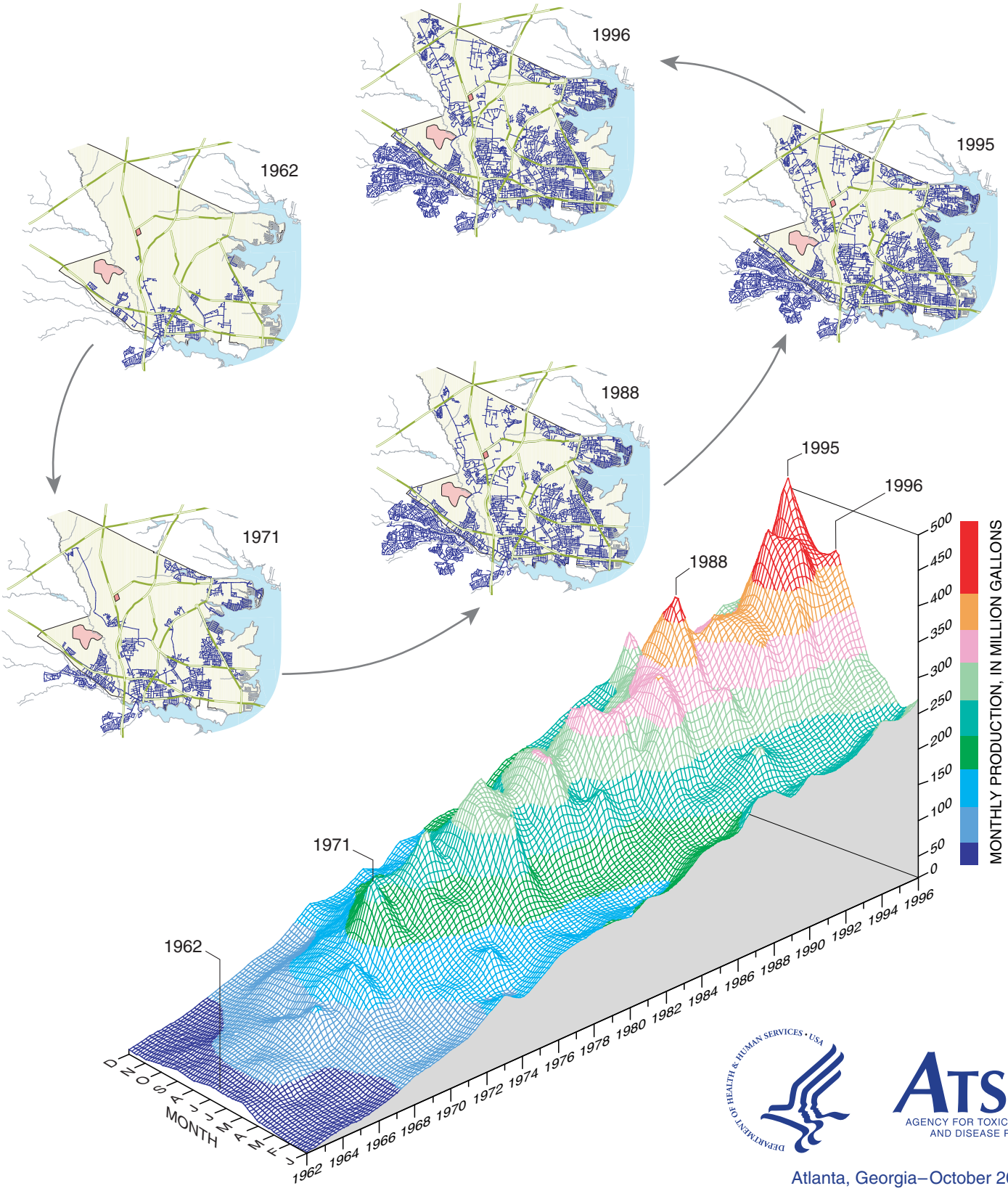
Supplemental Data

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



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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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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

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Prepared in coordination with:

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Ocean County Health Department
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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.

APPENDIX A

TABLES OF WATER-DISTRIBUTION SYSTEM PIPELINE CHARACTERISTICS, DOVER TOWNSHIP AREA, NEW JERSEY, 1962–96

Table A-1. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1962[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	2,217	71.6	93.0	4,6,8,12	120
Cast iron (CI)	1950	53	1.6	2.1	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	77	2.4	3.1	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.8	2	120

[1]Assumed in-service date for all pipelines is January 1, 1962.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 2,402
Total length of pipe segments in model network: 77.1 miles
Total number of pipe junctions (nodes) in model network: 2,272

Table A-2. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1963[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	2,535	81.4	93.3	4,6,8,10,12	120
Cast iron (CI)	1950	59	1.8	2.1	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	79	2.4	2.8	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.6	2	120
Plastic (PVC)	1963	1	0.04	0.05	12	140

[1]Assumed in-service date for all pipelines is January 1, 1963.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 2,730
Total length of pipe segments in model network: 87.2 miles
Total number of pipe junctions (nodes) in model network: 2,571

Table A-3. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1964[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	2723	86.9	93.2	4,6,8,10,12	120
Cast iron (CI)	1950	60	1.8	1.9	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	86	2.9	3.1	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.5	2	120
Plastic (PVC)	1963	1	0.04	0.04	12	140

[1]Assumed in-service date for all pipelines is January 1, 1964.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 3,068
Total length of pipe segments in model network: 93.2 miles
Total number of pipe junctions (nodes) in model network: 2,884

Table A-4. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1965[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	3,402	108.9	94.4	4,6,8,10,12	120
Cast iron (CI)	1950	63	1.8	1.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	89	2.9	2.5	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.2	2	120
Plastic (PVC)	1963	2	0.2	0.2	12	140

[1]Assumed in-service date for all pipelines is January 1, 1965.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 3,613
Total length of pipe segments in model network: 115.3 miles
Total number of pipe junctions (nodes) in model network: 3,403

Table A-5. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1966[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	3,678	116.8	94.8	4,6,8,10,12	120
Cast iron (CI)	1950	63	1.8	1.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	89	2.9	2.4	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.1	2	120
Plastic (PVC)	1963	2	0.2	0.2	12	140

[1]Assumed in-service date for all pipelines is January 1, 1966.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 3,892
Total length of pipe segments in model network: 123.2 miles
Total number of pipe junctions (nodes) in model network: 3,666

Table A-6. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1967[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	4,050	128.9	95.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	63	1.8	1.3	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	89	2.9	2.1	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.0	2	120
Plastic (PVC)	1963	2	0.2	0.1	12	140

[1]Assumed in-service date for all pipelines is January 1, 1967.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 4,267
Total length of pipe segments in model network: 135.3 miles
Total number of pipe junctions (nodes) in model network: 4,013

Table A-7. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1968[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	4,371	138.6	95.4	4,6,8,10,12,16	120
Cast iron (CI)	1950	68	1.9	1.3	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	97	3.1	2.1	6,8,12	130
Galvanized (GA)	1950	45	1.4	1.0	2	120
Plastic (PVC)	1963	2	0.2	0.1	12	140

[1]Assumed in-service date for all pipelines is January 1, 1968.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 4,601
Total length of pipe segments in model network: 145.3 miles
Total number of pipe junctions (nodes) in model network: 4,327

Table A-8. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1969[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	4,868	150.9	95.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	68	1.9	1.2	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	101	3.4	2.1	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.9	2	120
Plastic (PVC)	1963	20	0.6	0.4	6,8,12	140

[1]Assumed in-service date for all pipelines is January 1, 1969.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 5,115
Total length of pipe segments in model network: 158.3 miles
Total number of pipe junctions (nodes) in model network: 4,808

Table A-9. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1970[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	5638	174.3	96.0	4,6,8,10,12,16	120
Cast iron (CI)	1950	68	1.9	1.0	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.1	2	130
Ductile iron (DI)	1950	98	3.2	1.8	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.8	2	120
Plastic (PVC)	1963	24	0.7	0.4	6,12,16	140

[1]Assumed in-service date for all pipelines is January 1, 1970.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 5,891
Total length of pipe segments in model network: 181.6 miles
Total number of pipe junctions (nodes) in model network: 5,536

Table A-10. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1971[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	6,319	193.0	96.4	4,6,8,10,12,16	120
Cast iron (CI)	1950	68	1.9	0.9	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.05	2	130
Ductile iron (DI)	1950	98	3.2	1.6	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.7	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140

[1]Assumed in-service date for all pipelines is January 1, 1971.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 6,584
Total length of pipe segments in model network: 200.3 miles
Total number of pipe junctions (nodes) in model network: 6,165

Table A-11. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1972[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	6,696	203.8	96.5	4,6,8,10,12,16	120
Cast iron (CI)	1950	75	2.0	0.9	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.05	2	130
Ductile iron (DI)	1950	98	3.2	1.6	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.7	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140

[1]Assumed in-service date for all pipelines is January 1, 1972.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 6,970
Total length of pipe segments in model network: 211.2 miles
Total number of pipe junctions (nodes) in model network: 6,526

Table A-12. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1973[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	7,213	219.0	96.6	4,6,8,10,12,16	120
Cast iron (CI)	1950	75	2.0	0.9	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	108	3.5	1.5	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.6	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140
Plastic (PE)	1973	1	0.01	0.0	2	140

[1]Assumed in-service date for all pipelines is January 1, 1973.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 7,488
Total length of pipe segments in model network: 226.7 miles
Total number of pipe junctions (nodes) in model network: 7,004

Table A-13. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1974[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	7,628	233.0	96.8	4,6,8,10,12,16	120
Cast iron (CI)	1950	76	2.0	0.8	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	108	3.5	1.5	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.6	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140
Plastic (PE)	1973	1	0.01	0.0	2	140

[1]Assumed in-service date for all pipelines is January 1, 1974.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 7,904
Total length of pipe segments in model network: 240.7 miles
Total number of pipe junctions (nodes) in model network: 7,390

Table A-14. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1975[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	8,041	245.5	96.9	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.8	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	109	3.5	1.4	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.6	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140
Plastic (PE)	1973	1	0.01	0.0	2	140

[1]Assumed in-service date for all pipelines is January 1, 1975.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 8,320
Total length of pipe segments in model network: 253.3 miles
Total number of pipe junctions (nodes) in model network: 7,765

Table A-15. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1976[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	8,281	251.9	96.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.8	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	142	5.1	1.9	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140
Plastic (PE)	1973	5	0.1	0.04	2	140

[1]Assumed in-service date for all pipelines is January 1, 1976.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 8,565
Total length of pipe segments in model network: 259.7 miles
Total number of pipe junctions (nodes) in model network: 7,991

Table A-16. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1977[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	8,516	260.7	96.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.7	2,4,6,6,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	142	5.1	1.9	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	24	0.7	0.3	6,12,16	140
Plastic (PE)	1973	36	0.6	0.2	2	140

[1]Assumed in-service date for all pipelines is January 1, 1977.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 8,863
Total length of pipe segments in model network: 270.6 miles
Total number of pipe junctions (nodes) in model network: 8,262

Table A-17. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1978[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	8,983	273.3	96.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.7	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.04	2	130
Ductile iron (DI)	1950	159	5.4	1.9	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.5	2	120
Plastic (PVC)	1963	24	0.7	0.2	6,12,16	140
Plastic (PE)	1973	52	0.9	0.3	2	140

[1]Assumed in-service date for all pipelines is January 1, 1978.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 9,363
Total length of pipe segments in model network: 283.8 miles
Total number of pipe junctions (nodes) in model network: 8,718

Table A-18. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1979[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,295	283.3	95.9	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.7	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	167	5.5	1.9	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.5	2	120
Plastic (PVC)	1963	26	0.9	0.2	6,12,16	140
Plastic (PE)	1973	101	2.0	2.0	2	140

[1]Assumed in-service date for all pipelines is January 1, 1979.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 9,733
Total length of pipe segments in model network: 295.2 miles
Total number of pipe junctions (nodes) in model network: 9,056

Table A-19. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1980[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,431	287.7	95.7	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.7	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	167	5.5	1.8	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.5	2	120
Plastic (PVC)	1963	33	1.3	0.4	6,8,12,16	140
Plastic (PE)	1973	124	2.4	0.8	2	140

[1]Assumed in-service date for all pipelines is January 1, 1980.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 9,904
Total length of pipe segments in model network: 300.5 miles
Total number of pipe junctions (nodes) in model network: 9,212

Table A-20. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1981[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,495	289.7	93.8	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	167	5.5	1.8	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.5	2	120
Plastic (PVC)	1963	235	7.2	2.3	6,8,12,16	140
Plastic (PE)	1973	146	2.7	0.9	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1981.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 10,199
Total length of pipe segments in model network: 308.8 miles
Total number of pipe junctions (nodes) in model network: 9,490

Table A-21. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1982[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	92.1	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	167	5.5	1.7	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	378	12.4	3.9	6,8,12,16	140
Plastic (PE)	1973	172	3.2	1.0	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1982.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 10,370
Total length of pipe segments in model network: 314.6miles
Total number of pipe junctions (nodes) in model network: 9,646

Table A-22. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1983[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	89.5	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	168	5.5	1.7	6,8,12	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	672	21.0	6.5	2,6,8,12,16	140
Plastic (PE)	1973	202	3.9	1.2	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1983.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 10,697
Total length of pipe segments in model network: 323.9 miles
Total number of pipe junctions (nodes) in model network: 9,944

Table A-23. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1984[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	85.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	178	5.9	1.7	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	1,193	35.3	10.4	2,6,8,12,16	140
Plastic (PE)	1973	250	5.1	1.5	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1984.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 11,276
Total length of pipe segments in model network: 339.8 miles
Total number of pipe junctions (nodes) in model network: 10,488

Table A-24. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1985[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	81.8	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.6	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	181	6.0	1.7	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	1,675	48.8	13.8	2,6,8,12,16	140
Plastic (PE)	1973	276	5.9	1.7	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1985.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 11,782
Total length of pipe segments in model network: 354.1 miles
Total number of pipe junctions (nodes) in model network: 10,962

Table A-25. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1986[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	73.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.03	2	130
Ductile iron (DI)	1950	187	6.2	1.6	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.4	2	120
Plastic (PVC)	1963	3,065	90.0	22.8	2,4,6,8,12,16	140
Plastic (PE)	1973	277	5.9	1.5	2	140
Plastic (IPS)	1981	10	0.1	0.03	2	140

[1]Assumed in-service date for all pipelines is January 1, 1986.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 13,180
Total length of pipe segments in model network: 395.5 miles
Total number of pipe junctions (nodes) in model network: 12,292

Table A-26. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1987[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	71.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	77	2.0	0.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	188	6.2	1.5	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	3,331	100.7	24.8	2,4,6,8,12,16	140
Plastic (PE)	1973	278	5.9	1.5	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1987.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 13,447
Total length of pipe segments in model network: 406.2 miles
Total number of pipe junctions (nodes) in model network: 12,545

Table A-27. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1988[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	67.9	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	192	6.2	1.5	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	3,932	121.0	28.4	2,4,6,8,12,16	140
Plastic (PE)	1973	279	6.0	1.4	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1988.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 14,050
Total length of pipe segments in model network: 426.6 miles
Total number of pipe junctions (nodes) in model network: 13,114

Table A-28. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1989[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	66.0	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	193	6.3	1.4	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	4,408	133.5	30.4	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.4	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1989.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 14,528
Total length of pipe segments in model network: 439.2 miles
Total number of pipe junctions (nodes) in model network: 13,543

Table A-29. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1990[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	65.4	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.5	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	193	6.3	1.4	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	4,510	137.4	31.0	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.4	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1990.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 14,629
Total length of pipe segments in model network: 443.1 miles
Total number of pipe junctions (nodes) in model network: 13,632

