

A 9-year, \$25 million comprehensive development program will be needed before the large-scale operation described above can begin. Reducing the development time or costs may endanger opportunities to achieve a full success in utilizing such a new and complex technology as weather modification.

The regional research and development effort for the Upper Basin will be the first such undertaking in weather modification by the Bureau of Reclamation. Much of what is learned here will aid similar projects for other areas throughout the Nation.

WATER QUALITY STANDARDS

The Colorado River is the only major river of the world that is virtually completely controlled. With the existing system of large storage reservoirs it is possible to plan, for all practical purposes, on complete utilization of the river's runoff with no utilizable water escaping to the sea. This means that the limited water supply in the Colorado River Basin must be used and reused and then used again for a wide variety of purposes. In this complete utilization of runoff, the Colorado Basin is unique.

The River is unique also with respect to the number and extent of the institutional constraints on the division and use of the Basin's water which include an international treaty, two interstate water compacts, Supreme Court decisions, Indian water rights, State water laws, and Federal law.

These two aspects, in turn, make the problem of setting numerical mineral quality standards for the Colorado River not only unique but extremely complicated. Before discussing this problem further, I would like to state that salinity standards will not be established until we have sufficient information to assure that such standards will be equitable, workable, and enforceable.

The principal water uses in the Basin include irrigated agriculture, municipal and industrial water supply, fish and aquatic life, and recreation. Salinity in the Colorado River has no significant effect on instream or nonconsumptive water uses such as hydroelectric power generation and water-oriented recreation. However, ever-increasing levels of salinity do have an adverse impact on the consumptive uses of water for both irrigated agriculture and municipal and industrial water supply.

Further development and depletion of water allocated to the Upper Basin States will raise the salinity of water downstream.

Salinity standards must be so framed that they will not impede the growing economy of the Colorado River Basin and yet not permit unwarranted degradation of water quality. This is the hard dilemma which is the core of the problem of establishing equitable salinity standards.

A decision not to set salinity standards at this time does not and will not preclude getting started with programs to study and demonstrate the feasibility of controlling and alleviating the Basin's salinity problem. Promising methods of attacking this problem include (1) control of natural sources by such methods as suppression or diversion of mineral springs; (2) control of municipal and industrial wastes by lagooning or injection into deep geological formations; (3) reduction of salt loads from irrigated lands by such measures as rejection of areas of saline soils in new developments, improved irrigation practices, and control of drainage water; (4) alleviation of water losses through reduction of evaporation and evapo-transpiration, and control of phreatophytes; and (5) removal of salts by desalting.

Water quality also can be improved by measures to increase water supplies such as weather modification and augmentation by desalted sea water which I have previously discussed. These potentials for improving water quality are being explored. The Colorado River Basin Water Quality Control Project of the Federal Water Pollution Control Administration will complete by the end of 1968 a comprehensive report describing the mineral quality of the Basin's waters, delineating the causes of salinity and future increases thereof, assessing the effects of salinity on beneficial water uses and evaluating the economic impact of existing and future mineral quality. The Bureau of Reclamation, for several years, has been giving greater attention to salinity problems as they are related to and influenced by water resources development. Also, the Bureau has just recently embarked on reconnaissance studies to identify possibilities for controlling salinity and to identify specific studies that should be taken to assess control measures at a few select salinity sources. We hope to expand activities of this type in the years ahead, and in this context I can report that we are moving ahead with programs that we expect will lay the foundation for setting workable salinity standards.