turning room and time to organize for a thorough going effort, and

Fourth, although I doubt it will have much if any effect, the change in Administration could conceivably influence the direction and conduct of the studies.

Thus, at this time we have given only preliminary thought to the organization and conduct of the study. We plan to have a meeting in January of concerned Reclamation personnel to discuss the various aspects of the study, to draw up definite goals and to develop proposals to accomplish them. I hope to take from this meeting some ideas as to how best the studies might be conducted.

In the legislation and in the legislative history of the Colorado River Basin Project Act there are some definite guidelines as to what is
contemplated and expected of the studies. We also have some tentative ideas as to how we will proceed which I will review briefly at this time.

The Act itself directs the Secretary of the Interior to conduct full and complete reconnaissance investigations pursuant to Reclamation Law, and pursuant to the Water Resources Planning Act of 1965 with respect to coordination, for the purpose of developing a general plan to meet the future water needs of the Western United States.

The conference report on S. 1004 goes into some detail as to the type of studies intended and is the major item of legislative history.

Although many of you, I am sure, are familiar with that report, I believe that it would be helpful here to read the pertinent section of the conference report. It reads as follows:

"The language developed by the committee of conference as a substitute for section 201 of the House amendment directs the Secretary of the Interior to conduct full and complete reconnaissance investigations for the purpose of developing a general plan to meet the future water needs of the Western United States, a term which is defined in title VI of the conference report as those States lying wholly or in part west of the Continental Divide. The investigations and development of the plan are to be in accordance with reclamation law, and the studies, investigations, and assessments of water availability must be coordinated with other water planning activities being conducted under the Water Resources Planning Act. The purpose of the reference to the Water
Resources Planning Act is to assure cooperation and coordination among all Federal agencies, affected States, and study commissions established pursuant to the Planning Act and to eliminate possible duplication in the overall water resources planning effort. The reference of the Planning Act does not, of course, subject the Secretary of the Interior to the prohibition in that act against the study of transbasin transfers of water.

It is intended that the Secretary initiate this westwide planning effort by determining the water supplies available, and the long-range water requirements in each water resource region of the Western United States. When this phase of the study is completed, the Secretary can then proceed with investigations to determine the most economical means of augmenting the water supply of the Colorado River in order to serve the most critical water-short area of our Nation. When the water needs of the Colorado River Basin and the time schedule therefor have been established, all possible sources of water must be considered, including water conservation and salvage, weather modification, desalination, and importation from areas of surplus. However, for a period of 10 years from the date of this act, the Secretary cannot undertake studies of any plan for importation of water into the Colorado River Basin from any other drainage basin lying outside the States of Arizona, California, Colorado, New Mexico, and those portions of Nevada, Utah, and Wyoming which are in the natural drainage basin of the Colorado River. As the
studies proceed, the Secretary is required to submit progress reports every 2 years and to submit, not later than June 30, 1977, a completed reconnaissance report on water supplies and water requirements for the entire 11 Western States area as well as the possibilities of augmentation from within the Colorado River Basin States. Both the progress reports and the final reconnaissance report are to be submitted to the President, the National Water Commission (while it is in existence), the Water Resources Council, and the Congress.

The investigations and studies under this title do not end with submission of this initial report in 1977. This is only the first phase. It is intended that following the completion of this phase of the investigations and studies, the Secretary shall continue, pursuant to existing authority, to pursue vigorously the stated objective of section 201 which is to develop a general plan to meet the future water needs of the entire Western United States. He is expected to make such recommendations with respect to feasibility studies as are justified and appropriate, including feasibility studies of augmentation opportunities within the Colorado River Basin States. Also, it is intended that the Secretary, when the 10-year moratorium on studies of importation from outside the Colorado Basin States comes to an end, will conduct such additional reconnaissance investigations as are justified of importation from outside the Colorado River Basin States and make such recommendations with respect to feasibility studies as are warranted. He will do this pursuant to
existing authority and in the light of the investigations and studies
he has completed up to that time."

The remarks of Representative Aspinall and Senator Jackson on the floor
of the House and the Senate, respectively, in explaining the intent of
the study directive are a reiteration of the expressions of the
conference report.

From the language of the Act and from the legislative history certain
things are clear:

1. The charter issued to the Secretary of the Interior is broad.
2. Initial studies are to be reconnaissance in character.
3. The area of study comprises the eleven western states with,
in all probability, major emphasis on that portion of the area
west of the Continental Divide.
4. Duplication of the work of interdepartmental river basin
commissions and regional planning commissions is to be avoided.
5. There shall be broad coordination of the studies with States,
other Federal agencies, study commissions, and the Western
States Water Council.
6. Initial activity shall be directed toward determining water
supplies available and long-range water requirements.
7. Following the initiation of these determinations, development
of a plan to augment the Colorado River shall have high priority.
8. There is to be a ten year moratorium on study of imports to the
Colorado River from natural river basins outside of the
Colorado River Basin States.
9. Progress reports are to be submitted to the President, the National Water Commission, the Water Resources Council, and to the Congress each two years beginning on June 30, 1971, and a final reconnaissance report so submitted by June 30, 1977.