Table A-30. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1991[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	64.7	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	193	6.3	1.4	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	4,646	142.2	31.7	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.3	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1991.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 14,773
Total length of pipe segments in model network: 447.9 miles
Total number of pipe junctions (nodes) in model network: 13,770

Table A-31. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1992[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	64.2	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	193	6.3	1.4	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	4,746	145.4	32.2	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.3	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1992.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 14,874
Total length of pipe segments in model network: 451.2 miles
Total number of pipe junctions (nodes) in model network: 13,863

Table A-32. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1993[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	63.2	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	193	6.3	1.4	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	4,986	152.5	33.3	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.3	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1993.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 15,112
Total length of pipe segments in model network: 458.2 miles
Total number of pipe junctions (nodes) in model network: 14,083

Table A-33. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1994[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	62.1	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	194	6.3	1.3	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	5,316	161.1	34.5	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.3	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1994.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 15,444
Total length of pipe segments in model network: 466.9 miles
Total number of pipe junctions (nodes) in model network: 14,402

Table A-34. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1995[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	61.3	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	194	6.3	1.3	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	5,560	166.9	35.3	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.3	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1995.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 15,688
Total length of pipe segments in model network: 472.7 miles
Total number of pipe junctions (nodes) in model network: 14,629

Table A-35. Water-distribution system pipeline characteristics, Dover Township area, New Jersey, 1996[1]

Pipe material (model identification)[2]	Year pipeline first installed	Numer of pipe segments in model network	Length of pipe segments in model network (miles)	Percentage of total model network by length (percent)	Range of pipe diameters in model network (inches)	Value of Hazen-Williams "C-Factor" used in model[3] (dimensionless)
Asbestos cement (AC)	1950	9,505	289.8	60.1	4,6,8,10,12,16	120
Cast iron (CI)	1950	78	2.0	0.4	2,4,6,8,10,12	130
Copper (CP)	1950	3	0.1	0.02	2	130
Ductile iron (DI)	1950	194	6.3	1.3	6,8,12,16	130
Galvanized (GA)	1950	45	1.4	0.3	2	120
Plastic (PVC)	1963	5,920	176.4	36.6	2,4,6,8,12,16	140
Plastic (PE)	1973	280	6.0	1.2	2	140
Plastic (IPS)	1981	10	0.1	0.02	2	140

[1]Assumed in-service date for all pipelines is January 1, 1996.
[2]Data for pipe material, year first installed, year last installed, and range of pipe diameters from Flegal (1997).
[3]From Rossman (2000, Table 3.2).

Additional information
Total number of pipe segments (links) in model network: 16,048
Total length of pipe segments in model network: 482.1 miles
Total number of pipe junctions (nodes) in model network: 14,965

APPENDIX B

TABLES OF WATER-DISTRIBUTION SYSTEM GROUNDWATER WELL PRODUCTION AND OPERATING DATA, DOVER TOWNSHIP AREA, NEW JERSEY, 1962–96

Table B-1. Water-distribution system production and operating data, Dover Township area, New Jersey, 1962

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
13 (600)	1,400,000 (2.0)	1,000,000 (1.0)	2,109,000 (2.0)	2,000,000 (2.0)	7,800,000 (7.0)	7,500,000 (7.0)	6,000,000 (5.0)	4,500,000 (4.0)	5,000,000 (5.0)	4,184,625 (4.0)	2,013,352 (2.0)	2,038,259 (2.0)
14 (600)	1,494,000 (2.0)	1,075,000 (1.0)	1,100,000 (1.0)	3,497,000 (3.0)	7,044,000 (6.0)	7,289,000 (7.0)	8,273,000 (7.0)	6,262,000 (6.0)	8,762,000 (8.0)	5,823,139 (5.0)	3,520,345 (3.0)	3,563,896 (3.0)
Brookside well												
15 (700)	18,919,000 (15.0)	18,093,000 (15.0)	20,485,000 (16.0)	20,118,000 (16.0)	25,196,000 (19.0)	23,033,000 (18.0)	24,424,000 (19.0)	22,156,000 (17.0)	21,881,000 (17.0)	20,603,236 (16.0)	20,252,303 (16.0)	20,502,846 (16.0)
TOTAL PRODUCTION												
	21,813,000	**20,168,000**	**23,694,000**	**25,615,000**	**40,040,000**	**37,822,000**	**38,697,000**	**32,918,000**	**35,643,000**	**30,611,000**	**25,786,000**	**26,105,000**

1. Data from Board of Public Utilities, State of New Jersey (1962) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-2. Water-distribution system production and operating data, Dover Township area, New Jersey, 1963

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
13 (600)	3,073,272 (3.0)	2,517,595 (3.0)	3,817,266 (3.0)	4,174,364 (4.0)	8,961,182 (8.0)	9,795,171 (9.0)	8,850,988 (8.0)	7,450,097 (7.0)	6,539,206 (6.0)	6,485,518 (6.0)	3,769,757 (4.0)	3,778,580 (3.0)
14 (600)	3,194,697 (3.0)	2,611,553 (3.0)	2,596,109 (2.0)	6,352,158 (6.0)	8,215,227 (7.0)	9,555,184 (9.0)	11,724,882 (11.0)	9,871,977 (9.0)	10,507,655 (10.0)	8,529,712 (8.0)	5,644,703 (5.0)	5,660,130 (5.0)
Brookside well												
15 (700)	21,909,031 (17.0)	20,136,852 (17.0)	22,262,625 (17.0)	26,737,478 (21.0)	22,331,591 (17.0)	23,667,645 (19.0)	28,351,130 (22.0)	27,923,926 (21.0)	20,552,138 (16.0)	23,174,769 (18.0)	22,667,540 (18.0)	22,756,290 (17.0)
TOTAL PRODUCTION												
	28,177,000	**25,266,000**	**28,676,000**	**37,264,000**	**39,508,000**	**43,018,000**	**48,927,000**	**45,246,000**	**37,599,000**	**38,190,000**	**32,082,000**	**32,195,000**

1. Data from Board of Public Utilities, State of New Jersey (1963) and Michael P. McLinden, written communication, August 28, 1997.

2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-3. Water-distribution system production and operating data, Dover Township area, New Jersey, 1964

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
13 (600)	5,405,252 (5.0)	4,823,019 (5.0)	6,258,473 (6.0)	5,576,426 (5.0)	15,712,841 (14.0)	16,224,527 (15.0)	11,279,513 (10.0)	11,285,809 (10.0)	10,726,310 (10.0)	8,659,472 (8.0)	6,052,527 (6.0)	5,934,838 (5.0)
14 (600)	5,548,064 (5.0)	4,936,188 (5.0)	4,829,206 (4.0)	7,551,484 (7.0)	14,553,918 (13.0)	15,870,889 (15.0)	14,360,518 (13.0)	14,372,494 (13.0)	16,149,087 (15.0)	10,824,477 (10.0)	8,172,230 (8.0)	7,998,436 (7.0)
Brookside well												
15 (700)	22,186,683 (17.0)	20,672,794 (17.0)	22,475,321 (17.0)	20,667,089 (16.0)	31,113,240 (24.0)	31,294,583 (24.0)	26,812,969 (21.0)	32,007,698 (24.0)	24,502,603 (19.0)	20,963,051 (16.0)	22,045,242 (18.0)	21,376,726 (16.0)
TOTAL PRODUCTION												
	33,140,000	**30,432,000**	**33,563,000**	**33,795,000**	**61,380,000**	**63,390,000**	**52,453,000**	**57,666,000**	**51,378,000**	**40,447,000**	**36,270,000**	**35,310,000**

1. Data from Board of Public Utilities, State of New Jersey (1964) and Michael P. McLinden, written communication, August 28, 1997.

2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-4. Water-distribution system production and operating data, Dover Township area, New Jersey, 1965

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	2,506,241 (2.0)	4,663,758 (4.0)	4,519,078 (4.0)	4,670,000 (4.0)	4,565,000 (4.0)	4,108,000 (4.0)	3,000,000 (3.0)	0 (0.0)	0 (0.0)
16 (800)	11,895,884 (8.0)	11,371,557 (8.0)	12,801,764 (9.0)	8,481,126 (6.0)	15,100,334 (10.0)	15,975,375 (11.0)	15,000,000 (10.0)	16,000,000 (11.0)	13,500,000 (9.0)	10,000,000 (7.0)	15,030,000 (10.0)	13,878,000 (9.0)
18 (750)	0 (0.0)	0 (0.0)	0 (0.0)	6,295,172 (5.0)	15,100,34 (11.0)	15,975,375 (12.0)	15,000,000 (11.0)	16,000,000 (11.0)	13,500,000 (10.0)	7,439,000 (5.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	22,143,116 (17.0)	21,187,443 (18.0)	23,794,236 (18.0)	21,121,460 (17.0)	27,024,574 (21.0)	27,544,171 (22.0)	26,587,000 (21.0)	27,330,000 (21.0)	25,098,000 (20.0)	24,554,000 (19.0)	24,981,000 (20.0)	25,295,000 (19.0)
TOTAL PRODUCTION												
	34,039,000	**32,559,000**	**36,596,000**	**38,404,000**	**61,889,000**	**64,014,000**	**61,257,000**	**63,895,000**	**56,206,000**	**44,993,000**	**40,011,000**	**39,173,000**

1. Data from Board of Public Utilities, State of New Jersey (1965) and Michael P. McLinden, written communication, August 28, 1997.

2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-5. Water-distribution system production and operating data, Dover Township area, New Jersey, 1966

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,000,000 (4.0)	5,000,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
16 (800)	14,361,000 (10.0)	11,734,000 (9.0)	15,523,000 (10.0)	8,854,000 (6.0)	14,523,000 (10.0)	20,720,000 (14.0)	22,977,000 (15.0)	17,848,000 (12.0)	18,055,000 (13.0)	12,829,728 (9.0)	21,817,580 (15.0)	21,411,761 (14.0)
18 (750)	0 (0.0)	0 (0.0)	0 (0.0)	9,053,000 (7.0)	8,635,000 (6.0)	17,579,000 (13.0)	16,392,000 (12.0)	17,901,000 (13.0)	12,925,000 (10.0)	13,069,930 (9.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	25,167,000 (19.0)	22,258,000 (19.0)	20,441,000 (16.0)	25,130,000 (20.0)	25,679,000 (20.0)	26,776,000 (21.0)	28,976,000 (22.0)	28,603,000 (22.0)	28,891,000 (23.0)	25,989,341 (20.0)	26,278,420 (21.0)	25,567,239 (20.0)
South Toms River well												
17 (750)	0 (0.0)	0 (0.0)	5,783,000 (4.0)	3,373,000 (3.0)	5,253,000 (4.0)	8,487,000 (6.0)	9,483,000 (7.0)	5,588,000 (4.0)	4,928,000 (4.0)	4,130,000 (3.0)	0 (0.0)	0 (0.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,707,000 (6.0)	1,864,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,023,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	39,528,000	**33,992,000**	**41,747,000**	**46,410,000**	**54,090,000**	**77,562,000**	**88,558,000**	**71,804,000**	**64,799,000**	**56,019,000**	**48,096,000**	**46,979,000**

[1]Data from Board of Public Utilities, State of New Jersey (1966) and Michael P. McLinden, written communication, August 28, 1997.

[2]To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

[3]Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only

Table B-6. Water-distribution system production and operating data, Dover Township area, New Jersey, 1967

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,577,000 (8.0)	3,156,000 (3.0)	1,000,000 (1.0)	1,498,000 (2.0)	1,702,000 (2.0)	1,500,000 (2.0)	1,118,000 (1.0)
16 (800)	11,580,785 (8.0)	11,117,101 (8.0)	12,441,071 (8.0)	15,080,000 (10.0)	10,212,000 (7.0)	19,090,000 (13.0)	18,098,000 (12.0)	16,944,000 (11.0)	20,633,000 (14.0)	21,841,000 (15.0)	20,053,000 (14.0)	20,676,000 (14.0)
18 (750)	10,003,742 (7.0)	9,597,097 (8.0)	10,758,204 (8.0)	13,225,000 (10.0)	21,799,000 (16.0)	21,760,000 (16.0)	10,000,000 (7.0)	6,000,000 (4.0)	8,000,000 (6.0)	3,500,000 (3.0)	3,200,000 (2.0)	3,200,000 (2.0)
19 (600)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,654,000 (2.0)	3,000,000 (3.0)	1,996,000 (2.0)	1,498,000 (2.0)	2,500,000 (2.0)	675,000 (1.0)	800,000 (1.0)
Brookside well												
15 (700)	24,399,204 (19.0)	23,622,442 (20.0)	25,840,355 (20.0)	25,262,000 (20.0)	20,485,000 (16.0)	27,919,000 (22.0)	26,893,000 (21.0)	24,413,000 (19.0)	24,847,000 (20.0)	25,010,000 (19.0)	22,433,000 (18.0)	22,886,000 (18.0)
South Toms River well												
17 (750)	1,987,269 (2.0)	1,899,360 (2.0)	2,150,370 (2.0)	2,859,000 (2.0)	4,650,000 (3.0)	10,154,000 (8.0)	8,348,000 (6.0)	6,947,000 (5.0)	6,829,000 (5.0)	5,937,000 (4.0)	5,264,000 (4.0)	5,142,000 (4.0)
Indian Head well												
20 (500)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,081,000 (5.0)	14,241,000 (16.0)	8,326,000 (9.0)	9,405,000 (10.0)	8,019,000 (9.0)	4,263,000 (5.0)	1,876,000 (2.0)	1,895,000 (2.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,484,000 (4.0)	133,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,855,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	47,971,000	**46,236,000**	**51,190,000**	**56,426,000**	**62,227,000**	**107,734,000**	**77,954,000**	**66,705,000**	**71,324,000**	**64,753,000**	**55,001,000**	**55,717,000**

1. Data from Board of Public Utilities, State of New Jersey (1967) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-7. Water-distribution system production and operating data, Dover Township area, New Jersey, 1968

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	5,000,000 (5.0)	2,314,000 (2.0)	1,482,000 (2.0)	3,255,000 (3.0)	2,382,000 (2.0)	4,786,000 (4.0)	9,169,000 (8.0)	4,927,000 (4.0)	5,028,000 (5.0)	12,232,000 (11.0)	856,000 (1.0)	1,175,000 (1.0)
16 (800)	2,233,000 (2.0)	17,460,000 (13.0)	20,171,000 (14.0)	21,563,000 (15.0)	21,563,000 (15.0)	19,870,000 (14.0)	23,193,000 (16.0)	21,863,000 (15.0)	21,260,000 (15.0)	22,872,000 (15.0)	19,367,000 (13.0)	21,926,000 (15.0)
18 (750)	10,000,000 (7.0)	3,200,000 (3.0)	2,500,000 (2.0)	14,844,000 (11.0)	14,807,000 (11.0)	17,841,000 (12.0)	18,505,000 (13.0)	20,412,000 (15.0)	18,685,000 (14.0)	11,862,000 (9.0)	10,139,000 (8.0)	8,902,000 (6.0)
19 (600)	6,042,000 (5.0)	2,000,000 (2.0)	1,800,000 (2.0)	4,266,000 (4.0)	4,448,000 (4.0)	5,364,000 (5.0)	14,992,000 (13.0)	7,617,000 (7.0)	9,395,000 (9.0)	3,677,000 (3.0)	2,428,000 (2.0)	507,000 (1.0)
Brookside well												
15 (700)	25,684,000 (20.0)	22,976,000 (19.0)	24,934,000 (19.0)	25,286,000 (20.0)	25,599,000 (20.0)	25,211,000 (20.0)	26,495,000 (20.0)	26,764,000 (20.0)	25,550,000 (20.0)	26,415,000 (20.0)	24,937,000 (20.0)	26,322,000 (20.0)
South Toms River well												
17 (750)	6,067,000 (4.0)	5,323,000 (4.0)	5,659,000 (4.0)	7,787,000 (6.0)	7,787,000 (6.0)	8,735,000 (7.0)	11,059,000 (8.0)	8,902,000 (6.0)	7,100,000 (5.0)	6,436,000 (5.0)	3,464,000 (3.0)	2,082,000 (2.0)
Indian Head well												
20 (500)	5,523,000 (6.0)	3,067,000 (4.0)	3,258,000 (4.0)	6,448,000 (7.0)	6,448,000 (7.0)	6,982,000 (8.0)	10,657,000 (11.0)	8,945,000 (10.0)	8,102,000 (9.0)	5,864,000 (6.0)	2,241,000 (3.0)	3,247,000 (4.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,185,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,275,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-7. Water-distribution system production and operating data, Dover Township area, New Jersey, 1968—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
TOTAL PRODUCTION												
	60,549,000	**56,340,000**	**59,804,000**	**83,449,000**	**83,034,000**	**91,249,000**	**114,070,000**	**99,430,000**	**95,120,000**	**89,358,000**	**63,432,000**	**64,161,000**

