THE ROSWELL SALINE WATER CONVERSION PLANT-- ITS IMPORTANCE AND MEANING TO NEW MEXICO

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New Mexico has a considerable stake in experimentation with various processes of desalinization currently being carried on by industry and government, and she has expressed her interest in a variety of ways.

Public Law 85-883, sponsored by New Mexico's Senator Clinton P. Anderson, authorized the Secretary of the Interior to construct, operate, and maintain for a limited period of time not less than five demonstration plants to produce, from the sea or from brackish sources, water suitable for agricultural, industrial, municipal, and other beneficial uses. Under terms of the act, which became effective on September 2, 1958, at least one of the five plants was to be located in the semiarid Southwest.

In October 1958, Governor Edwin L. Mechem of New Mexico by letter advised Secretary of the Interior, Fred E. Seaton, of benefits which would result from construction of a brackish-water conversion plant in New Mexico. The letter cited 16 New Mexico communities of more than 1,000 population which were utilizing, for public supply, water whose quality was below recommended standards of the United States Public Health Service. The 16 communities were Artesia; Carlsbad; Fort Sumner; Hagerman; Jal; Roswell; Santa Rosa; and Vaughn in the Pecos Valley; Espanola and Truth or Consequences in the Rio Grande Valley; Alamogordo, Carrizozo, and Tularosa in the Tularosa Basin; Aztec and Farmington in the San Juan Basin; and Hurley in Grant County. The letter also invited attention to the tremendous saline-water resources of New Mexico, and expressed the hope that means could be devised to render this potentially valuable resource available for beneficial use.

Secretary Seaton's reply to the Governor's letter, dated November 5, 1958, suggested a cooperative agreement between the Department of the Interior and the State of New Mexico providing for mutual technical assistance and exchange of information concerning techniques of brackish-water conversion. This agreement subsequently was executed. A similar agreement was entered by the Department of the Interior and New Mexico State University.

The third New Mexico Water Conference, held at University Park, on November 6 and 7, 1958, had as its theme "New Mexico

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Water--Present Use and New Sources," and Public Law 85-883 received considerable conference attention. Senator Anderson delivered an address on the subject of congressional interest in the Nation's water resources. David Miller, eminent consulting ground-water geologist, presented a paper titled "Development and Utilization of Saline Ground-Water Resources." John O'Meara, special assistant to the Secretary of the Interior, described various tried methods of desalinizing water.

On November 7, 1958, the third Water Conference adopted a resolution commending Senator Anderson, Secretary Seaton, and others instrumental in enactment of the conversion plant statute, and urging that the authorized southwestern plant be located in New Mexico. The resolution established a standing committee to cooperate with the Senator and the Secretary to work with the State Engineer and other officials in selecting potential plant sites within the State, to keep appropriate officials in Washington keenly aware of New Mexico's interest during the period in which various potential sites were being considered, and to do all things possible to establish the feasibility of constructing a conversion plant in this State. The committee was headed by Mr. Rogers Aston of Roswell, a member of the Water Conference Advisory Committee. Organizations cooperating with the standing committee in its efforts included the New Mexico Geological Society, New Mexico Oil and Gas Association, New Mexico Bankers Association, New Mexico Economic Development Commission, Southeastern New Mexico Chapter of the American Petroleum Institute, Realtors Association of New Mexico, and the New Mexico Farm and Livestock Bureau.

On November 17, 1958, the State Engineer transmitted to the 16 New Mexico municipalities cited by the Governor as utilizing inferior water supplies questionnaire forms suggested by the Department of the Interior's Office of Saline Water for assembly of data required to evaluate the merits of each community as a potential site for the southwestern plant. Eleven of the municipalities completed questionnaires and forwarded them to the OSW in Washington, together with requests that their communities be considered as sites for the plant.

Owing in no small measure to efforts of the Water Conference Standing Committee and its supporting groups and associations, the 24th Lesgislature of New Mexico in 1959 authorized the State Engineer to enter a second cooperative agreement with the Office of Saline Water, under which New Mexico would pay 10 percent of the cost of constructing a brackish-water conversion plant, up to a maximum expenditure of $100,000 provided the plant should be located in New Mexico.