10. Investigation will not end with the reconnaissance report. This will only be the first phase to be followed by feasibility investigations.

11. Following the end of the 10-year moratorium such studies of surface water imports from outside the Colorado River Basin States as are justified will be undertaken.

Pursuant to the conference report guidelines the initial activity of the reconnaissance study will be directed toward determining water supplies available and the long range water requirements in each water resource region of the Western United States. Practically the entire area involved, however, is covered by a Federal Interdepartmental Comprehensive Basin Survey or is included in the area of study of the Pacific Northwest River Basin Commission. In addition most, if not all, of the individual states are either independently or in cooperation with Federal agencies formulating State water plans. An important part of these state and comprehensive basin study endeavors is the determination of available water supplies and long range water requirements. I am sure that we will not duplicate these studies as part of the west wide reconnaissance. Rather, the role of the Bureau of Reclamation will
be to fill in any gaps in coverage, reconcile differences, and merge the findings in the individual river basins into a single west wide picture.

As I view it, this phase of the reconnaissance is expected to involve largely the synthesis and coordination of the results of studies by other groups. Perhaps the most difficult task will be to reconcile the projections of future water requirements as presented in individual state plans with those included in the broader basin surveys.

The other broad aspect of the reconnaissance will be the development of plans to meet future water needs. It is in this area that the opportunity for original work lies as the existing river basin studies are not oriented so strongly in this direction.

Here again the planning effort undoubtedly will be segregated initially by geographical areas and later combined into a general west wide plan. At this time I cannot tell you how we will proceed with development of plans for the Pacific Northwest, the Great Basin, the Central Valley, and the portions of the eleven western states east of the Continental Divide. After our meeting in January we should have some basic ideas but we may be feeling our way for some time. As to the Colorado River Basin, which is identified as a priority area for study in the Conference Report, we do have some general ideas as to augmentation studies to be pursued. There are four principal ways in which augmentation will be
investigated -- desalting of sea or brackish water, weather modification, surface water imports from California streams, and water salvage measures. I would briefly like to outline these possibilities:

**Desalting of Sea Water** -- Our Bureau in cooperation with the Atomic Energy Commission and the Office of Saline Water, has made preliminary studies of a nuclear-desalting complex on the California coast capable of producing over 2,000,000 acre-feet of desalted water annually as a means of augmenting the Colorado River. The desalted sea water would be conveyed through an aqueduct system 313 miles in length to Lake Mead where it could be thoroughly mixed with Colorado River water.

The desalting plant would be constructed in 3 stages. Installation would be scheduled in order to deliver 1.0 million acre-feet to Lake Mead in 1990, and an additional 0.5 million acre-feet in the years 2000 and 2010. The related powerplant would have 7,229 megawatts of installed capacity, of which 902 megawatts would be required for project pumping. The remainder would be available for commercial sales and auxiliary standby. It was assumed that the nuclear-desalting complex would be a joint venture of Federal and non-Federal interests with the latter participating to the extent of financing and marketing the commercial power component.

The Federal government's share of the construction costs were estimated to be $2,784,000,000, which consists of $921,000,000 for the nuclear-desalting plant and pumping facilities, and $1,863,000,000 for the
aqueduct system. Annual Federal operation, maintenance and replacement costs would total $48,910,000. The cost of water produced and delivered by these facilities was estimated to total $80 per acre-foot consisting of $50 for conveyance and $30 for the desalting process. The $80 figure is equivalent to a cost of 25 cents per 1,000 gallons.

These cost estimates, at least in part, were based on projected techniques for combined nuclear-desalting and thermal-electric generating plants. It was also assumed that fast breeder nuclear reactors will be developed by 1995. Such reactors would increase the fuel use efficiency and result in low fuel cycle costs, low cost heat, power, and water.

Our January 1968 report on the findings of our studies concluded that, with the assumed levels of technology, it is reasonable to expect that detailed studies will establish that it would be feasible to augment the Colorado River with at least 2 to 2.5 million acre-feet of desalted sea water annually. Eventually amounts greater than 2.5 million acre-feet per year will be needed.

The report presented alternative plans including location of the desalting plant on the Gulf of Southern California. It pointed out that if proper international agreements could be worked out significant savings in water conveyance costs could be realized by such a location.
Continuing study of alternative routes and of developing technologies in nuclear reactors and desalting equipment will be an important part of the augmentation study effort.

Recent studies of geo-thermal areas in Southern California reveal the presence of large bodies of ground water at high temperatures having major potential for conversion to electric power. The potential also is available for recovery of millions of acre-feet of water susceptible to conversion to fresh water. Further study of these potentials also will be undertaken.