1. Data from Board of Public Utilities, State of New Jersey (1968) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-8. Water-distribution system production and operating data, Dover Township area, New Jersey, 1969

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	10,697,000 (10.0)	15,861,000 (14.0)	12,846,000 (12.0)	5,890,000 (5.0)	5,875,000 (5.0)	6,093,000 (6.0)	4,226,000 (4.0)	0 (0.0)	0 (0.0)
16 (800)	18,741,979 (13.0)	16,175,866 (12.0)	19,911,185 (13.0)	3,482,000 (3.0)	20,744,000 (14.0)	20,760,000 (14.0)	21,809,000 (15.0)	21,041,000 (14.0)	21,099,000 (15.0)	20,938,000 (14.0)	18,255,000 (13.0)	21,073,000 (14.0)
18 (750)	8,314,846 (6.0)	7,176,395 (6.0)	8,833,563 (6.0)	17,399,000 (13.0)	12,868,000 (9.0)	27,511,000 (20.0)	24,383,000 (17.0)	24,764,000 (18.0)	22,515,000 (17.0)	18,781,000 (13.0)	12,677,000 (9.0)	9,349,000 (7.0)
19 (600)	7,276,047 (7.0)	6,279,825 (6.0)	7,729,958 (7.0)	15,282,000 (14.0)	20,746,000 (19.0)	19,550,000 (18.0)	17,192,000 (15.0)	19,910,000 (18.0)	17,749,000 (16.0)	14,360,000 (13.0)	11,167,000 (10.0)	8,181,000 (7.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,943,000 (5.0)	10,730,000 (9.0)	3,246,000 (3.0)	4,250,000 (3.0)	961,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	22,890,064 (18.0)	19,756,003 (17.0)	24,318,045 (19.0)	24,500,000 (19.0)	26,693,000 (21.0)	25,231,000 (20.0)	26,495,000 (20.0)	27,467,000 (21.0)	24,961,000 (20.0)	24,430,000 (19.0)	22,507,000 (18.0)	25,737,000 (20.0)
South Toms River well												
17 (750)	4,998,335 (4.0)	4,313,974 (4.0)	5,310,153 (4.0)	6,873,000 (5.0)	10,406,000 (7.0)	10,910,000 (8.0)	9,295,000 (7.0)	9,052,000 (7.0)	7,346,000 (5.0)	6,559,000 (5.0)	2,281,000 (2.0)	5,620,000 (4.0)
Indian Head well												
20 (500)	3,708,729 (4.0)	3,200,938 (4.0)	3,940,096 (4.0)	4,343,000 (5.0)	9,257,000 (10.0)	11,240,000 (12.0)	10,235,000 (11.0)	11,724,000 (13.0)	6,299,000 (7.0)	6,274,000 (7.0)	5,713,000 (6.0)	4,170,000 (5.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,158,000 (3.0)	4,145,000 (6.0)	1,993,000 (3.0)	1,731,000 (2.0)	1,296,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,312,000 (3.0)	4,291,000 (6.0)	2,140,000 (3.0)	1,727,000 (2.0)	1,355,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-8. Water-distribution system production and operating data, Dover Township area, New Jersey, 1969—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
TOTAL PRODUCTION												
	65,930,000	56,903,000	70,043,000	82,576,000	126,988,000	147,214,000	122,678,000	127,541,000	109,674,000	95,568,000	72,600,000	74,130,000

1. Data from Board of Public Utilities, State of New Jersey (1969) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-9. Water-distribution system production and operating data, Dover Township area, New Jersey, 1970

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	108,000 (1.0)	22,000 (1.0)	121,000 (1.0)	3,494,000 (3.0)	4,148,000 (4.0)	8,648,000 (8.0)	7,199,000 (6.0)	6,833,000 (6.0)	1,030,000 (1.0)	150,000 (1.0)	40,000 (1.0)
16 (800)	18,541,000 (12.0)	21,803,000 (16.0)	1,336,000 (1.0)	12,439,000 (9.0)	27,793,000 (19.0)	25,267,000 (18.0)	28,546,000 (19.0)	28,729,000 (19.0)	28,897,000 (20.0)	30,797,000 (21.0)	29,768,000 (21.0)	30,982,000 (21.0)
18 (750)	9,508,000 (7.0)	6,464,000 (5.0)	19,113,000 (14.0)	11,320,000 (8.0)	18,315,000 (13.0)	18,569,000 (14.0)	20,679,000 (15.0)	18,183,000 (13.0)	18,003,000 (13.0)	12,476,000 (9.0)	13,824,000 (10.0)	13,842,000 (10.0)
19 (600)	9,993,000 (9.0)	7,241,000 (7.0)	18,166,000 (16.0)	15,579,000 (14.0)	7,649,000 (7.0)	13,718,000 (13.0)	19,044,000 (17.0)	16,954,000 (15.0)	18,912,000 (18.0)	15,245,000 (14.0)	770,000 (1.0)	2,741,000 (3.0)
21 (700)	0 (0.0)	151,000 (1.0)	195,000 (1.0)	631,000 (1.0)	798,000 (1.0)	660,000 (1.0)	3,926,000 (3.0)	1,428,000 (1.0)	1,011,000 (1.0)	173,000 (1.0)	76,000 (1.0)	31,000 (1.0)
Brookside well												
15 (700)	25,651,000 (20.0)	22,827,000 (19.0)	24,535,000 (19.0)	25,171,000 (20.0)	26,127,000 (20.0)	25,106,000 (20.0)	26,035,000 (20.0)	25,174,000 (19.0)	22,856,000 (18.0)	26,168,000 (20.0)	24,833,000 (20.0)	23,895,000 (18.0)
South Toms River well												
17 (750)	6,032,000 (4.0)	5,270,000 (4.0)	5,845,000 (4.0)	6,606,000 (5.0)	8,361,000 (6.0)	9,432,000 (7.0)	10,006,000 (7.0)	9,973,000 (7.0)	8,405,000 (6.0)	6,881,000 (5.0)	4,747,000 (4.0)	4,265,000 (3.0)
Indian Head well												
20 (500)	4,692,000 (5.0)	997,000 (1.0)	5,042,000 (5.0)	6,797,000 (8.0)	7,797,000 (8.0)	10,017,000 (11.0)	11,099,000 (12.0)	9,585,000 (10.0)	8,635,000 (10.0)	7,489,000 (8.0)	5,777,000 (6.0)	3,699,000 (4.0)
Anchorage well[3]												
98 (400)	0.00 (0.0)	0 (0.0)	0 (0.0)	154,000 (1.0)	1,885,000 (3.0)	3,716,000 (5.0)	5,658,000 (8.0)	4,406,000 (6.0)	5,901,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,947,000 (3.0)	3,816,000 (5.0)	7,153,000 (10.0)	12,593,000 (17.0)	11,005,000 (15.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-9. Water-distribution system production and operating data, Dover Township area, New Jersey, 1970—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
TOTAL PRODUCTION												
	74,417,000	64,861,000	74,254,000	78,818,000	104,166,000	114,449,000	140,794,000	134,224,000	130,458,000	100,259,000	79,945,000	79,495,000

1. Data from Board of Public Utilities, State of New Jersey (1970) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

   T_{avg} = average time a well was operated, in hours per day;
   Q_P = production of water, in gallons per month;
   C = rated capacity of the well, in gallons per minute;
   D = number of days per month; and
   60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-10. Water-distribution system production and operating data, Dover Township area, New Jersey, 1971

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	60,000 (1.0)	0 (0.0)	198,000 (1.0)	2,696,000 (3.0)	3,179,000 (3.0)	10,759,000 (10.0)	11,129,000 (10.0)	8,006,000 (7.0)	3,615,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
16 (800)	31,589,000 (21.0)	28,582,000 (21.0)	28,203,000 (19.0)	30,091,000 (21.0)	31,331,000 (21.0)	30,299,000 (21.0)	31,224,000 (21.0)	31,778,000 (21.0)	31,082,000 (22.0)	32,199,000 (22.0)	30,308,000 (21.0)	31,049,000 (21.0)
18 (750)	8,025,000 (6.0)	9,487,000 (8.0)	20,707,000 (15.0)	22,297,000 (17.0)	21,416,000 (15.0)	24,245,000 (18.0)	24,744,000 (18.0)	19,747,000 (14.0)	12,657,000 (9.0)	15,040,000 (11.0)	4,797,000 (4.0)	9,174,000 (7.0)
19 (600)	7,229,000 (7.0)	3,685,000 (4.0)	1,626,000 (2.0)	9,287,000 (9.0)	18,031,000 (16.0)	19,544,000 (18.0)	21,853,000 (20.0)	20,903,000 (19.0)	14,136,000 (13.0)	14,247,000 (13.0)	9,487,000 (9.0)	15,286,000 (14.0)
21 (700)	68,000 (1.0)	0 (0.0)	0 (0.0)	1,596,000 (2.0)	745,000 (1.0)	14,889,000 (12.0)	15,752,000 (12.0)	2,475,000 (2.0)	736,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	25,750,000 (20.0)	14,966,000 (13.0)	23,597,000 (18.0)	23,844,000 (19.0)	24,459,000 (19.0)	25,570,000 (20.0)	27,160,000 (21.0)	27,034,000 (21.0)	24,812,000 (20.0)	24,769,000 (19.0)	25,540,000 (20.0)	27,803,000 (21.0)
South Toms River well												
17 (750)	3,866,000 (3.0)	5,293,000 (4.0)	6,932,000 (5.0)	6,159,000 (5.0)	10,198,000 (7.0)	14,105,000 (10.0)	9,495,000 (7.0)	6,520,000 (5.0)	3,180,000 (2.0)	2,327,000 (2.0)	1,472,000 (1.0)	0 (0.0)
Indian Head well												
20 (500)	3,715,000 (4.0)	10,699,000 (13.0)	4,593,000 (5.0)	10,100,000 (11.0)	9,321,000 (10.0)	13,163,000 (15.0)	11,156,000 (12.0)	8,496,000 (9.0)	8,949,000 (10.0)	3,343,000 (4.0)	7,742,000 (9.0)	12,728,000 (14.0)
Parkway wells												
22 (650)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,348,000 (2.0)	20,876,000 (17.0)	5,119,000 (4.0)	2,969,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,172,000 (2.0)	9,919,000 (15.0)	2,476,000 (4.0)	1,516,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 (740)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10,325,000 (8.0)	5,324,000 (4.0)	2,915,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,231,000 (2.0)	11,339,000 (10.0)	4,428,000 (4.0)	2,389,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Anchorage well[3]												
98 (400)	0 (0.0)	423,000 (1.0)	0 (0.0)	2,298,000 (3.0)	4,230,000 (6.0)	10,180,000 (14.0)	12,732,000 (17.0)	12,090,000 (16.0)	11,597,000 (16.0)	11,864,000 (16.0)	3,733,000 (5.0)	0 (0.0)

Table B-10. Water-distribution system production and operating data, Dover Township area, New Jersey, 1971 (Continued)

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Silver Bay well[3]												
99 (400)	0 (0.0)	356,000 (1.0)	0 (0.0)	2,736,000 (4.0)	6,599,000 (9.0)	11,682,000 (16.0)	12,628,000 (17.0)	12,042,000 (16.0)	11,456,000 (16.0)	11,841,000 (16.0)	5,066,000 (7.0)	0 (0.0)
TOTAL PRODUCTION												
	80,302,000	**73,491,000**	**85,856,000**	**111,104,000**	**129,509,000**	**180,187,000**	**230,332,000**	**166,438,000**	**132,009,000**	**115,630,000**	**88,145,000**	**96,040,000**

1. Data from Board of Public Utilities, State of New Jersey (1971) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-11. Water-distribution system production and operating data, Dover Township area, New Jersey, 1972

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	486,000 (1.0)	0 (0.0)	525,000 (1.0)	4,670,000 (4.0)	4,326,000 (4.0)	8,460,000 (8.0)	6,831,000 (6.0)	689,000 (1.0)	2,934,000 (3.0)	3,412,000 (3.0)	0 (0.0)	0 (0.0)
16 (800)	31,530,000 (21.0)	29,963,000 (22.0)	32,082,000 (22.0)	29,547,000 (21.0)	28,297,000 (19.0)	30,068,000 (21.0)	31,070,000 (21.0)	26,280,000 (18.0)	29,014,000 (20.0)	30,288,000 (20.0)	28,210,000 (20.0)	30,236,000 (20.0)
18 (750)	8,338,000 (6.0)	9,861,000 (8.0)	11,939,000 (9.0)	12,292,000 (9.0)	13,537,000 (10.0)	12,367,000 (9.0)	17,052,000 (12.0)	21,486,000 (15.0)	23,703,000 (18.0)	23,321,000 (17.0)	22,889,000 (17.0)	25,761,000 (18.0)
19 (600)	16,011,000 (14.0)	15,636,000 (15.0)	18,875,000 (17.0)	8,077,000 (8.0)	24,839,000 (22.0)	24,280,000 (22.0)	22,696,000 (20.0)	21,330,000 (19.0)	20,325,000 (19.0)	21,284,000 (19.0)	21,488,000 (20.0)	19,042,000 (17.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,618,000 (2.0)	1,212,000 (1.0)	4,603,000 (4.0)	8,264,000 (6.0)	813,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	28,634,000 (22.0)	26,489,000 (22.0)	27,281,000 (21.0)	25,495,000 (20.0)	25,007,000 (19.0)	25,532,000 (20.0)	27,295,000 (21.0)	27,364,000 (21.0)	25,406,000 (20.0)	25,854,000 (20.0)	25,118,000 (20.0)	26,089,000 (20.0)
South Toms River well												
17 (750)	239,000 (1.0)	14,000 (1.0)	4,027,000 (3.0)	3,847,000 (3.0)	9,766,000 (7.0)	8,571,000 (6.0)	10,090,000 (7.0)	10,534,000 (8.0)	553,000 (1.0)	5,061,000 (4.0)	5,955,000 (4.0)	5,520,000 (4.0)
Indian Head well												
20 (500)	14,807,000 (16.0)	13,977,000 (16.0)	14,460,000 (16.0)	12,347,000 (14.0)	11,822,000 (13.0)	9,180,000 (10.0)	12,739,000 (14.0)	7,414,000 (8.0)	5,470,000 (6.0)	9,673,000 (10.0)	9,631,000 (11.0)	10,703,000 (12.0)
Parkway wells												
22 (650)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,059,000 (3.0)	4,434,000 (4.0)	10,984,000 (9.0)	14,592,000 (12.0)	8,498,000 (7.0)	1,169,000 (1.0)	0 (0.0)	0 (0.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,465,000 (2.0)	2,097,000 (3.0)	5,054,000 (8.0)	6,897,000 (11.0)	4,127,000 (7.0)	856,000 (2.0)	0 (0.0)	0 (0.0)
24 (610)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,112,000 (1.0)	298,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	852,000 (1.0)	1,623,000 (2.0)	9,606,000 (10.0)	6,246,000 (7.0)	1,270,000 (2.0)	0 (0.0)	0 (0.0)
26 (740)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,853,000 (2.0)	4,037,000 (3.0)	4,089,000 (3.0)	14,944,000 (11.0)	8,700,000 (7.0)	1,748,000 (2.0)	0 (0.0)	0 (0.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,783,000 (4.0)	5,236,000 (5.0)	7,487,000 (7.0)	11,560,000 (11.0)	6,816,000 (6.0)	1,401,000 (2.0)	0 (0.0)	0 (0.0)