Later in that month, Mr. W. W. Rinne of the Office of Saline Water made a preliminary inspection of the 11 proposed New Mexico sites. He was accompanied during the inspection by personnel of the State Engineer Office and the Ground Water Branch of the Geological Survey. These agencies also supplied to the OSW basic and interpretive data pertaining to the water resources of each of the New Mexico sites under consideration.

On the basis of Mr. Rinne's preliminary investigation, the Site Selection Board of the OSW narrowed the field of potential sites for the southwestern plant from the 55 originally considered to 10--5 in Texas, 4 in New Mexico, and 1 in Arizona. New Mexico communities still in the running were Alamogordo, Carlsbad, Roswell, and Santa Rosa. Accompanied by personnel of the State Engineer Office and the Geological Survey, the Site Selection Board visited the four New Mexico communities between November 7 and 11, 1959, to inspect proposed sites and to interview municipal officials with regard to the various problems associated with final site selection.

On February 3, 1960, Secretary Seaton announced that Roswell had been selected as the site for the southwestern brackish-water conversion plant, and that the forced-circulation vapor-compression distillation process would be used, in a plant to be designed and constructed to produce at least 250,000 gallons of fresh water daily. Production capacity of the plant later was increased to about a million gallons a day.

Under contractual agreement with the Office of Saline Water, the City of Roswell provided a 7-acre site for the plant and agreed to deliver to the plant daily about 4 acre-feet of raw water containing some 25,000 parts per million total dissolved solids, for conversion to nearly pure water containing less than 50 parts per million. The city agreed further to purchase the product water and to dispose of the brine effluent, which will amount to from 1 to 1½ acre-feet per day of water, with a dissolved salt content of approximately 100,000 parts per million (three times the salinity of sea water, four times the salinity of the raw water feed).

On April 6, 1962, Secretary of the Interior Stewart L. Udall announced the award of a contract in amount of $1,794,000 to the Chicago Bridge and Iron Company for construction of the plant. The installation was to be completed within 1 year, followed by an acceptance-test period of 75 days. The contract was fulfilled, and the first brackish-water conversion plant in the Southwest using the vapor compression process is now operating.

No one believes that this plant will solve all the water problems of the Roswell Basin. Overall, we can expect only a

very modest measure of relief from this first desalting plant, but it will help improve conditions locally by slightly reducing the amount of fresh water being withdrawn from the basin, and by slightly decreasing the tendency for saline water to move into portions of the aquifer where the water is still fresh. Also, the plant's product water, which will amount to about 10 percent of the city's annual usage, can be used to give the people of Roswell water of a little better quality, to attract specialized industries requiring water with a very low concentration of dissolved solids--or both.

Perhaps the most significant fact of all is that, by acting with dispatch and great determination to have the southwestern conversion plant located in New Mexico, the people of Roswell and the State as a whole demonstrated clear recognition of their obligation as custodians of our resources by contributing materially to a program which promises to enhance the future of the State, and the nation as a whole, by increasing the quantity and improving the quality of our usable water supplies. These contributions undoubtedly were determinative in the site-selection committee's decision that this plant should be located in Roswell.

What are the potential benefits to the rest of the State?

New Mexico reportedly has about 15 billion acre-feet of saline ground waters of a quality which ranges from brackish to brine. If only one-tenth of these saline waters could be mined, desalinized, and conveyed to places where water is or will be needed, we could supply for 1,000 years as much water as we are presently pumping from our ground-water reservoirs. These salt-laden waters, which in the past have usually been considered a curse in this arid land, may yet become one of our greatest blessings.

As has been noted, the desalinization techniques being developed and evaluated in this and the other demonstration plants across the nation promise not only to increase the total quantity of water available for beneficial use but also to improve the quality and utility of waters presently being used. In New Mexico, there still are at least 16 communities of more than 1,000 population using substandard water for public supply. Desalinization of these supplies could make an important contribution to the welfare and comfort of the citizens of these communities and their visitors.

In addition to the potential for improving the utility of presently developed water supplies, there are important potentialities for applying desalinized water to new uses in New Mexico. Let us take, for example, Lea County on the Southern High Plains.

