Using Desalination Technologies for Water Treatment

March 1988

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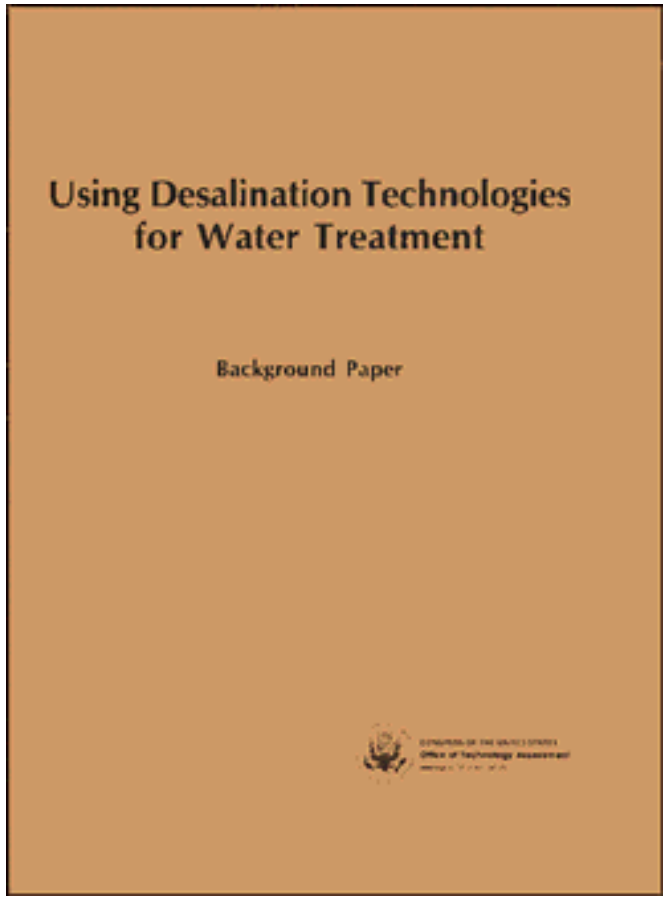

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Foreword

Technologies that were originally developed to desalinate water are widely applied in this country to remove contaminants other than salt from freshwater supplies. Of the many available desalination technologies, two membrane processes—reverse osmosis and electrodialysis —are most widely used in the United States. Such widespread use would not have been possible without the advances made in membrane technology over the last two decades, due largely to federally sponsored research and development.

In the past when water was found to be contaminated, a new supply of uncontaminated water was developed. But, most renewable supplies of clean freshwater have now either been tapped or are not readily available for development. OTA'S study "Protecting the Nation Groundwater from Contamination' also found that the frequency of groundwater contamination is increasing. Therefore, the need to decontaminate surface and groundwater supplies of freshwater will undoubtedly increase in the future. The need for treatment will be further increased as water quality regulations are developed under the Clean Water and Safe Drinking Water Acts.

This study provides a technical assessment of traditional desalination techniques that can be used for water treatment. These techniques include distillation, as well as more recently developed membrane processes. As part of this effort OTA held a one-day workshop on July 29, 1987, with desalination and water treatment experts to review the initial draft of this background paper and to discuss other areas of interest. The conclusions of these discussions are invluded in this background report.

OTA is grateful for the input from the workshop participants and the desalination community at large. The preparation of this report would have been much more difficult without such support. As with all OTA studies, the content of this report is the sole responsibility of OTA.

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NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the workshop participants. The workshop participants do not, however, necessarily approve, disapprove, or endorse this background paper. OTA assumes full responsibility for the background paper and the accuracy of its contents.

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Abbreviations

AID –(U.S.) Agency for International Development
CWJA —Clean Water Act
degrees C—degrees Centigrade
degrees F —degrees Fahrenheit
DOI —Department of the Interior
ED —electrodialysis
EPA —(U.S.) Environmental Protection Agency
GAC —granular activated carbon
gpd —gallons per day
IX —ion exchange
lb/sq. in. —pounds per square inch
ME —multiple effect (distillation)
mgd —million gallons per day
MSF —multi-stage flash (distillation)
NPDES —National Pollutant Discharge Elimination System
OWRR —Office of Water Resources Research
O s w —Office of Saline Water
OWRT —Office of Water Research and Technology
ppm —parts per million
POE —point-of-entry
P o u —point-of-use
R&D —research and development
RO —reverse osmosis
SDWA —Safe Drinking Water Act
USGS —U.S. Geological Survey
V c —vapor compression (distillation)

Conversion Factors

To convert from:	To:	Multiply by:
cubic meters	U.S. gallons	264
U.S. gallons	cubic meters	0.0038
millions of U.S. gallons	acre-feet	3.07
acre-feet	millions of U.S. gallons	0.33
dollars/1 ,000 gallons	dollars/acre-foot	325
parts per million	milligrams per liter	1
degrees Fahrenheit	degrees centigrade	0.56 X (^{0}F – 32)