Table B-11. Water-distribution system production and operating data, Dover Township area, New Jersey, 1972—Continued

ell Number capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	4,592,000 (6.0)	12,867,000 (17.0)	9,454,000 (13.0)	10,642,000 (14.0)	12,852,000 (17.0)	10,007,000 (14.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	419,000 (1.0)	2,049,000 (3.0)	4,532,000 (6.0)	5,333,000 (7.0)	9,071,000 (13.0)	10,464,000 (14.0)	12,541,000 (17.0)	9,832,000 (14.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	100,045,000	**96,359,000**	**111,238,000**	**105,399,000**	**148,572,000**	**155,963,000**	**183,017,000**	**206,353,000**	**162,444,000**	**125,337,000**	**113,291,000**	**117,351,000**

Data from Board of Public Utilities, State of New Jersey (1972) and Michael P. McLinden, written communication, August 28, 1997.

o determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

ell numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-12. Water-distribution system production and operating data, Dover Township area, New Jersey, 1973

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	8,841,000 (8.0)	18,705,000 (17.0)	15,135,000 (14.0)	8,251,000 (8.0)	8,085,000 (7.0)	7,455,000 (7.0)	12,048,000 (11.0)	6,261,000 (6.0)	0 (0.0)	0 (0.0)
16 (800)	30,200,000 (20.0)	25,004,000 (19.0)	30,767,000 (21.0)	29,923,000 (21.0)	47,905,000 (24.0)	28,900,000 (20.0)	30,873,000 (21.0)	30,308,000 (20.0)	16,149,000 (11.0)	17,756,000 (12.0)	29,498,000 (20.0)	30,268,000 (20.0)
18 (750)	25,234,000 (18.0)	20,648,000 (16.0)	13,759,000 (10.0)	0 (0.0)	20,138,000 (14.0)	33,844,000 (24.0)	28,842,000 (21.0)	21,333,000 (15.0)	18,914,000 (14.0)	17,280,000 (12.0)	13,644,000 (10.0)	8,057,000 (6.0)
19 (600)	19,772,000 (18.0)	15,482,000 (15.0)	18,555,000 (17.0)	18,895,000 (18.0)	12,732,000 (11.0)	21,592,000 (20.0)	20,403,000 (18.0)	14,755,000 (13.0)	21,175,000 (20.0)	25,175,000 (23.0)	20,990,000 (19.0)	12,689,000 (11.0)
21 (700)	0 (0.0)	0 (0.0)	28,000 (1.0)	704,000 (1.0)	0 (0.0)	5,091,000 (4.0)	4,239,000 (3.0)	2,214,000 (2.0)	2,149,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	26,547,000 (20.0)	23,869,000 (20.0)	25,977,000 (20.0)	25,552,000 (20.0)	26,483,000 (20.0)	24,150,000 (19.0)	25,052,000 (19.0)	25,422,000 (20.0)	13,582,000 (11.0)	3,523,000 (3.0)	250,000 (1.0)	1,311,000 (1.0)
South Toms River well												
17 (750)	2,774,000 (2.0)	5,769,000 (5.0)	6,621,000 (5.0)	7,149,000 (5.0)	7,821,000 (6.0)	10,377,000 (8.0)	10,824,000 (8.0)	9,939,000 (7.0)	8,392,000 (6.0)	8,085,000 (6.0)	6,511,000 (5.0)	6,650,000 (5.0)
Indian Head well												
20 (500)	13,765,000 (15.0)	7,422,000 (9.0)	8,800,000 (9.0)	13,730,000 (15.0)	11,828,000 (13.0)	8,509,000 (9.0)	10,265,000 (11.0)	12,245,000 (13.0)	16,378,000 (18.0)	17,692,000 (19.0)	18,603,000 (21.0)	18,328,000 (20.0)
Parkway wells												
22 (650)	0 (0.0)	0 (0.0)	0 (0.0)	3,677,000 (3.0)	5,689,000 (5.0)	10,666,000 (9.0)	13,132,000 (11.0)	13,319,000 (11.0)	18,116,000 (15.0)	20,506,000 (17.0)	8,827,000 (8.0)	11,673,000 (10.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,278,000 (4.0)	3,908,000 (6.0)	5,803,000 (9.0)	2,278,000 (4.0)	251,000 (1.0)	0 (0.0)	0 (0.0)
24 (610)	0 (0.0)	0 (0.0)	0 (0.0)	3,397,000 (3.0)	1,277,000 (1.0)	7,278,000 (7.0)	10,541,000 (9.0)	12,278,000 (11.0)	16,526,000 (15.0)	18,981,000 (17.0)	8,058,000 (7.0)	10,979,000 (10.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,455,000 (5.0)	5,023,000 (5.0)	2,914,000 (3.0)	2,001,000 (2.0)	356,000 (1.0)	0 (0.0)	0 (0.0)
26 (740)	0 (0.0)	0 (0.0)	0 (0.0)	4,161,000 (3.0)	5,526,000 (4.0)	11,622,000 (9.0)	13,913,000 (10.0)	7,119,000 (5.0)	6,568,000 (5.0)	21,536,000 (16.0)	8,952,000 (7.0)	12,226,000 (9.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,391,000 (3.0)	5,955,000 (5.0)	8,229,000 (8.0)	3,818,000 (4.0)	400,000 (1.0)	0 (0.0)	0 (0.0)

Table B-12. Water-distribution system production and operating data, Dover Township area, New Jersey, 1973—Continued

ell Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9,163,000 (13.0)	12,834,000 (17.0)	12,755,000 (17.0)	4,577,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,905,000 (12.0)	12,671,000 (17.0)	12,442,000 (17.0)	7,657,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	118,292,000	**98,194,000**	**113,348,000**	**125,893,000**	**154,534,000**	**198,472,000**	**216,560,000**	**198,530,000**	**170,328,000**	**157,802,000**	**115,333,000**	**112,181,000**

Data from Board of Public Utilities, State of New Jersey (1973) and Michael P. McLinden, written communication, August 28, 1997.

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-13. Water-distribution system production and operating data, Dover Township area, New Jersey, 1974

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	1,120,000 (1.0)	5,211,000 (5.0)	2,559,000 (2.0)	8,370,000 (8.0)	726,000 (1.0)	0 (0.0)	64,000 (1.0)	0 (0.0)	0 (0.0)
16 (800)	23,297,000 (16.0)	23,798,000 (18.0)	30,379,000 (20.0)	29,386,000 (20.0)	30,236,000 (20.0)	29,814,000 (21.0)	30,687,000 (21.0)	30,666,000 (21.0)	29,456,000 (20.0)	37,087,000 (24.0)	30,226,000 (21.0)	31,400,000 (21.0)
18 (750)	2,699,000 (2.0)	1,884,000 (2.0)	36,811,000 (24.0)	9,008,000 (7.0)	13,577,000 (10.0)	8,442,000 (6.0)	16,757,000 (12.0)	12,154,000 (9.0)	12,606,000 (9.0)	13,461,000 (10.0)	1,863,000 (2.0)	0 (0.0)
19 (600)	4,117,000 (4.0)	2,668,000 (3.0)	4,008,000 (4.0)	8,469,000 (8.0)	14,868,000 (13.0)	15,854,000 (15.0)	23,994,000 (22.0)	17,538,000 (16.0)	17,283,000 (16.0)	14,563,000 (13.0)	2,392,000 (2.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,003,000 (1.0)	3,227,000 (3.0)	14,063,000 (11.0)	119,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	2,684,000 (2.0)	4,804,000 (4.0)	5,057,000 (4.0)	13,644,000 (11.0)	4,961,000 (4.0)	3,296,000 (3.0)	2,735,000 (2.0)	0 (0.0)	0 (0.0)
South Toms River well												
17 (750)	4,750,000 (3.0)	6,027,000 (5.0)	6,801,000 (5.0)	8,004,000 (6.0)	9,684,000 (7.0)	10,314,000 (8.0)	12,765,000 (9.0)	9,871,000 (7.0)	7,959,000 (6.0)	8,008,000 (6.0)	6,858,000 (5.0)	7,376,000 (5.0)
Indian Head well												
20 (500)	2,413,000 (3.0)	8,430,000 (10.0)	10,379,000 (11.0)	21,702,000 (24.0)	21,134,000 (23.0)	19,607,000 (22.0)	18,396,000 (20.0)	21,556,000 (23.0)	20,883,000 (23.0)	21,509,000 (23.0)	19,912,000 (22.0)	22,089,000 (24.0)
Parkway wells												
22 (650)	21,870,000 (18.0)	20,791,000 (19.0)	20,896,000 (17.0)	16,727,000 (14.0)	17,163,000 (14.0)	12,754,000 (11.0)	21,468,000 (18.0)	13,555,000 (11.0)	19,725,000 (17.0)	19,401,000 (16.0)	20,169,000 (17.0)	18,835,000 (16.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	629,000 (1.0)	3,364,000 (5.0)	5,952,000 (9.0)	10,256,000 (16.0)	7,070,000 (11.0)	754,000 (1.0)	3,645,000 (6.0)	0 (0.0)	0 (0.0)
24 (610)	20,201,000 (18.0)	12,746,000 (12.0)	17,785,000 (16.0)	13,336,000 (12.0)	14,587,000 (13.0)	10,380,000 (9.0)	18,298,000 (16.0)	11,392,000 (10.0)	18,457,000 (17.0)	17,503,000 (15.0)	18,527,000 (17.0)	17,402,000 (15.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	758,000 (1.0)	5,332,000 (6.0)	9,413,000 (10.0)	15,921,000 (17.0)	10,150,000 (11.0)	1,067,000 (1.0)	3,965,000 (4.0)	0 (0.0)	0 (0.0)
26 (740)	22,609,00 (16.0)	20,156,000 (16.0)	21,797,000 (16.0)	19,062,000 (14.0)	17,720,000 (13.0)	13,516,000 (10.0)	22,476,000 (16.0)	14,109,000 (10.0)	20,729,000 (16.0)	19,885,000 (14.0)	20,602,000 (15.0)	19,499,000 (14.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	998,000 (1.0)	6,330,000 (6.0)	9,927,000 (9.0)	15,659,000 (14.0)	11,342,000 (10.0)	1,195,000 (1.0)	1,509,000 (2.0)	0 (0.0)	0 (0.0)

Table B-13. Water-distribution system production and operating data, Dover Township area, New Jersey, 1974—Continued

ell Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	1,085,000 (2.0)	7,966,000 (11.0)	12,336,000 (17.0)	13,087,000 (18.0)	12,152,000 (16.0)	2,335,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	1,055,000 (2.0)	7,256,000 (10.0)	12,090,000 (17.0)	12,707,000 (17.0)	12,036,000 (16.0)	2,377,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	101,956,000	**96,500,000**	**148,856,000**	**134,023,000**	**180,235,000**	**181,242,000**	**268,548,000**	**189,397,000**	**158,122,000**	**163,335,000**	**120,549,000**	**116,601,000**

Data from Board of Public Utilities, State of New Jersey (1974) and Michael P. McLinden, written communication, August 28, 1997.

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-14. Water-distribution system production and operating data, Dover Township area, New Jersey, 1975

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
16 (800)	31,210,000 (21.0)	27,744,000 (21.0)	31,010,000 (21.0)	28,814,000 (20.0)	29,771,000 (20.0)	29,963,000 (21.0)	31,094,000 (21.0)	31,521,000 (21.0)	30,314,000 (21.0)	30,818,000 (21.0)	31,189,000 (22.0)	18,390,000 (12.0)
18 (750)	0 (0.0)	0 (0.0)	0 (0.0)	11,088,000 (8.0)	21,472,000 (15.0)	13,724,000 (10.0)	15,721,000 (11.0)	15,294,000 (11.0)	11,797,000 (9.0)	6,860,000 (5.0)	3,940,000 (3.0)	13,670,000 (10.0)
19 (600)	0 (0.0)	0 (0.0)	0 (0.0)	5,052,000 (5.0)	9,327,000 (8.0)	7,973,000 (7.0)	9,596,000 (9.0)	10,027,000 (9.0)	8,183,000 (8.0)	4,724,000 (4.0)	2,825,000 (3.0)	9,211,000 (8.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	22,000 (1.0)	1,962,000 (2.0)	1,438,000 (1.0)	1,722,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	13,830,000 (11.0)	21,451,000 (17.0)	22,526,000 (17.0)	23,476,000 (18.0)	23,115,000 (18.0)	23,845,000 (18.0)	9,291,000 (7.0)	0 (0.0)
South Toms River well												
17 (750)	7,576,000 (5.0)	6,758,000 (5.0)	7,025,000 (5.0)	7,523,000 (6.0)	10,152,000 (7.0)	10,679,000 (8.0)	11,044,000 (8.0)	10,330,000 (7.0)	7,702,000 (6.0)	6,987,000 (5.0)	6,745,000 (5.0)	7,172,000 (5.0)
Indian Head well												
20 (500)	22,376,000 (24.0)	19,889,000 (24.0)	21,785,000 (23.0)	20,957,000 (23.0)	21,326,000 (23.0)	20,022,000 (22.0)	20,880,000 (22.0)	22,055,000 (24.0)	20,765,000 (23.0)	20,684,000 (22.0)	19,809,000 (22.0)	20,806,000 (22.0)
Parkway wells												
22 (650)	19,087,000 (16.0)	18,033,000 (17.0)	20,479,000 (17.0)	19,552,000 (17.0)	21,410,000 (18.0)	12,631,000 (11.0)	14,452,000 (12.0)	15,390,000 (13.0)	12,843,000 (11.0)	15,164,000 (13.0)	15,860,000 (14.0)	17,778,000 (15.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,127,000 (3.0)	5,560,000 (9.0)	7,461,000 (11.0)	7,753,000 (12.0)	1,699,000 (3.0)	91,000 (1.0)	0 (0.0)	0 (0.0)
24 (610)	17,480,000 (15.0)	16,748,000 (16.0)	19,027,000 (17.0)	17,956,000 (16.0)	17,276,000 (15.0)	9,704,000 (9.0)	9,391,000 (8.0)	9,988,000 (9.0)	11,407,000 (10.0)	12,801,000 (11.0)	14,878,000 (14.0)	16,385,000 (14.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,030,000 (3.0)	9,653,000 (11.0)	10,065,000 (11.0)	11,248,000 (12.0)	2,275,000 (3.0)	111,000 (1.0)	0 (0.0)	0 (0.0)
26 (740)	20,852,00 (15.0)	18,066,000 (15.0)	20,645,000 (15.0)	19,548,000 (15.0)	21,423,000 (16.0)	12,688,000 (10.0)	14,313,000 (10.0)	15,178,000 (11.0)	10,458,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,880,000 (3.0)	10,254,000 (10.0)	11,736,000 (11.0)	12,306,000 (11.0)	6,964,000 (7.0)	133,000 (1.0)	0 (0.0)	0 (0.0)

Table B-14. Water-distribution system production and operating data, Dover Township area, New Jersey, 1975—Continued

ell Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
28 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,482,000 (2.0)	7,944,000 (6.0)	11,318,000 (9.0)	12,275,000 (9.0)	10,212,000 (8.0)	12,200,000 (9.0)	12,855,000 (10.0)	14,179,000 (11.0)
29 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,899,000 (2.0)	9,448,000 (8.0)	10,499,000 (8.0)	11,335,000 (9.0)	10,118,000 (8.0)	12,281,000 (9.0)	12,935,000 (10.0)	14,435,000 (11.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,227,000 (2.0)	5,084,000 (7.0)	5,044,000 (7.0)	1,782,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,347,000 (2.0)	4,821,000 (7.0)	5,098,000 (7.0)	2,218,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	118,581,000	**107,238,000**	**119,971,000**	**130,490,000**	**182,001,000**	**193,561,000**	**211,676,000**	**213,898,000**	**167,852,000**	**146,699,000**	**130,327,000**	**132,026,000**

Data from Board of Public Utilities, State of New Jersey (1975) and Michael P. McLinden, written communication, August 28, 1997.