As everyone here probably is aware, Northern Lea County contains one of New Mexico's most intensive ground-water developments--primarily for agricultural use. Water there is being mined; that is, the annual withdrawals, currently averaging about 170,000 acre-feet annually, greatly exceed the average annual recharge of 30,000 acre-feet and the estimated 25 million acre-feet in storage is being depleted. Controls instituted in 1952 envision withdrawals of up to 440,000 acre-feet per year with a resultant economic life for agriculture of about 40 years--at the end of which period it was believed that the aquifer would be so depleted that agriculture could not thereafter pump water economically for irrigation.

I might remark that recent studies indicate that rates of withdrawal in Lea County have not been as great as anticipated and water may remain economically available for a somewhat longer period than was originally estimated. But, whenever and wherever water is mined on a sustained basis, there ultimately must come a time when the supply will be depleted.

Lea County also contains rich oil and gas fields where the estimated reserves are increasing as a result of exploration and discovery despite steady production. When the saturated thickness of the fresh-water aquifer in Lea County has been reduced by about two-thirds, well-production capacity will be low and it probably will be uneconomic to produce water for irrigation. It probably will be economically feasible for municipalities and industries to pump much of the remaining water for their use, utilizing numerous low-production wells. Nonetheless, it seems reasonable at this time to anticipate that there will be demands for water for oil and gas production and processing and other industries, as well as for municipalities, when the fresh water resources of the area are essentially depleted. If the practicability of desalination can be demonstrated, saline waters and brines--abundant in Lea County--can be used to meet these demands for an indefinite period of time.

Another area that comes to mind is the Tularosa Basin. This arid valley has become an important center of military and space research and development. Rocketry is still in its infancy and there are indications that these activities in the basin may be stepped up.

Research and development and the people associated with it require water. If the program continues to grow it could ultimately overtax the fresh water resources of the Basin. Water is already being imported from the Hondo Valley to the east and more could be imported from other drainages, for example, the Rio Grande, to meet the needs of almost any conceivable program.

However, the USGS has estimated that 143 million acre-feet of saline water underlies the arid floor of the Tularosa Basin, and this water--right at the doorstep--could be developed and refined by one of several proven processes being demonstrated here in Roswell and elsewhere. Under the program of the Office of Saline Water the cost of desalination is steadily being driven downward. Under Secretary of the Interior Carr recently told a Congressional Committee that fresh water from ocean water could be produced from known processes at about 30 cents per thousand gallons.

It does not seem visionary to suggest that when more water is needed in the Tularosa Valley it may be found more economical to pump and refine water from the local saline aquifers than to pipe another auxiliary supply into the basin from a distant river whose supply is already fully appropriated. This solution to the problem would be especially attractive inasmuch as it would accomplish the end desired without buying and transferring water rights and uses and disturbing going economies elsewhere.

There are many other areas in New Mexico where fresh water for new uses could be obtained by conventional means only at great expense by transportation over long distances. In general, there also would be the added expense of acquiring rights from present users of fresh water, as well as attendant disruptions of going economies. The unit cost of water obtained in this fashion would be particularly high in cases wherein the quantity needed is relatively small.

The Raton and Las Vegas Plateaus in the northern part of the State provide an example of a large area deficient in fresh surface-water and ground-water supplies. However, there almost undoubtedly are large amounts of saline water available from the Upper Cretaceous Formation which is 3,200 feet thick under much of the region. Similar conditions exist in the Gallup area, in much of Rio Arriba County, and elsewhere in the State where rocks of Cretaceous age occur.

Even at the present stage of development of desalinization processes, it could be economic to develop and convert saline water for municipal and industrial uses in such areas.

Desalinization demonstration plants such as the one dedicated at Roswell today will make it possible for us to evaluate the economic feasibility of enhancing our total water resources through use of treated saline water and will give us the experience needed to do this in the most practical and economic fashion. In this direction, it may be noted that most saline water in New Mexico contains relatively high concentrations of sulfate; the process

chosen for demonstration at the Roswell plant is particularly adapted to handle water whose sulfate content is high.

I think we all may be proud of the pioneer work the United States is doing in the field of water desalinization to improve and insure the welfare of people the world over. I think we may be particularly proud of the contribution to this work that is being made by the people of Roswell and the State of New Mexico.