dustrial trends indicate reuse, increase recirculation ratios, and even closed-cycle operations, but they also indicate an overall increase in consumption. Therefore, the ever-increasing problem of dissolved solids combined with the reduction in volume of the diluting water will increase the salinity even further.

In its assessment of the Nation's water resources, the Water Resources Council projects intensive use of the available water by the year 2000. At that time, the ratio of withdrawal to availability will exceed 100% in five of the regions studied, with two of these regions exceeding 170%. Of the remaining 16 regions, four will exceed 50%. (In 1965, only three regions exceeded 50% and only one of these exceeded 100%). Therefore, in less than 30 years, over 40% of our water resource regions will be using water very intensively. Desalting technology can make substantial contributions in reducing the salinity of our natural waters and in preventing the build-up of concentrations of many toxic substances.

The U.S. Public Health Service has established criteria for drinking water, including a recommended level of not more than 500 parts per million (ppm) of total dissolved solids and a maximum level of 1,000 ppm. Studies show that, although for much of the country the quantity of water will be adequate for the foreseeable future, its quality will become increasingly unacceptable as it is used more intensively.

Several hundred communities are now using water containing more than 1,000 ppm. Desalting will provide water of more acceptable quality.

This committee is acutely aware of the increased attention that has been focused on the environment in the past few years. Our awareness of ecological problems is rapidly increasing; but, we still do not know the effects of many substances contained in our industrial and municipal effluents. We find that desalination can make a sizable contribution to the problem of water quality beyond that of removing total dissolved solids, because desalination processes remove many other contaminants as well. The processes have also been effective in reducing concentrations of harmful bacteriological organisms. While the Nation is taking significant steps in sewage treatment and improving water supply treatment, there still remains a gap to close. Desalination technology is especially well suited to bridging that gap.

Further, the state of this technology has reached the point where more desalting plants can be built with confidence. It is the small community which presently needs the most help in improving their water supplies.

Beyond the question of health indicated by water supplies containing more than 1,000 ppm is that of economic limitation. Many industries require ultrapure water.

Since its inception, the desalting program has made considerable progress in reducing the cost of product water. In 1952 it was upward of $7 per 1,000 gallons in 1970 dollars. Today, commercial sea water distillation plants of 7–10 million gallons per day (MGD) produce fresh water for 65¢–85¢ per thousand gallons and membrane process plants of up to 2 million gallons per day (MGD) desalt lower salinity brackish waters for 30¢–40¢ per thousand gallons. We are confident that we can continue to improve upon this economic progress during the next five years.

The criterion of product water cost is not the only one which must be applied to this program. As I have mentioned, the water supply of many communities does not meet Public Health Service recommended standards. As the use of our surface and ground waters becomes more intensive due to the growth of our population and increased industrialization, additional communities will be faced with this problem. The criterion of water quality is as significant as product water cost.

The desalting program has four major elements. The first of these is basic research, where we seek to expand our fundamental knowledge of processes and materials which can be utilized in the separation of salts from water. An important aspect of this element has been the development of new processes and data and the evaluation of existing processes, materials, and process modifications.

Second is the development program, which has converted more promising research developments into engineering achievements through testing and evaluation.

The third is our test bed and prototype program, which is necessary to prove on a practical scale the engineering and economic feasibility of these processes applied to real water problems.

The fourth element is studies which provide information on desalting costs and how desalting can help meet water supply needs. These studies, which may be carried out in cooperation with Federal or state water planning agencies,