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-15. Water-distribution system production and operating data, Dover Township area, New Jersey, 1976

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
14 (600)	0 (0.0)	0 (0.0)	0 (0.0)	3,523,000 (3.0)	4,714,000 (4.0)	3,800,000 (4.0)	2,754,000 (3.0)	3,179,000 (3.0)	3,463,000 (3.0)	1,355,000 (2.0)	360,000 (1.0)	0 (0.0)
16 (800)	262,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	30,623,000 (21.0)	30,079,000 (21.0)	30,742,000 (21.0)	30,104,000 (20.0)	29,019,000 (20.0)	30,323,000 (20.0)	29,296,000 (20.0)	30,303,000 (20.0)
18 (750)	23,012,000 (17.0)	23,539,000 (18.0)	21,981,000 (16.0)	19,131,000 (14.0)	11,533,000 (8.0)	12,931,000 (10.0)	10,675,000 (8.0)	8,897,000 (6.0)	10,486,000 (8.0)	8,777,000 (6.0)	11,672,000 (9.0)	12,550,000 (9.0)
19 (600)	18,743,000 (17.0)	20,396,000 (20.0)	21,427,000 (19.0)	17,977,000 (17.0)	8,992,000 (8.0)	17,473,000 (16.0)	15,854,000 (14.0)	11,645,000 (10.0)	14,513,000 (13.0)	11,101,000 (10.0)	4,594,000 (4.0)	317,000 (1.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	6,024,000 (5.0)	2,528,000 (2.0)	16,908,000 (13.0)	11,471,000 (9.0)	3,113,000 (2.0)	2,749,000 (2.0)	33,000 (1.0)	67,000 (1.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	6,665,000 (5.0)	12,532,000 (10.0)	21,056,000 (17.0)	22,106,000 (17.0)	22,627,000 (17.0)	22,517,000 (18.0)	23,510,000 (18.0)	5,049,000 (4.0)	947,000 (1.0)
South Toms River well												
17 (750)	7,032,000 (5.0)	6,480,000 (5.0)	7,437,000 (5.0)	8,005,000 (6.0)	8,966,000 (6.0)	12,143,000 (9.0)	11,301,000 (8.0)	9,887,000 (7.0)	8,325,000 (6.0)	7,067,000 (5.0)	6,983,000 (5.0)	7,046,000 (5.0)
Indian Head well												
20 (500)	20,864,000 (22.0)	19,005,000 (22.0)	20,808,000 (22.0)	20,526,000 (23.0)	20,613,000 (22.0)	17,747,000 (20.0)	18,810,000 (20.0)	20,117,000 (22.0)	20,445,000 (23.0)	20,289,000 (22.0)	20,215,000 (22.0)	21,123,000 (23.0)
Parkway wells												
22 (650)	19,000,000 (16.0)	16,641,000 (15.0)	19,925,000 (16.0)	19,728,000 (17.0)	13,560,000 (11.0)	21,198,000 (18.0)	20,892,000 (17.0)	16,383,000 (14.0)	15,638,000 (13.0)	11,194,000 (9.0)	14,377,000 (12.0)	1,668,000 (2.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	5,030,000 (8.0)	7,296,000 (11.0)	10,989,000 (17.0)	9,948,000 (15.0)	8,572,000 (13.0)	3,783,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)
24 (610)	18,227,000 (16.0)	15,568,000 (15.0)	18,268,000 (16.0)	17,445,000 (16.0)	11,595,000 (10.0)	17,643,000 (16.0)	17,798,000 (16.0)	13,299,000 (12.0)	13,795,000 (13.0)	10,304,000 (9.0)	12,706,000 (12.0)	13,566,000 (12.0)
25 (510)	100,000 (1.0)	0 (0.0)	0 (0.0)	6,560,000 (7.0)	10,398,000 (11.0)	16,679,000 (18.0)	15,852,000 (17.0)	11,915,000 (13.0)	7,765,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 (740)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,844,000 (5.0)	20,304,000 (15.0)	19,322,000 (14.0)	15,166,000 (11.0)	14,542,000 (11.0)	10,329,000 (8.0)	11,779,000 (9.0)	8,087,000 (6.0)
27 (590)	139,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10,718,000 (10.0)	12,246,000 (11.0)	5,402,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-15. Water-distribution system production and operating data, Dover Township area, New Jersey, 1976—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 da
Parkway wells—Continued												
28 (700)	15,612,000 (12.0)	13,735,000 (11.0)	16,525,000 (13.0)	16,393,000 (13.0)	11,204,000 (9.0)	17,314,000 (14.0)	16,639,000 (13.0)	12,800,000 (10.0)	12,023,000 (10.0)	8,440,000 (7.0)	10,909,000 (9.0)	12,689,000
29 (700)	14,989,000 (12.0)	13,659,000 (11.0)	16,492,000 (13.0)	16,339,000 (13.0)	11,060,000 (9.0)	16,942,000 (13.0)	16,617,000 (13.0)	12,847,000 (10.0)	12,134,000 (10.0)	7,970,000 (6.0)	10,865,000 (9.0)	12,500,000
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	5,762,000 (8.0)	12,450,000 (17.0)	12,308,000 (17.0)	12,016,000 (16.0)	11,393,000 (15.0)	8,757,000 (12.0)	0 (0.0)	0 (0.0)	
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	3,696,000 (5.0)	12,642,000 (17.0)	12,626,000 (18.0)	11,654,000 (16.0)	12,412,000 (17.0)	8,976,000 (12.0)	0 (0.0)	0 (0.0)	
TOTAL PRODUCTION												
	137,980,000	**129,023,000**	**142,863,000**	**172,804,000**	**197,550,000**	**278,140,000**	**275,169,000**	**236,602,000**	**214,332,000**	**150,692,000**	**138,872,000**	**120,796,000**

1. Data from Board of Public Utilities, State of New Jersey (1976) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-16. Water-distribution system production and operating data, Dover Township area, New Jersey, 1977

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	29,824,000 (20.0)	27,880,000 (21.0)	30,894,000 (21.0)	29,949,000 (21.0)	30,977,000 (21.0)	30,000,000 (21.0)	31,000,000 (21.0)	31,000,000 (21.0)	30,000,000 (21.0)	30,800,000 (21.0)	29,282,000 (20.0)	31,000,000 (21.0)
18 (750)	9,341,000 (7.0)	8,165,000 (7.0)	9,405,000 (7.0)	19,305,000 (14.0)	20,822,000 (15.0)	19,341,000 (14.0)	17,904,000 (13.0)	14,483,000 (10.0)	16,393,000 (12.0)	10,928,000 (8.0)	13,486,000 (10.0)	19,853,000 (14.0)
19 (600)	0 (0.0)	126,000 (1.0)	385,000 (1.0)	7,430,000 (7.0)	11,405,000 (10.0)	8,243,000 (8.0)	11,230,000 (10.0)	5,146,000 (5.0)	2,572,000 (2.0)	788,000 (1.0)	0 (0.0)	30,000 (1.0)
21 (700)	0 (0.0)	249,000 (1.0)	41,000 (1.0)	752,000 (1.0)	12,092,000 (9.0)	9,511,000 (8.0)	15,669,000 (12.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	102,000 (1.0)	0 (0.0)	0 (0.0)	11,251,000 (9.0)	19,008,000 (15.0)	22,785,000 (18.0)	24,822,000 (19.0)	25,734,000 (20.0)	25,139,000 (20.0)	26,171,000 (20.0)	11,375,000 (9.0)	0 (0.0)
South Toms River well												
17 (750)	6,632,000 (5.0)	0 (0.0)	4,626,000 (3.0)	8,202,000 (6.0)	12,602,000 (9.0)	11,912,000 (9.0)	12,890,000 (9.0)	9,220,000 (7.0)	7,444,000 (6.0)	11,844,000 (9.0)	7,546,000 (6.0)	3,657,000 (3.0)
Indian Head well												
20 (500)	21,078,000 (23.0)	18,129,000 (22.0)	20,998,000 (23.0)	18,206,000 (20.0)	19,705,000 (21.0)	14,320,000 (16.0)	19,689,000 (21.0)	21,436,000 (23.0)	20,787,000 (23.0)	20,566,000 (22.0)	19,546,000 (22.0)	20,829,000 (22.0)
Parkway wells												
22 (650)	11,738,000 (10.0)	13,216,000 (12.0)	15,415,000 (13.0)	16,878,000 (14.0)	23,996,000 (20.0)	21,185,000 (18.0)	23,812,000 (20.0)	14,838,000 (12.0)	16,683,000 (14.0)	16,359,000 (14.0)	18,895,000 (16.0)	22,201,000 (18.0)
23 (350)	0 (0.0)	5,809,000 (10.0)	6,206,000 (10.0)	0 (0.0)	8,640,000 (13.0)	14,186,000 (23.0)	15,215,000 (23.0)	4,255,000 (7.0)	636,000 (1.0)	0 (0.0)	0 (0.0)	391,000 (1.0)
24 (610)	18,102,000 (16.0)	13,861,000 (14.0)	0 (0.0)	9,459,000 (9.0)	20,248,000 (18.0)	18,250,000 (17.0)	20,247,000 (18.0)	13,161,000 (12.0)	7,313,000 (7.0)	14,837,000 (13.0)	17,533,000 (16.0)	20,650,000 (18.0)
25 (510)	0 (0.0)	0 (0.0)	7,090,000 (8.0)	12,556,000 (14.0)	16,898,000 (18.0)	15,130,000 (17.0)	16,901,000 (18.0)	5,117,000 (5.0)	2,316,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 (740)	15,345,000 (11.0)	15,408,000 (12.0)	11,222,000 (8.0)	13,909,000 (10.0)	18,856,000 (14.0)	13,061,000 (10.0)	19,398,000 (14.0)	14,796,000 (11.0)	9,775,000 (7.0)	0 (0.0)	0 (0.0)	450,000 (1.0)
27 (590)	0 (0.0)	5,566,000 (6.0)	11,205,000 (10.0)	12,120,000 (11.0)	16,124,000 (15.0)	14,298,000 (14.0)	15,259,000 (14.0)	4,354,000 (4.0)	706,000 (1.0)	0 (0.0)	0 (0.0)	405,000 (1.0)
28 (700)	16,285,000 (13.0)	16,179,000 (14.0)	10,651,000 (8.0)	11,592,000 (9.0)	15,853,000 (12.0)	14,138,000 (11.0)	15,834,000 (12.0)	10,069,000 (8.0)	9,964,000 (8.0)	9,749,000 (8.0)	11,592,000 (9.0)	13,332,000 (10.0)

Table B-16. Water-distribution system production and operating data, Dover Township area, New Jersey, 1977—Continued

ell Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
29 (700)	16,019,000 (12.0)	15,996,000 (14.0)	10,934,000 (8.0)	12,033,000 (10.0)	16,153,000 (12.0)	14,631,000 (12.0)	16,460,000 (13.0)	10,341,000 (8.0)	10,671,000 (8.0)	11,047,000 (9.0)	12,800,000 (10.0)	14,959,000 (12.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	373,000 (1.0)	7,085,000 (10.0)	12,344,000 (17.0)	12,692,000 (17.0)	11,689,000 (16.0)	7,659,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	383,000 (1.0)	7,017,000 (9.0)	11,749,000 (16.0)	13,170,000 (18.0)	11,766,000 (16.0)	7,894,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	144,466,000	**140,584,000**	**139,072,000**	**184,398,000**	**277,481,000**	**265,084,000**	**302,192,000**	**207,405,000**	**175,952,000**	**153,089,000**	**142,055,000**	**147,757,000**

Data from Board of Public Utilities, State of New Jersey (1977) and Michael P. McLinden, written communication, August 28, 1997.