Weather Modification -- Detailed planning is being initiated for a large-scale pilot operation in the Upper Colorado River Basin. Knowledge gained through comprehensive efforts and research projects financed through the National Science Foundation lends validity to the planning of an undertaking of this magnitude. This first pilot project logically could be initiated within the next five years.

Primary target areas for initial large-scale operations have been tentatively selected. These areas total 14,200 square miles and have precipitation and runoff sufficient to warrant weather modification. These areas are generally above 9,500 feet where settlement is sparse and where temperatures are suitably cold during reasonably long periods of time. The best seeding season normally is November through April when an average of 19.4 inches of precipitation occurs.
We believe it safe to assume that average winter precipitation can be increased by 15-percent within the next 10 years. Such estimates seem conservative when we consider that current cloud seeding operations and experiments are yielding precipitation increases in the general range of 10-to-20-percent and that expanded knowledge and improved systems should be available by the mid-1970's.

Such an increase would provide an average annual streamflow augmentation of about 1,900,000 acre-feet during the spring runoff. Regulation provided by the large amount of storage capacity built in the Colorado River Basin will make virtually all the increase usable water supply.

Full-scale cloud seeding operations in the prime target areas are estimated to cost $2,650,000 annually. This estimate includes amortization of the capital cost of the hardware and the operation, maintenance, and replacement costs, as well as a continuing analysis of results and any effects on ecological regimes. Based on these estimates the unit cost of producing 1,900,000 acre-feet of new water by cloud seeding would be $1.50 per acre-foot.

The regional research and development effort for the Upper Basin will be our first such undertaking in weather modification. The knowledge gained here will be beneficial for similar projects elsewhere.

Assuming that the predicted yield is realized, a major question would undoubtedly arise. That is would the additional water developed by cloud seeding be considered augmentation water in fulfillment of the
Mexican Treaty obligation or would it be claimed by the Upper Basin in fulfillment of its 7.5 million acre-feet allotted by the Colorado River Compact but unavailable to the Upper Basin by reason of the Upper Basin's obligation to not deplete the runoff at Lee Ferry below 75,000,000 acre-feet each consecutive ten year period?

Potential Surface Water Imports from California -- Two potentials exist for augmenting the Colorado River by importing surplus surface water from California streams. First, in average and above average years the Central Valley produces a great deal of water that is surplus to its needs. By diverting this excess water to off-channel hold over storage reservoirs and pumping it into the Colorado River basin it could be used for augmentation. This potential has not been studied but it is expected that costs would be high.

The second potential would entail controlling surplus runoff of North Coast streams for transbasin diversion to the Colorado. Limited study has been made of this potential which indicates that its costs also would be high, and further, that California eventually will need this water for its internal use.

Further consideration will be given to both of these potentials.

Water Salvage Measures -- Much has already been accomplished to salvage water and prevent waste through channelization, canal lining,
water shed treatment, construction of Senator Wash regulating reservoir, and other means. Additional salvage and waste prevention can be attained through eradication and control of phreatophytes, ground-water recovery, municipal waste water capture and treatment, evaporation suppression, further water shed treatment, further canal lining, and other means.

Water made available through salvage measures is usually relatively inexpensive. Although water salvage is not the complete answer to augmentation, it should and will be thoroughly considered to determine the extent to which it can contribute to the total water needs.

These are some of the studies that will be under way during the next ten years relating to the augmentation of the Colorado River. Other studies relating to other water short areas such as the Great Basin must also be undertaken if the broad charter of Title II of the Colorado River Basin Project Act is to be realized.

I would like to call your attention to a major problem which we will face and which will receive high priority consideration in formulating our study plans -- that is how best to bring the affected States, the Western States Water Council, other Federal agencies, and other planning groups into the overall study effort. This surely is essential. Representative Aspinall expressed it well in his recent address to the National Reclamation Association when he said: "If this planning effort is to succeed, the States themselves must negotiate their differences and make the decisions and the necessary agreements with respect to water use in the west. All states, agencies,
groups, and individuals involved in water planning must work together with a common objective if we are to achieve success."

As to organization of the reconnaissance study I expect that we will establish a small directional and coordinating group in a central location in the West. I expect also that the existing planning organizations in our seven regions will be used to be maximum practical extent. Establishment of the organizational pattern to be followed will be a primary consideration at our January meeting.

In summary we have a broad charter and a broader challenge. We have an opportunity for creative planning of new scope and new dimensions. To achieve success we realize that we must have not only the cooperation of the Western States and other water resources planning groups but we must have their active participation as well. This we will active in every way possible to achieve. Some basic guidelines for the study effort have been set forth by the Congress, others have yet to be developed. We are anxious to get under way and to the extent that very limited available funds will permit we will start immediately. Thereafter, we will proceed as fast as funds and personnel will permit. We solicit your support and will appreciate deeply any suggestions that you may have as to how best we can accomplish our ultimate mission of forging a workable and acceptable plan to meet the future water requirements of the Western United States.