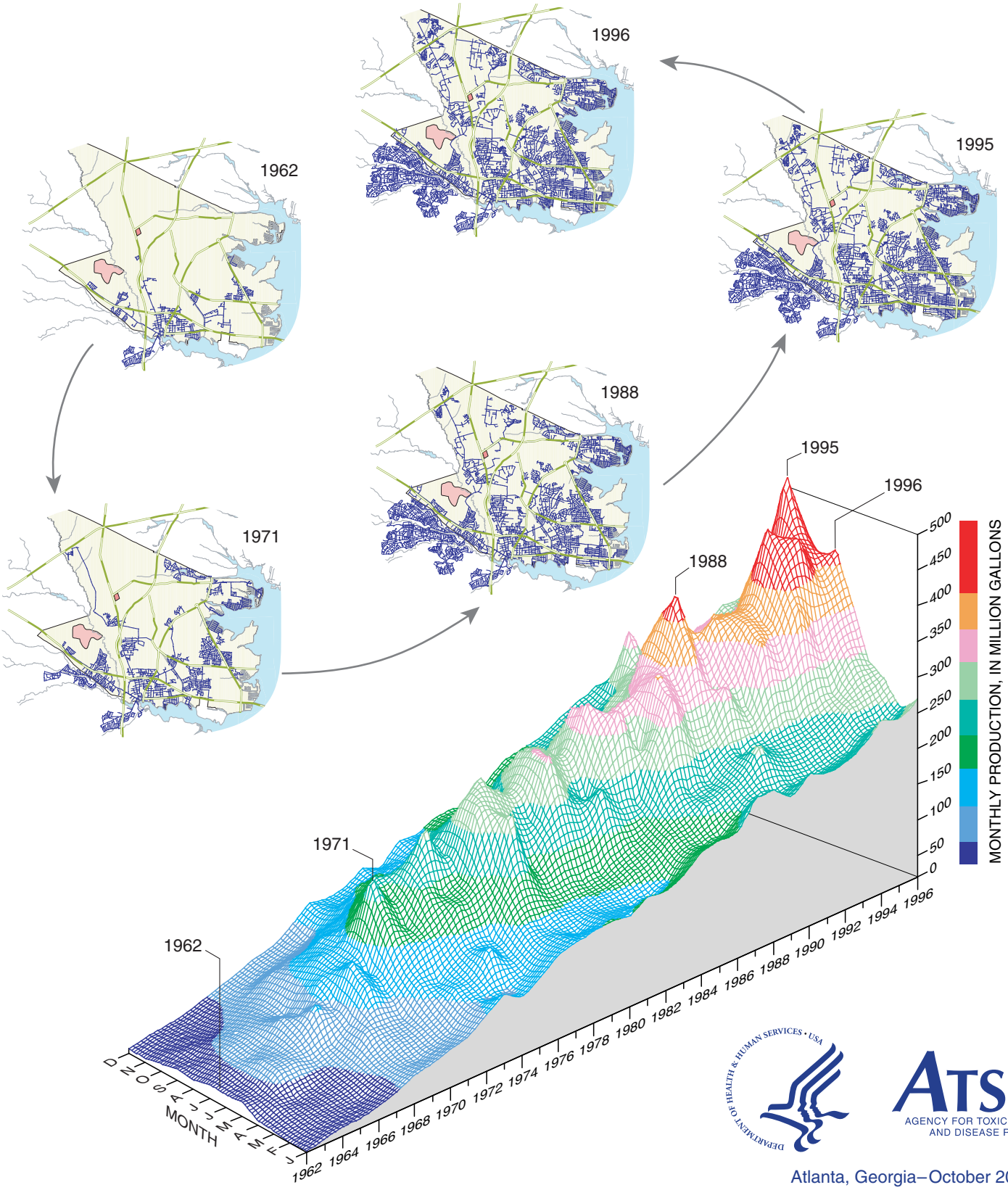
Supplemental Data

Historical Reconstruction of the Water-Distribution System Serving the Dover Township Area, New Jersey: January 1962–December 1996



DEPARTMENT OF HEALTH & HUMAN SERVICES • USA

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Atlanta, Georgia–October 2001

01-0489

Front Cover Illustrations:

Upper Images: Maps showing configuration and expansion of the historical water-distribution system networks serving the Dover Township area, New Jersey: 1962, 1971, 1988, 1995, and 1996.

Lower Image: Plot showing three-dimensional representation of monthly water-supply well production for the Dover Township area, New Jersey, January 1962–December 1996.

Historical Reconstruction of the Water-Distribution System Serving the Dover Township Area, New Jersey: January 1962–December 1996

SUPPLEMENTAL DATA

BY MORRIS L. MASLIA, JASON B. SAUTNER, MUSTAFA M. ARAL,
RICHARD E. GILLIG, JUAN J. REYES, AND ROBERT C. WILLIAMS

Prepared in coordination with:

New Jersey Department of Health and Senior Services
New Jersey Department of Environmental Protection
Ocean County Health Department
Citizens Action Committee on Childhood Cancer Cluster and
United Water Toms River, Inc.