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-17. Water-distribution system production and operating data, Dover Township area, New Jersey, 1978

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	31,000,000 (21.0)	28,000,000 (21.0)	31,000,000 (21.0)	30,000,000 (21.0)	31,000,000 (21.0)	30,000,000 (21.0)	31,000,000 (21.0)	31,000,000 (21.0)	30,000,000 (21.0)	31,000,000 (21.0)	29,852,000 (21.0)	31,000,000 (21.0)
18 (750)	21,672,000 (16.0)	8,133,000 (6.0)	6,152,000 (4.0)	11,089,000 (8.0)	15,645,000 (11.0)	21,868,000 (16.0)	22,275,000 (16.0)	20,939,000 (15.0)	24,554,000 (18.0)	24,399,000 (18.0)	23,397,000 (17.0)	12,748,000 (9.0)
19 (600)	0 (0.0)	0 (0.0)	0 (0.0)	9,029,000 (8.0)	3,325,000 (3.0)	9,817,000 (9.0)	12,717,000 (11.0)	3,686,000 (3.0)	1,235,000 (1.0)	1,992,000 (2.0)	480,000 (1.0)	76,000 (1.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,290,000 (2.0)	2,628,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	12,841,000 (10.0)	18,395,000 (14.0)	22,953,000 (18.0)	26,776,000 (21.0)	26,769,000 (21.0)	25,073,000 (20.0)	27,262,000 (21.0)	7,239,000 (6.0)	0 (0.0)
South Toms River well												
17 (750)	7,332,000 (5.0)	6,848,000 (5.0)	8,021,000 (6.0)	7,909,000 (6.0)	9,599,000 (7.0)	9,753,000 (7.0)	11,728,000 (8.0)	7,705,000 (6.0)	7,292,000 (5.0)	7,971,000 (6.0)	3,134,000 (2.0)	7,525,000 (5.0)
Indian Head well												
20 (500)	21,018,00 (23.0)	19,127,000 (23.0)	21,023,000 (23.0)	13,489,000 (15.0)	22,530,000 (24.0)	21,129,000 (24.0)	21,852,000 (24.0)	22,444,000 (24.0)	21,269,000 (24.0)	21,734,000 (24.0)	19,062,000 (21.0)	0 (0.0)
Parkway wells												
22 (650)	23,548,000 (19.0)	23,721,000 (22.0)	24,031,000 (20.0)	13,096,000 (11.0)	13,109,000 (11.0)	16,870,000 (14.0)	17,896,000 (15.0)	10,222,000 (8.0)	0 (0.0)	0 (0.0)	9,060,000 (8.0)	9,616,000 (8.0)
23 (350)	0 (0.0)	0 (0.0)	87,000 (1.0)	0 (0.0)	3,618,000 (6.0)	11,133,000 (18.0)	11,846,000 (18.0)	8,601,000 (13.0)	5,681,000 (9.0)	0 (0.0)	0 (0.0)	0 (0.0)
24 (610)	6,374,000 (6.0)	675,000 (1.0)	14,295,000 (13.0)	11,433,000 (10.0)	9,525,000 (8.0)	12,140,000 (11.0)	15,919,000 (14.0)	11,425,000 (10.0)	15,012,000 (14.0)	17,693,000 (16.0)	16,157,000 (15.0)	22,803,000 (20.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,737,000 (3.0)	8,579,000 (9.0)	12,219,000 (13.0)	9,649,000 (10.0)	6,117,000 (7.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 (740)	8,826,000 (6.0)	17,235,000 (14.0)	17,460,000 (13.0)	9,307,000 (7.0)	10,619,000 (8.0)	12,063,000 (9.0)	13,797,000 (10.0)	9,284,000 (7.0)	11,745,000 (9.0)	13,558,000 (10.0)	13,852,000 (10.0)	13,631,000 (10.0)
27 (590)	0 (0.0)	0 (0.0)	9,209,000 (8.0)	9,931,000 (9.0)	10,588,000 (10.0)	11,584,000 (11.0)	12,470,000 (11.0)	8,902,000 (8.0)	5,917,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)
28 (700)	13,992,000 (11.0)	12,713,000 (11.0)	5,842,000 (5.0)	11,115,000 (9.0)	10,725,000 (8.0)	15,298,000 (12.0)	17,758,000 (14.0)	12,792,000 (10.0)	13,209,000 (11.0)	17,597,000 (14.0)	17,236,000 (14.0)	24,087,000 (19.0)

Table B-17. Water-distribution system production and operating data, Dover Township area, New Jersey, 1978—Continued

ell Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
29 (700)	15,851,000 (12.0)	15,341,000 (13.0)	9,851,000 (8.0)	10,003,000 (8.0)	11,096,000 (9.0)	14,256,000 (11.0)	16,824,000 (13.0)	11,916,000 (9.0)	14,978,000 (12.0)	17,068,000 (13.0)	16,909,000 (13.0)	23,171,000 (18.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	9,158,000 (13.0)	5,712,000 (8.0)	12,045,000 (17.0)	13,023,000 (18.0)	12,212,000 (16.0)	7,695,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	5,146,000 (7.0)	5,810,000 (8.0)	11,784,000 (16.0)	12,673,000 (17.0)	12,096,000 (16.0)	7,670,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	149,613,000	**131,793,000**	**146,971,000**	**163,546,000**	**184,033,000**	**243,562,000**	**273,401,000**	**219,642,000**	**197,447,000**	**180,274,000**	**156,378,000**	**144,657,000**

Data from Board of Public Utilities, State of New Jersey (1978) and Michael P. McLinden, written communication, August 28, 1997.

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-18. Water-distribution system production and operating data, Dover Township area, New Jersey, 1979

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	14,328,000 (10.0)	7,650,000 (6.0)	31,000,000 (21.0)	30,884,000 (21.0)	32,576,000 (22.0)	31,542,000 (22.0)	32,356,000 (22.0)	32,353,000 (22.0)	31,287,000 (22.0)	32,558,000 (22.0)	31,575,000 (22.0)	32,527,000 22.0
18 (750)	18,484,000 (13.0)	16,712,000 (13.0)	0 (0.0)	1,034,000 (1.0)	15,604,000 (11.0)	16,833,000 (12.0)	23,128,000 (17.0)	26,861,000 (19.0)	26,426,000 (20.0)	24,471,000 (18.0)	23,590,000 (17.0)	11,629,000 (8.0)
19 (600)	10,594,000 (10.0)	13,759,000 (14.0)	0 (0.0)	4,114,000 (4.0)	2,275,000 (2.0)	3,099,000 (3.0)	6,873,000 (6.0)	4,896,000 (4.0)	3,454,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,547,000 (4.0)	11,463,000 (9.0)	22,406,000 (17.0)	22,980,000 (18.0)	25,854,000 (21.0)	12,543,000 (10.0)	0 (0.0)	0 (0.0)
South Toms River well												
17 (750)	7,115,000 (5.0)	7,297,000 (6.0)	7,529,000 (5.0)	8,093,000 (6.0)	10,148,000 (7.0)	10,156,000 (8.0)	12,311,000 (9.0)	10,635,000 (8.0)	9,517,000 (7.0)	8,590,000 (6.0)	7,436,000 (6.0)	7,371,000 (5.0)
Indian Head well												
20 (500)	4,523,000 (5.0)	19,497,000 (24.0)	21,966,000 (24.0)	21,630,000 (24.0)	21,907,000 (24.0)	20,709,000 (24.0)	21,491,000 (24.0)	22,003,000 (24.0)	21,552,000 (24.0)	22,516,000 (24.0)	21,351,000 (24.0)	22,002,000 (24.0)
Parkway wells												
22 (650)	12,029,000 (10.0)	20,562,000 (19.0)	20,228,000 (17.0)	25,049,000 (21.0)	23,185,000 (19.0)	22,098,000 (19.0)	21,060,000 (17.0)	19,766,000 (16.0)	17,191,000 (15.0)	17,126,000 (14.0)	17,085,000 (15.0)	17,733,000 (15.0)
23 (350)	214,000 (1.0)	0 (0.0)	0 (0.0)	4,784,000 (8.0)	13,982,000 (21.0)	12,680,000 (20.0)	12,368,000 (19.0)	5,467,000 (8.0)	1,244,000 (2.0)	410,000 (1.0)	0 (0.0)	0 (0.0)
24 (610)	26,922,000 (24.0)	22,913,000 (22.0)	22,580,000 (20.0)	23,460,000 (21.0)	15,652,000 (14.0)	12,915,000 (12.0)	17,459,000 (15.0)	20,647,000 (18.0)	18,666,000 (17.0)	17,737,000 (16.0)	18,206,000 (17.0)	3,208,000 (3.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,993,000 (10.0)	10,758,000 (12.0)	14,140,000 (15.0)	3,680,000 (4.0)	1,180,000 (2.0)	0 (0.0)	0 (0.0)	11,440,000 (12.0)
26 (740)	21,041,000 (15.0)	17,110,000 (14.0)	3,915,000 (3.0)	0 (0.0)	15,107,000 (11.0)	18,777,000 (14.0)	18,490,000 (13.0)	20,524,000 (15.0)	18,018,000 (14.0)	16,527,000 (12.0)	13,697,000 (10.0)	17,668,000 (13.0)
27 (590)	8,472,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	10,026,000 (9.0)	13,657,000 (13.0)	12,888,000 (12.0)	5,315,000 (5.0)	548,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
28 (700)	3,234,000 (3.0)	0 (0.0)	16,757,000 (13.0)	22,340,000 (18.0)	18,937,000 (15.0)	17,638,000 (14.0)	17,317,000 (13.0)	18,529,000 (14.0)	16,639,000 (13.0)	15,772,000 (12.0)	16,253,000 (13.0)	17,054,000 (13.0)

Table B-18. Water-distribution system production and operating data, Dover Township area, New Jersey, 1979—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
29 (700)	25,351,00 (19.0)	20,378,000 (17.0)	20,342,000 (16.0)	21,343,000 (17.0)	18,486,000 (14.0)	17,317,000 (14.0)	16,722,000 (13.0)	17,989,000 (14.0)	16,263,000 (13.0)	15,344,000 (12.0)	15,741,000 (13.0)	16102000 (12.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,159,000 (2.0)	4,197,000 (6.0)	1,476,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,203,000 (2.0)	6,978,000 (10.0)	13,476,000 (18.0)	5,985,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	152,307,000	**145,878,000**	**144,317,000**	**162,731,000**	**214,787,000**	**230,817,000**	**263,961,000**	**237,630,000**	**207,839,000**	**183,594,000**	**164,934,000**	**156,734,000**

1. Data from Board of Public Utilities, State of New Jersey (1979) and Michael P. McLinden, written communication, August 28, 1997.
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:
   - T_{avg} = average time a well was operated, in hours per day;
   - Q_P = production of water, in gallons per month;
   - C = rated capacity of the well, in gallons per minute;
   - D = number of days per month; and
   - 60 = number of minutes per hour.
3. Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-19. Water-distribution system production and operating data, Dover Township area, New Jersey, 1980

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 da
Holly wells												
16 (800)	33,246,000 (22.0)	31,235,000 (22.0)	33,475,000 (22.0)	28,837,000 (20.0)	31,874,000 (21.0)	32,395,000 (22.0)	26,298,000 (18.0)	31,266,000 (21.0)	30,864,000 (21.0)	30,922,000 (21.0)	4,110,000 (3.0)	0 (0.0)
18 (750)	923,000 (1.0)	0 (0.0)	1,042,000 (1.0)	4,816,000 (4.0)	15,146,000 (11.0)	27,063,000 (20.0)	13,423,000 (10.0)	9,892,000 (7.0)	9,924,000 (7.0)	5,327,000 (4.0)	0 (0.0)	0 (0.0)
19 (600)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,535,000 (6.0)	13,176,000 (12.0)	11,138,000 (10.0)	6,694,000 (6.0)	6,312,000 (6.0)	2,491,000 (2.0)	2,461,000 (2.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,436,000 (4.0)	5,943,000 (5.0)	3,031,000 (2.0)	1,159,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7,365,000 (6.0)	26,489,000 (20.0)	27,259,000 (21.0)	24,937,000 (20.0)	26,735,000 (21.0)	15,651,000 (12.0)	0 (0.0)
South Toms River wells												
17 (750)	6,926,000 (5.0)	6,802,000 (5.0)	7,243,000 (5.0)	8,016,000 (6.0)	10,876,000 (8.0)	14,323,000 (11.0)	13,116,000 (9.0)	11,370,000 (8.0)	9,739,000 (7.0)	8,199,000 (6.0)	7,735,000 (6.0)	6,631,000 (5.0)
32 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	347,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	21,976,000 (24.0)	20,068,000 (23.0)	21,480,000 (23.0)	20,680,000 (23.0)	20,493,000 (22.0)	18,190,000 (20.0)	19,241,000 (21.0)	29,614,000 (24.0)	19,025,000 (21.0)	20,592,000 (22.0)	19,545,000 (22.0)	20,181,000 (22.0)
Parkway wells												
22 (650)	18,639,000 (15.0)	15,554,000 (14.0)	16,575,000 (14.0)	17,575,000 (15.0)	17,909,000 (15.0)	18,389,000 (16.0)	14,462,000 (12.0)	17,217,000 (14.0)	18,340,000 (16.0)	17,439,000 (14.0)	14,032,000 (12.0)	16,601,000 (14.0)
23 (350)	0 (0.0)	0 (0.0)	0 (0.0)	4,087,000 (7.0)	14,243,000 (22.0)	12,929,000 (21.0)	10,577,000 (16.0)	6,707,000 (10.0)	10,739,000 (17.0)	9,946,000 (15.0)	1,233,000 (2.0)	10,652,000 (16.0)
24 (610)	9,248,000 (8.0)	18,933,000 (18.0)	19,643,000 (17.0)	19,975,000 (18.0)	18,089,000 (16.0)	20,524,000 (19.0)	18,305,000 (16.0)	19,563,000 (17.0)	9,385,000 (9.0)	14,170,000 (13.0)	13,594,000 (12.0)	1,022,000 (1.0)
25 (510)	0 (0.0)	0 (0.0)	0 (0.0)	700,000 (1.0)	9,833,000 (10.0)	19,982,000 (22.0)	18,293,000 (19.0)	18,517,000 (20.0)	19,602,000 (21.0)	11,673,000 (12.0)	13,561,000 (15.0)	15,163,000 (16.0)
26 (740)	19,960,000 (15.0)	17,464,000 (14.0)	17,870,000 (13.0)	18,363,000 (14.0)	18,733,000 (14.0)	21,356,000 (16.0)	18,643,000 (14.0)	19,767,000 (14.0)	16,879,000 (13.0)	3,057,000 (2.0)	11,940,000 (9.0)	17,544,000 (13.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	2,104,000 (2.0)	8,230,000 (8.0)	14,793,000 (14.0)	12,443,000 (11.0)	10,005,000 (9.0)	10,565,410 (10.0)	7,407,000 (7.0)	0 (0.0)	5,845,000 (5.0)

Table B-19. Water-distribution system production and operating data, Dover Township area, New Jersey, 1980—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
28 (700)	18,588,000 (14.0)	16,277,000 (13.0)	16,835,000 (13.0)	17,206,000 (14.0)	17,860,000 (14.0)	19,891,000 (16.0)	17,075,000 (13.0)	18,657,000 (14.0)	22,404,603 (18.0)	15,707,000 (12.0)	13,436,000 (11.0)	16,130,000 (12.0)
29 (700)	18,257,000 (14.0)	15,808,000 (13.0)	16,156,000 (12.0)	16,838,000 (13.0)	17,498,000 (13.0)	19,649,000 (16.0)	16,778,000 (13.0)	18,256,000 (14.0)	22,338,988 (18.0)	15,661,000 (12.0)	13,303,000 (11.0)	16,104,000 (12.0)
Route 70 well												
31 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17,559,000 (14.0)	31,634,000 (24.0)	32,448,000 (24.0)	27,733,000 (21.0)	16,048,000 (13.0)	0 (0.0)	26,921,000 (21.0)	33,544,000 (24.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7,694,500 (11.0)	15,389,000 (21.0)	7,694,500 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Silver Bay well[3]												
99 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,173,250 (9.0)	12,346,500 (17.0)	6,173,250 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	147,763,000	*142,141,000*	*150,319,000*	*159,197,000*	*224,878,000*	*311,309,750*	*302,407,500*	*289,415,750*	*248,262,000*	*189,326,000*	*157,522,000*	*159,417,000*

Data from Board of Public Utilities, State of New Jersey (1980).

