FUTURE OF SALINE WATER CONVERSION

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Mr. Chairman, members of panel, and ladies and gentlemen of the water conference: I am very happy to be with you today, and feel honored indeed to have been asked to say a few words. Having arrived on the New Mexico scene a dozen years ago, I have spent a good part of my time looking for water, good or bad, but looking for water. Though I have not been associated with the saline water program, I have followed the developments as reported in the press and trade journals. The dedication which most of us attended yesterday means much to us now and will mean a great deal more as time goes on.

In discussions of saline water conversion we often hear comments about the unlimited resources in the oceans, and how we may expect to get all the useable water we will need from that source as power becomes cheaper. In New Mexico, it may be a long time--if ever--before we can convert ocean water for use for irrigation at this altitude. Even when the day arrives that conversion costs are reduced to the 30 cents per 1,000 gallons range reported to a congressional committee by Under Secretary Carr early this year, the costs of lifting the water to New Mexico fields will nearly double that figure and we will still be talking in terms of $200 per acre-foot. The industrial and domestic consumer may well afford such prices, but I doubt if this will ever be true for the agricultural consumer. This then means that we need to look to supplies of saline water occurring at this elevation, which can be brought to the surface for a penny or two per 1,000 gallons, and which can perhaps be treated for less since most of these waters will be much less mineralized than sea water. Much information is already available, both as to saline water resources and as to methods of conversion. Our State Engineer, Mr. Steve Reynolds, gave us an estimate of 15 billion acre-feet of ground water in the state ranging from brackish to brine. He pointed out, you will recall, that 10% of this water--made useable--would last a long time. According to the most recent biennial report of the State Engineer this 15 billion acre-feet represents about three-fourths of the ground water of the state. The U. S. Geological Survey's district staff in Albuquerque have prepared a number of reports that will be of much help to all who are concerned with the problem.

James W. Hood and Lester R. Kister of the Survey describe the general geology of the state and the saline-water aquifers in

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U. S. Geological Survey Water Supply Paper 1601, "Saline-Water Resources of New Mexico," published in 1962. They state: "Parts of most aquifers in New Mexico contain saline waters, and some of the aquifers can yield large quantities of saline water to wells." And, "Few of the aquifers in New Mexico contain exclusively fresh or saline water." Aquifers are described and tabulated, and selected examples of well discharges are noted, together with discussions of the dissolved minerals. Analyses of saline waters are tabulated and locations of wells and springs sampled are shown on maps arranged according to source aquifer. Saline surface waters are also described with particulars included for many streams and localities. This work is an excellent guide to the selection of areas meriting additional study, particularly in terms of reserves (or total supplies of saline water).

Water Supply Paper 1374, "Preliminary Survey of the Saline-Water Resources of the United States," by Krieger, Hatchett, and Poole, not of the Albuquerque District, published in 1957, provides saline surface and ground-water data on a country-wide basis.

James W. Hood, co-author of the New Mexico study is also the author of Water Supply Paper 1939-M, "Saline Ground Water in the Roswell Basin, Chaves and Eddy Counties, New Mexico, 1958-59," published earlier this year. Mr. Hood indicates that encroachment of saline water in the San Andres limestone is a serious problem in a number of areas. The work of Mr. Hood probably provided much of the source data which was used in the evaluation of this desalination plant site.

The Demonstration Plant Program of the Office of Saline Water is showing what can be done in the field of conversion. Plants in operation for some time have been performing beyond expectations and more improvements will be forthcoming. Large quantities of lower-cost water will be coming our way.

At this point, I should like to inject the thought that there is also a very real need to develop the small-quantity conversion technique to the point where it is sufficiently reliable and sufficiently non-technical so that the average home owner can operate his own unit. During the past few years, each time I read about a large unit, particularly of the electrodialysis type, going into production, I felt the need--an urgent need, for units of a size adequate to treat domestic supplies for the ranch housewife--and to treat supplies for stock watering. For example, as you travel westward from Carrizozo, and cross the Jornada del Muerto, you can see windmills on either side of the highway, some near ranch headquarters, some just "high lonesome." And everyone of these produces water in the saline range--some as high as 4,000 ppm of dissolved solids. This is just an example of one area in

the arid Southwest, but it is an example which we should not and will not forget. It is my understanding that at least one manufacturer has installed a number of low-capacity units in a community in a neighboring state; in a city where it was possible to have a maintenance man readily available. I have neither read nor heard about results of those installations, but more than likely the large distances between installations in a place like the Jornada, and, the need for some servicing may keep manufacturers from actively seeking sales in such an area until all the "bugs" are finally ironed out of the units. The ranchers are undoubtedly there to stay, and we need to help provide them with a satisfactory water supply.

Along with these few random comments, I believe I was expected to say a few words about our efforts in the field of water resources at the Institute of Mining and Technology at Socorro. J. A. Schufle of the Chemistry Department has perhaps been most closely associated with the demineralization program. In an article entitled "Deionized Water by Electrodialysis" Dr. Schufle pointed out that costs of deionizing by this process are exceptionally low and that the water is equivalent in quality to distilled water. He stated further that the method is most efficient in this range, and the cell can produce water at a power consumption many times less than for a conventional still. To date his interest has been in producing a "distilled quality water" from already potable supplies. The cells used in his studies produced about 100 gallons of water per day, one of which was displayed at the Water Conference at New Mexico State University in November 1961.

Francis R. Hall of the Research and Development Staff at the Institute of Socorro has been making a study of the quality of water in a number of areas in the State. One of Dr. Hall's areas of prime concern has been the Pecos Valley. He has tabulated and plotted, made equilibrium studies and constitutent correlations, of several hundred samples in this area. His objective is to learn as much as possible about what happens to water in a limestone aquifer--what causes the changes in quality between the recharge water and the discharge area. Work such as this may have an important bearing on water management of the basin at some future time.

There are on file in the petroleum section of the Bureau of Mines Division of the Institute more than 28,000 oil and gas well records. We know from preliminary and spot inspections that most of the logs make little or no reference to water, but have hopes that a careful "swabbing" of the files may yield sufficient valuable data about the saline water resources that such a study would be well worthwhile.

From Dr. Workman, President of the Institute and Director of the Research and Development Division, on down through the ranks we have many others working in the field of water resources--on varied studies ranging from thunderstorm projects and ice studies to quantitative ground-water movement formulas such as those developed by Dr. Hantush. Other projects which have a bearing on the water resource picture include seismic studies, earth resistivity studies, and induced polarization studies, in which the emphasis has been on the improvement of techniques and instrumentation toward a better understanding of the earth below.

It should, of course, be noted that geologists of the Institute have played a large part in their mapping of goodly portions of the State. Much of this mapping was done for other studies but it certainly provides the basic guidelines for more detailed studies for ground-water evaluation.

With the mention of just one more project, I shall have about used my allotment of time. Tritium is a heavy radioactive isotope of hydrogen having a half-life of about 12-1/2 years. This property, plus the fact that it is almost nonexistent in nature, makes it valuable in tracing the flow of water in aquifers. Bomb-produced tritium, which increased the total quantity of tritium many-fold, has been of much help in the age-dating process as applied to ground water in determining how long waters--as, for example, spring waters--have been underground.

During the discussion period, I shall be happy to answer any questions you may have, regarding any of my remarks or regarding our work at Socorro.

Upon the future of saline water conversion depend the futures of many areas of the world, and these futures have a bright outlook.