Agency for Toxic Substances and Disease Registry
U.S. Department of Health and Human Services
Atlanta, Georgia
October 2001

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

AUTHORS

MORRIS L. MASLIA, MSCE, PE
Research Environmental Engineer and Project Officer
Exposure-Dose Reconstruction Project
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

JASON B. SAUTNER, MSCE, EIT
Environmental Health Scientist
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

MUSTAFA M. ARAL, Ph.D., PE, PHy
Director, Multimedia Environmental Simulations Laboratory
School of Civil and Environmental Engineering
Georgia Institute of Technology

RICHARD E. GILLIG, MCP
Supervisory Environmental Health Scientist
Chief, Superfund Site Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

JUAN J. REYES, MSPA
Program Manager
Director, Office of Regional Operations
Office of the Assistant Administrator
Agency for Toxic Substances and Disease Registry

ROBERT C. WILLIAMS, PE, DEE
Assistant Surgeon General
Director, Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

For additional information, write to:

Project Officer
Exposure-Dose Reconstruction Project
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road, Mail Stop E-32
Atlanta, Georgia 30333

CONTENTS

GLOSSARY AND ABBREVIATIONS

Definition of terms and abbreviations used throughout this report are listed below:

Term or Abbreviation	Definition
AC	Asbestos cement water pipeline
ATSDR	Agency for Toxic Substances and Disease Registry
CD-ROM	Computer disc, read only memory
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act; is also known as Superfund
Consumption	The use of water by customers of a water utility; is also known as demand. In a water-distribution system, consumption should equal production if there are no losses through leaks or pipe breaks
Direct measurement or observation	A method of obtaining data that is based on measuring or observing the parameter of interest.
EPA	U.S. Environmental Protection Agency
EPANET 2	A water-distribution system model developed by the EPA
EPS model	Extended period simulation model; a simulation method used to analyze a water-distribution system that is characterized by time-varying demand and operating conditions
Epidemiologic study	A study to determine whether a relation exists between the occurrence and frequency of a disease and a specific factor such as exposure to a toxic compound found in the environment
ft	Foot (feet)
GA	Genetic Algorithm; a method of optimization that attempts to find the most optimal solution by mimicking the mechanics of natural selection and genetics
GIS	Geographic information system
gal	gallon(s)
gpm	gallon(s) per minute
Historical reconstruction	A diagnostic analysis used to examine the historical characteristics of a water-distribution system
in.	Inch(s)
Link	The representation of a length of pipeline section in EPANET 2
Manual adjustment process	A modeling approach whereby a balanced flow condition is achieved through the repeated modification and refinement of modeling parameters by the analyst
Master Operating Criteria	Guidelines developed for operating a water-distribution system that are based, in part, on hydraulic engineering principles
Maximum-demand month	A time during a prescribed year when water usage is greatest; is also known as a peak- or summer-demand period

GLOSSARY AND ABBREVIATIONS—CONTINUED

Definition of terms and abbreviations used throughout this report are listed below:

Term or Abbreviation	Definition
MGD	Million gallons per day
Mgal	Million gallons
mi	Mile(s)
Minimum-demand month	A time during a prescribed year when water usage is least; is also known as a low- or winter-demand period
Model node	The representation of the end point of a section of pipeline in EPANET 2; is also known as pipeline junction
NJDHSS	New Jersey Department of Health and Senior Services
NPL	National Priorities List; the EPA's official list of hazardous waste sites which are to be cleaned up under the Superfund
Pipeline junction	Representation of the end point of a section of pipeline in EPANET 2; is also known as model node
Point demand	The spatial distribution of total consumption to pipeline or model locations based on measured data such as metered billing records
Point of entry	The location where water enters a water-distribution system from a source such as an aquifer, lake, stream, or river. For the Dover Township area, the points of entry are the wells and well fields
Production	The processing of potable water by a water utility and the delivery of the water to locations serviced by the water-distribution system. In a water-distribution system, production should equal consumption if there are no losses through leaks, pipe breaks, or non-metered water usage.
Proportionate contribution	The derivation of water from one or more sources in differing proportions. The sum of the proportionate contribution at any location in the water-distribution system should equal 100%
PVC, PE, IPS	Types of plastic water pipelines
psi	pounds per square inch
Qualitative description	A method of estimating data that is based on inference or is synthesized using surrogate information
Quantitative estimate	A method of estimating data that based on using computational techniques
SAN	Styrene-acrylonitrile trimer
Sensitivity analysis	A method of characterizing or quantifying uncertainty and variability. This involves conducting a series of model simulations, changing specific parameter or constraint values, and comparing the effect of changed parameter(s) or constraint(s) with reference to a base condition

GLOSSARY AND ABBREVIATIONS—CONTINUED

Definition of terms and abbreviations used throughout this report are listed below:

Term or Abbreviation	Definition
Source-trace analysis	A method used to identify the source of delivered water using a water-distribution model. A source-trace analysis can be used to track the percentage of water reaching any point in a water-distribution system over time from a specified location or source
SNL	Supply-node-link simulation method
Steady-state model	A simulation method used to analyze a water-distribution system that is characterized by static or non-time-varying demand and operating conditions
SVOC	Semi-volatile organic compound
System operations	The on-and-off cycling of wells and high-service and booster pumps and the operational extremes of water levels in storage tanks over a 24-hour period
TCE	Trichloroethylene
TIGER	Topologically integrated, geographic encoding and referencing system. A database developed by the U.S. Department of Commerce that describes in a digital format the locations of roadways, hydrography, landmarks, places, cities, and geographic census boundaries
UWTR	United Water Toms River, Inc.
VOC	Volatile organic compound
Water-distribution system	A water-conveyance network consisting of hydraulic facilities such as wells, reservoirs, storage tanks, and high-service and booster pumps; and a network of pipelines for delivering potable water
WSTP	Well-Storage Tank-Pump simulation method

DISCLAIMER

Use of trade names and commercial sources is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry or the U.S. Department of Health and Human Services.