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-20. Water-distribution system production and operating data, Dover Township area, New Jersey, 1981

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,193,000 (6.0)	15,984,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,204,000 (3.0)	4,550,000 (4.0)	7,932,000 (6.0)	4,271,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	52,046,000 (13.0)	86,514,000 (22.0)	42,015,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9,297,000 (7.0)	24,057,000 (19.0)	26,753,000 (21.0)	25,989,000 (20.0)	26,383,000 (21.0)	6,272,000 (5.0)	0 (0.0)	0 (0.0)
South Toms River wells												
17 (750)	7,188,000 (5.0)	5,885,000 (5.0)	6,101,000 (4.0)	5,927,000 (4.0)	11,857,000 (9.0)	13,388,000 (10.0)	12,543,000 (9.0)	10,249,000 (7.0)	8,449,000 (6.0)	10,024,000 (7.0)	9,069,000 (7.0)	9,613,000 (7.0)
32 (700)	0 (0.0)	0 (0.0)	0 (0.0)	1,414,000 (1.0)	2,395,000 (2.0)	8,211,000 (7.0)	11,548,000 (9.0)	4,212,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	20,826,000 (22.0)	18,120,000 (22.0)	20,773,000 (22.0)	19,937,000 (22.0)	20,105,000 (22.0)	19,443,000 (22.0)	19,041,000 (21.0)	19,454,000 (21.0)	18,859,000 (21.0)	19,837,000 (21.0)	19,455,000 (22.0)	20,073,000 (22.0)
Parkway wells												
22 (650)	18,972,000 (16.0)	17,833,000 (16.0)	20,151,000 (17.0)	20,003,000 (17.0)	21,477,000 (18.0)	20,062,000 (17.0)	18,029,000 (15.0)	8,452,000 (7.0)	14,354,000 (12.0)	20,388,000 (17.0)	17,477,000 (15.0)	17,475,000 (14.0)
23 (350)	11,842,000 (18.0)	11,273,000 (19.0)	13,075,000 (20.0)	12,609,000 (20.0)	13,308,000 (20.0)	12,125,000 (19.0)	10,736,000 (17.0)	8,244,000 (13.0)	8,607,000 (14.0)	12,884,000 (20.0)	10,886,000 (17.0)	10,852,000 (17.0)
24 (610)	0 (0.0)	0 (0.0)	153,000 (1.0)	7,925,000 (7.0)	20,671,000 (18.0)	19,666,000 (18.0)	17,494,000 (15.0)	16,837,000 (15.0)	14,208,000 (13.0)	19,230,000 (17.0)	16,441,000 (15.0)	16,261,000 (14.0)
25 (510)	12,770,000 (13.0)	1,147,000 (2.0)	323,000 (1.0)	0 (0.0)	0 (0.0)	11,427,000 (12.0)	18,191,000 (19.0)	11,176,000 (12.0)	9,543,000 (10.0)	18,018,000 (19.0)	15,239,000 (17.0)	15,180,000 (16.0)
26 (740)	19,722,000 (14.0)	16,984,000 (14.0)	20,468,000 (15.0)	20,279,000 (15.0)	20,888,000 (15.0)	20,044,000 (15.0)	18,031,000 (13.0)	16,739,000 (12.0)	15,182,000 (11.0)	2,263,000 (2.0)	1,695,000 (2.0)	577,000 (1.0)
27 (590)	3,930,000 (4.0)	1,015,000 (1.0)	878,000 (1.0)	4,426,000 (4.0)	13,255,000 (12.0)	12,439,000 (12.0)	10,894,000 (10.0)	10,961,000 (10.0)	9,412,000 (9.0)	1,342,000 (2.0)	0 (0.0)	0 (0.0)

Table B-20. Water-distribution system production and operating data, Dover Township area, New Jersey, 1981—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
28 (700)	17,956,000 (14.0)	16,820,000 (14.0)	19,171,000 (15.0)	18,393,000 (15.0)	19,506,000 (15.0)	17,871,000 (14.0)	16,105,000 (12.0)	14,704,000 (11.0)	12,780,000 (10.0)	19,050,000 (15.0)	15,933,000 (13.0)	15,953,000 (12.0)
29 (700)	17,519,000 (13.0)	16,820,000 (14.0)	19,171,000 (15.0)	18,211,000 (14.0)	19,078,000 (15.0)	17,321,000 (14.0)	15,652,000 (12.0)	14,118,000 (11.0)	12,313,000 (10.0)	18,636,000 (14.0)	15,687,000 (12.0)	15,522,000 (12.0)
Route 70 well												
31 (700)	33,593,000 (24.0)	29,664,000 (24.0)	32,117,000 (24.0)	31,933,000 (24.0)	32,761,000 (24.0)	31,668,000 (24.0)	32,227,000 (24.0)	32,296,000 (24.0)	31,268,000 (24.0)	32,850,000 (24.0)	31,950,000 (24.0)	33,099,000 (24.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,173,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	164,318,000	**135,561,000**	**152,381,000**	**161,057,000**	**216,995,000**	**248,256,000**	**288,395,000**	**284,216,000**	**223,373,000**	**180,794,000**	**153,832,000**	**154,605,000**

Data from Board of Public Utilities, State of New Jersey (1981).

To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Well numbers for the Anchorage and Silver Bay wells assigned by ATSDR for identification and simulation purposes only.

Table B-21. Water-distribution system production and operating data, Dover Township area, New Jersey, 1982

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	985,000 (1.0)	1,982,000 (2.0)	0 (0.0)	7,267,000 (6.0)	477,000 (1.0)	0 (0.0)	867,000 (1.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	15,041,000 (4.0)	63,619,000 (16.0)	79,754,000 (21.0)	82,468,000 (21.0)	88,504,000 (23.0)	85,246,000 (23.0)	89,235,000 (23.0)	87,278,000 (23.0)	85,568,000 (22.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,565,000 (5.0)	0 (0.0)	549,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
17 (750)	9,823,000 (7.0)	7,015,000 (6.0)	8,284,000 (6.0)	8,220,000 (6.0)	10,970,000 (8.0)	7,616,000 (6.0)	11,603,000 (8.0)	4,806,000 (4.0)	169,000 (1.0)	210,000 (1.0)	0 (0.0)	0 (0.0)
32 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,983,000 (3.0)	4,885,000 (4.0)	8,808,000 (7.0)	8,031,000 (6.0)	6,820,000 (5.0)	7,432,000 (6.0)
Indian Head well												
20 (500)	19,951,000 (21.0)	18,431,000 (22.0)	16,078,000 (17.0)	18,253,000 (20.0)	18,393,000 (20.0)	18,482,000 (20.0)	18,975,000 (21.0)	19,320,000 (21.0)	18,798,000 (21.0)	20,292,000 (22.0)	19,258,000 (21.0)	19,455,000 (21.0)
Parkway wells												
22 (650)	17,070,000 (14.0)	10,117,000 (9.0)	0 (0.0)	8,031,000 (7.0)	19,401,000 (16.0)	13,801,000 (12.0)	19,871,000 (16.0)	16,618,000 (14.0)	16,218,000 (14.0)	14,623,000 (12.0)	1,520,000 (2.0)	0 (0.0)
23 (350)	11,752,000 (18.0)	804,000 (2.0)	0 (0.0)	5,699,000 (9.0)	11,677,000 (18.0)	6,923,000 (11.0)	10,290,000 (16.0)	8,106,000 (12.0)	5,886,000 (9.0)	301,000 (1.0)	3,310,000 (5.0)	4,880,000 (8.0)
24 (610)	17,331,000 (15.0)	17,104,000 (17.0)	20,153,000 (18.0)	15,568,000 (14.0)	16,295,000 (14.0)	11,103,000 (10.0)	15,967,000 (14.0)	13,209,000 (12.0)	12,620,000 (12.0)	8,704,000 (8.0)	7,169,000 (7.0)	8,388,000 (7.0)
25 (510)	4,265,000 (5.0)	0 (0.0)	10,523,000 (11.0)	15,038,000 (16.0)	15,645,000 (17.0)	10,476,000 (11.0)	15,424,000 (16.0)	12,744,000 (13.0)	9,725,000 (11.0)	105,000 (1.0)	2,408,000 (3.0)	0 (0.0)
26 (740)	15,367,000 (11.0)	20,137,000 (16.0)	23,290,000 (17.0)	17,785,000 (13.0)	18,726,000 (14.0)	12,852,000 (10.0)	18,118,000 (13.0)	15,356,000 (11.0)	15,031,000 (11.0)	10,134,000 (7.0)	6,645,000 (5.0)	6,905,000 (5.0)
27 (590)	179,000 (1.0)	6,381,000 (6.0)	16,869,000 (15.0)	11,550,000 (11.0)	10,403,000 (10.0)	7,462,000 (7.0)	9,534,000 (9.0)	8,899,000 (8.0)	6,802,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)
28 (700)	16,488,000 (13.0)	16,603,000 (14.0)	19,502,000 (15.0)	14,738,000 (12.0)	14,985,000 (12.0)	10,552,000 (8.0)	14,584,000 (11.0)	12,391,000 (10.0)	11,989,000 (10.0)	11,291,000 (9.0)	8,577,000 (7.0)	8,859,000 (7.0)
29 (700)	15,866,000 (12.0)	15,664,000 (13.0)	18,197,000 (14.0)	13,923,000 (11.0)	14,674,000 (11.0)	9,992,000 (8.0)	14,301,000 (11.0)	11,723,000 (9.0)	11,504,000 (9.0)	10,710,000 (8.0)	8,176,000 (7.0)	8,314,000 (6.0)

Table B-21. Water-distribution system production and operating data, Dover Township area, New Jersey, 1982—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	32,666,000 (24.0)	25,658,000 (22.0)	27,234,000 (21.0)	30,863,000 (24.0)	31,172,000 (24.0)	30,882,000 (24.0)	31,688,000 (24.0)	31,745,000 (24.0)	30,856,000 (24.0)	32,686,000 (24.0)	31,112,000 (24.0)	27,593,000 (21.0)
TOTAL PRODUCTION												
	160,758,000	**137,914,000**	**160,130,000**	**175,694,000**	**254,507,000**	**219,895,000**	**274,622,000**	**248,783,000**	**233,652,000**	**207,189,000**	**182,273,000**	**177,394,000**

1. Data from Board of Public Utilities, State of New Jersey (1982).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-22. Water-distribution system production and operating data, Dover Township area, New Jersey, 1983

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	180,000 (1.0)	6,444,000 (4.0)	13,356,000 (9.0)	12,960,000 (9.0)	4,374,000 (3.0)	0 (0.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,246,000 (1.0)	9,186,000 (7.0)	16,721,000 (13.0)	11,365,000 (9.0)	2,376,000 (2.0)	8,523,000 (7.0)	0 (0.0)	0 (0.0)
30 (2,100)	53,293,000 (14.0)	0 (0.0)	34,881,000 (9.0)	82,192,000 (22.0)	91,432,000 (24.0)	89,234,000 (24.0)	88,494,000 (23.0)	91,929,000 (24.0)	88,420,000 (24.0)	9,716,000 (3.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	837,000 (1.0)	13,582,000 (11.0)	22,785,000 (18.0)	12,684,000 (10.0)	1,962,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
17 (750)	0 (0.0)	0 (0.0)	215,000 (1.0)	1,138,000 (1.0)	10,016,000 (7.0)	14,462,000 (11.0)	15,844,000 (11.0)	11,188,000 (8.0)	8,761,000 (7.0)	10,013,000 (7.0)	10,467,000 (8.0)	10,420,000 (8.0)
32 (700)	7,301,000 (6.0)	7,648,000 (7.0)	7,357,000 (6.0)	5,648,000 (5.0)	0 (0.0)	10,199,000 (8.0)	12,117,000 (9.0)	2,575,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	19,912,000 (21.0)	18,125,000 (22.0)	19,671,000 (21.0)	6,584,000 (7.0)	2,491,000 (3.0)	13,132,000 (15.0)	19,464,000 (21.0)	23,403,000 (24.0)	19,769,000 (22.0)	23,524,000 (24.0)	24,697,000 (24.0)	24,215,000 (24.0)
Parkway wells												
22 (650)	3,923,000 (3.0)	19,812,000 (18.0)	15,425,000 (13.0)	11,197,000 (10.0)	15,311,000 (13.0)	19,527,000 (17.0)	22,521,000 (19.0)	19,856,000 (16.0)	17,272,000 (15.0)	23,373,000 (19.0)	22,192,000 (19.0)	21,540,000 (18.0)
23 (350)	5,984,000 (9.0)	9,162,000 (16.0)	7,215,000 (11.0)	5,160,000 (8.0)	0 (0.0)	6,685,000 (11.0)	10,437,000 (16.0)	9,132,000 (14.0)	7,966,000 (13.0)	10,573,000 (16.0)	10,539,000 (17.0)	10,170,000 (16.0)
24 (610)	10,268,000 (9.0)	15,773,000 (15.0)	12,299,000 (11.0)	8,894,000 (8.0)	12,172,000 (11.0)	11,387,000 (10.0)	6,479,000 (6.0)	15,960,000 (14.0)	13,718,000 (13.0)	18,611,000 (16.0)	17,782,000 (16.0)	17,464,000 (15.0)
25 (610)	3,018,000 (3.0)	2,637,000 (3.0)	3,876,000 (4.0)	8,611,000 (9.0)	11,947,000 (13.0)	14,892,000 (16.0)	17,648,000 (19.0)	15,308,000 (16.0)	13,291,000 (14.0)	17,996,000 (19.0)	17,242,000 (19.0)	16,913,000 (18.0)
26 (740)	12,615,000 (9.0)	19,731,000 (16.0)	15,105,000 (11.0)	11,471,000 (9.0)	15,325,000 (11.0)	19,824,000 (15.0)	22,783,000 (17.0)	20,049,000 (15.0)	17,058,000 (13.0)	23,055,000 (17.0)	21,234,000 (16.0)	20,850,000 (15.0)
27 (590)	2,330,000 (2.0)	8,871,000 (9.0)	7,417,000 (7.0)	4,880,000 (5.0)	6,499,000 (6.0)	8,217,000 (8.0)	8,955,000 (8.0)	7,962,000 (7.0)	6,997,000 (7.0)	9,158,000 (8.0)	9,070,000 (9.0)	8,140,000 (7.0)
28 (700)	10,890,000 (8.0)	1,909,000 (2.0)	3,728,000 (3.0)	6,327,000 (5.0)	14,125,000 (11.0)	17,979,000 (14.0)	20,781,000 (16.0)	18,125,000 (14.0)	14,928,000 (12.0)	20,289,000 (16.0)	18,580,000 (15.0)	18,497,000 (14.0)

Table B-22. Water-distribution system production and operating data, Dover Township area, New Jersey, 1983—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	31,797,000 (24.0)	29,085,000 (24.0)	31,550,000 (24.0)	29,905,000 (24.0)	27,047,000 (21.0)	25,218,000 (20.0)	28,990,000 (22.0)	30,846,000 (24.0)	27,429,000 (22.0)	16,394,000 (13.0)	31,077,000 (24.0)	31,751,000 (24.0)
TOTAL PRODUCTION												
	171,440,000	**147,022,000**	**168,997,000**	**182,007,000**	**219,595,000**	**288,026,000**	**337,354,000**	**318,249,000**	**265,213,000**	**211,975,000**	**198,352,000**	**194,980,000**

1. Data from Board of Public Utilities, State of New Jersey (1983).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-23. Water-distribution system production and operating data, Dover Township area, New Jersey, 1984

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,195,000 (2.0)	859,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,991,000 (2.0)	19,223,000 (15.0)	9,502,000 (7.0)	8,666,000 (7.0)	4,718,000 (4.0)	862,000 (1.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	9,735,000 (3.0)	43,305,000 (11.0)	80,843,000 (21.0)	84,876,000 (22.0)	84,433,000 (22.0)	80,151,000 (21.0)	85,203,000 (22.0)	86,961,000 (23.0)	79,235,000 (20.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	966,000 (1.0)	20,764,000 (16.0)	26,523,000 (20.0)	5,239,000 (4.0)	522,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
17 (750)	9,713,000 (7.0)	8,202,000 (6.0)	9,475,000 (7.0)	9,651,000 (7.0)	8,334,000 (6.0)	9,507,000 (7.0)	9,377,000 (7.0)	2,105,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
32 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10,948,000 (9.0)	2,337,000 (2.0)	6,668,000 (5.0)	8,209,000 (7.0)	7,271,000 (6.0)	6,722,000 (5.0)	6,804,000 (5.0)
Indian Head well												
20 (500)	24,773,000 (24.0)	22,964,000 (24.0)	23,987,000 (24.0)	23,980,000 (24.0)	23,883,000 (24.0)	23,467,000 (24.0)	23,985,000 (24.0)	23,855,000 (24.0)	23,290,000 (24.0)	23,463,000 (24.0)	22,110,000 (24.0)	23,216,000 (24.0)
Parkway wells												
22 (650)	20,518,000 (17.0)	18,953,000 (17.0)	20,472,000 (17.0)	20,381,000 (17.0)	18,440,000 (15.0)	22,496,000 (19.0)	19,203,000 (16.0)	20,343,000 (17.0)	18,997,000 (16.0)	13,693,000 (11.0)	8,795,000 (8.0)	10,351,000 (9.0)
23 (350)	9,734,000 (15.0)	6,658,000 (11.0)	8,763,000 (13.0)	9,623,000 (15.0)	2,437,000 (4.0)	0 (0.0)	3,166,000 (5.0)	9,672,000 (15.0)	9,422,000 (15.0)	6,619,000 (10.0)	1,595,000 (3.0)	4,852,000 (7.0)
24 (610)	16,606,000 (15.0)	15,368,000 (15.0)	16,437,000 (15.0)	16,417,000 (15.0)	7,333,000 (7.0)	19,444,000 (18.0)	17,765,000 (16.0)	18,676,000 (16.0)	13,799,000 (13.0)	12,113,000 (11.0)	11,593,000 (11.0)	12,008,000 (11.0)
25 (510)	16,031,000 (17.0)	14,575,000 (16.0)	15,756,000 (17.0)	15,845,000 (17.0)	15,598,000 (16.0)	17,603,000 (19.0)	15,897,000 (17.0)	16,280,000 (17.0)	10,936,000 (12.0)	8,491,000 (9.0)	6,364,000 (7.0)	4,403,000 (5.0)
26 (740)	21,632,000 (16.0)	19,034,000 (15.0)	20,473,000 (15.0)	20,391,000 (15.0)	18,659,000 (14.0)	22,796,000 (17.0)	19,439,000 (14.0)	20,457,000 (15.0)	19,172,000 (14.0)	13,502,000 (10.0)	8,938,000 (7.0)	10,710,000 (8.0)
27 (590)	8,732,000 (8.0)	9,296,000 (9.0)	9,662,000 (9.0)	9,624,000 (9.0)	6,736,000 (6.0)	6,471,000 (6.0)	6,469,000 (6.0)	6,250,000 (6.0)	5,468,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)
28 (700)	18,697,000 (14.0)	16,056,000 (13.0)	17,061,000 (13.0)	16,926,000 (13.0)	16,975,000 (13.0)	20,503,000 (16.0)	17,233,000 (13.0)	18,219,000 (14.0)	16,420,000 (13.0)	12,509,000 (10.0)	7,880,000 (6.0)	9,409,000 (7.0)

Table B-23. Water-distribution system production and operating data, Dover Township area, New Jersey, 1984—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkwell wells—Continued												
29 (700)	15,357,000 (12.0)	12,865,000 (11.0)	13,668,000 (11.0)	13,591,000 (11.0)	15,160,000 (12.0)	19,331,000 (15.0)	16,304,000 (13.0)	17,253,000 (13.0)	12,480,000 (10.0)	12,558,000 (10.0)	7,508,000 (6.0)	8,949,000 (7.0)
Route 70 well												
31 (700)	31,674,000 (24.0)	29,262,000 (24.0)	31,351,000 (24.0)	30,585,000 (24.0)	30,673,000 (24.0)	30,040,000 (24.0)	30,742,000 (24.0)	30,817,000 (24.0)	30,137,000 (24.0)	30,983,000 (24.0)	29,908,000 (24.0)	29,851,000 (23.0)
Anchorage well[3]												
98 (400)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,456,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	193,467,000	**173,233,000**	**187,105,000**	**196,749,000**	**211,490,000**	**330,087,000**	**303,677,000**	**288,933,000**	**253,721,000**	**227,267,000**	**198,374,000**	**199,788,000**

Data from Board of Public Utilities, State of New Jersey (1984).

o determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

ell number for the Anchorage well assigned by ATSDR for identification and simulation purposes only.

Table B-24. Water-distribution system production and operating data, Dover Township area, New Jersey, 1985

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,528,000 (7.0)	856,000 (1.0)	12,983,000 (10.0)	10,877,000 (8.0)	9,807,000 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	84,302,000 (22.0)	76,910,000 (22.0)	14,537,000 (4.0)	77,963,000 (21.0)	93,580,000 (24.0)	90,682,000 (24.0)	94,607,000 (24.0)	93,433,000 (24.0)	89,072,000 (24.0)	89,103,000 (23.0)	88,056,000 (24.0)	9,731,000 (3.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	126,000 (1.0)	0 (0.0)	8,055,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
17 (750)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,308,000 (4.0)	10,897,000 (8.0)	5,193,000 (4.0)	1,484,000 (1.0)	2,613,000 (2.0)	0 (0.0)	0 (0.0)
32 (700)	6,764,000 (5.0)	6,244,000 (5.0)	8,746,000 (7.0)	7,743,000 (6.0)	11,861,000 (9.0)	4,745,000 (4.0)	6,405,000 (5.0)	7,992,000 (6.0)	8,507,000 (7.0)	5,728,000 (4.0)	6,628,000 (5.0)	10,807,000 (8.0)
Indian Head well												
20 (500)	1,639,000 (2.0)	0 (0.0)	19,179,000 (21.0)	22,375,000 (24.0)	22,392,000 (24.0)	22,283,000 (24.0)	22,032,000 (24.0)	21,769,000 (24.0)	21,594,000 (24.0)	22,595,000 (24.0)	8,395,000 (9.0)	19,500,000 (21.0)
Parkway wells												
22 (650)	15,597,00 (13.0)	14,280,000 (13.0)	22,789,000 (19.0)	16,645,000 (14.0)	21,462,000 (18.0)	18,956,000 (16.0)	22,827,000 (19.0)	19,505,000 (16.0)	19,452,000 (17.0)	15,164,000 (13.0)	14,050,000 (12.0)	24,698,000 (20.0)
23 (350)	5,757,000 (9.0)	6,309,000 (11.0)	9,735,000 (15.0)	7,168,000 (11.0)	9,029,000 (14.0)	8,129,000 (13.0)	9,667,000 (15.0)	8,294,000 (13.0)	8,407,000 (13.0)	6,915,000 (11.0)	6,465,000 (10.0)	11,277,000 (17.0)
24 (610)	7,873,000 (7.0)	7,829,000 (8.0)	21,156,000 (19.0)	14,449,000 (13.0)	18,712,000 (17.0)	16,200,000 (15.0)	19,444,000 (17.0)	16,182,000 (14.0)	16,371,000 (15.0)	12,349,000 (11.0)	12,098,000 (11.0)	16,599,000 (15.0)
25 (510)	1,086,000 (1.0)	0 (0.0)	0 (0.0)	3,080,000 (3.0)	12,495,000 (13.0)	11,351,000 (12.0)	13,232,000 (14.0)	12,836,000 (14.0)	12,444,000 (14.0)	10,175,000 (11.0)	8,877,000 (10.0)	15,543,000 (16.0)
26 (740)	16,036,000 (12.0)	14,991,000 (12.0)	23,518,000 (17.0)	16,607,000 (12.0)	19,336,000 (14.0)	6,801,000 (5.0)	19,783,000 (14.0)	19,337,000 (14.0)	12,781,000 (10.0)	14,843,000 (11.0)	9,382,000 (7.0)	20,670,000 (15.0)
27 (590)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,138,000 (2.0)	5,217,000 (5.0)	5,899,000 (5.0)	4,927,000 (5.0)	4,943,000 (5.0)	3,184,000 (3.0)	0 (0.0)	0 (0.0)
28 (700)	14,156,000 (11.0)	13,391,000 (11.0)	20,764,000 (16.0)	14,948,000 (12.0)	19,423,000 (15.0)	16,999,000 (14.0)	20,364,000 (16.0)	17,535,000 (14.0)	17,649,000 (14.0)	13,700,000 (11.0)	13,098,000 (10.0)	23,246,000 (18.0)
29 (700)	13,782,000 (11.0)	7,865,000 (7.0)	20,234,000 (16.0)	15,465,000 (12.0)	19,911,000 (15.0)	17,922,000 (14.0)	21,966,000 (17.0)	17,575,000 (14.0)	16,920,000 (13.0)	13,079,000 (10.0)	13,115,000 (10.0)	21,537,000 (17.0)

Table B-24. Water-distribution system production and operating data, Dover Township area, New Jersey, 1985—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	30,665,000 (24.0)	27,893,000 (24.0)	30,524,000 (23.0)	28,256,000 (22.0)	23,199,000 (18.0)	21,128,000 (17.0)	28,407,000 (22.0)	29,266,000 (22.0)	25,479,000 (20.0)	29,437,000 (23.0)	28,989,000 (23.0)	30,083,000 (23.0)
TOTAL PRODUCTION												
	197,657,000	**175,712,000**	**191,182,000**	**224,699,000**	**282,192,000**	**246,577,000**	**316,568,000**	**284,721,000**	**264,910,000**	**238,885,000**	**209,153,000**	**203,691,000**

Data from Board of Public Utilities, State of New Jersey (1985).

o determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Table B-25. Water-distribution system production and operating data, Dover Township area, New Jersey, 1986

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
16 (800)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	276,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	20,543,000 (16.0)	15,036,000 (12.0)	8,810,000 (7.0)	986,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	56,039,000 (14.0)	89,466,000 (24.0)	91,883,000 (24.0)	88,732,000 (24.0)	91,539,000 (24.0)	93,506,000 (24.0)	89,789,000 (24.0)	92,444,000 (24.0)	85,366,000 (23.0)	83,816,000 (22.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12,190,000 (9.0)	10,940,000 (9.0)	10,062,000 (8.0)	3,375,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River well												
32 (700)	10,987,000 (8.0)	9,824,000 (8.0)	10,492,000 (8.0)	10,503,000 (8.0)	29,959,000 (23.0)	32,290,000 (24.0)	17,523,000 (13.0)	14,035,000 (11.0)	9,948,000 (8.0)	8,195,000 (6.0)	8,695,000 (7.0)	8,887,000 (7.0)
Indian Head well												
20 (500)	22,787,000 (24.0)	20,505,000 (24.0)	23,248,000 (24.0)	22,453,000 (24.0)	22,070,000 (24.0)	20,216,000 (22.0)	20,061,000 (22.0)	22,120,000 (24.0)	22,154,000 (24.0)	23,165,000 (24.0)	22,492,000 (24.0)	22,413,000 (24.0)
Parkway wells												
22 (650)	24,513,000 (20.0)	24,213,000 (22.0)	15,500,000 (13.0)	0 (0.0)	13,121,000 (11.0)	22,527,000 (19.0)	19,235,000 (16.0)	21,873,000 (18.0)	20,736,000 (18.0)	17,583,000 (15.0)	4,174,000 (4.0)	14,731,000 (12.0)
23 (350)	8,424,000 (13.0)	8,131,000 (14.0)	5,234,000 (8.0)	0 (0.0)	9,216,000 (14.0)	11,362,000 (18.0)	10,229,000 (16.0)	10,761,000 (17.0)	10,277,000 (16.0)	8,928,000 (14.0)	8,272,000 (13.0)	7,564,000 (12.0)
24 (610)	19,962,000 (18.0)	17,888,000 (17.0)	18,506,000 (16.0)	17,974,000 (16.0)	19,559,000 (17.0)	16,883,000 (15.0)	15,631,000 (14.0)	16,561,000 (15.0)	15,763,000 (14.0)	13,592,000 (12.0)	12,882,000 (12.0)	11,572,000 (10.0)
25 (510)	15,509,000 (16.0)	14,206,000 (17.0)	14,211,000 (15.0)	12,791,000 (14.0)	12,862,000 (14.0)	8,018,000 (9.0)	7,959,000 (8.0)	6,392,000 (7.0)	4,641,000 (5.0)	4,054,000 (4.0)	3,726,000 (4.0)	3,326,000 (4.0)
26 (740)	20,999,000 (15.0)	12,977,000 (10.0)	18,318,000 (13.0)	17,319,000 (13.0)	20,316,000 (15.0)	16,598,000 (12.0)	15,596,000 (11.0)	14,252,000 (10.0)	12,790,000 (10.0)	13,234,000 (10.0)	11,923,000 (9.0)	11,440,000 (8.0)
27 (590)	0 (0.0)	4,770,000 (5.0)	5,070,000 (5.0)	4,669,000 (4.0)	5,866,000 (5.0)	4,912,000 (5.0)	4,467,000 (4.0)	4,209,000 (4.0)	4,379,000 (4.0)	3,227,000 (3.0)	0 (0.0)	0 (0.0)
28 (700)	22,741,000 (17.0)	19,784,000 (17.0)	19,460,000 (15.0)	19,054,000 (15.0)	21,651,000 (17.0)	18,348,000 (15.0)	14,218,000 (11.0)	16,708,000 (13.0)	17,037,000 (14.0)	14,147,000 (11.0)	13,728,000 (11.0)	12,308,000 (10.0)
29 (700)	21,559,00 (17.0)	18,587,000 (16.0)	19,017,000 (15.0)	17,995,000 (14.0)	20,881,000 (16.0)	16,978,000 (13.0)	15,081,000 (12.0)	16,058,000 (12.0)	15,282,000 (12.0)	12,515,000 (10.0)	11,863,000 (9.0)	10,880,000 (8.0)

Table B-25. Water-distribution system production and operating data, Dover Township area, New Jersey, 1986—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	30,122,000 (23.0)	27,475,000 (23.0)	7,132,000 (6.0)	5,560,000 (4.0)	31,080,000 (24.0)	28,440,000 (23.0)	31,350,000 (24.0)	31,825,000 (24.0)	31,013,000 (24.0)	32,219,000 (24.0)	31,245,000 (24.0)	32,451,000 (24.0)
Berkeley wells												
33 (1,000)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,830,000 (3.0)	42,360,000 (24.0)	24,384,000 (13.0)	9,210,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
34 (1,000)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,140,000 (2.0)	22,494,000 (12.0)	1,179,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	197,603,000	**178,360,000**	**212,227,000**	**217,784,000**	**336,027,000**	**358,056,000**	**328,639,000**	**283,050,000**	**253,809,000**	**243,303,000**	**214,366,000**	**219,388,000**

1. Data from Board of Public Utilities, State of New Jersey (1986).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-26. Water-distribution system production and operating data, Dover Township area, New Jersey, 1987

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	861,000 (1.0)	0 (0.0)	6,349,000 (5.0)	0 (0.0)	2,107,000 (2.0)	8,375,000 (7.0)	11,235,000 (9.0)	5,511,000 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2100)	8,939,000 (2.0)	0 (0.0)	0 (0.0)	62,305,000 (16.0)	87,651,000 (22.0)	84,501,000 (22.0)	88,998,000 (23.0)	94,885,000 (24.0)	90,853,000 (24.0)	94,735,000 (24.0)	40,962,000 (11.0)	90,177,000 (24.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,223,000 (2.0)	4,484,000 (4.0)	5,328,000 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	9,708,000 (8.0)	26,680,000 (21.0)
South Toms River well												
32 (700)	17,121,000 (13.0)	9,542,000 (8.0)	11,177,000 (9.0)	8,815,000 (7.0)	11,399,000 (9.0)	14,583,000 (12.0)	16,827,000 (13.0)	13,445,000 (10.0)	3,657,000 (3.0)	4,642,000 (4.0)	1,129,000 (1.0)	6,815,000 (5.0)
Indian Head well												
20 (500)	23,196,000 (24.0)	21,186,000 (24.0)	23,341,000 (24.0)	21,673,000 (24.0)	22,381,000 (24.0)	21,919,000 (24.0)	22,719,000 (24.0)	22,855,000 (24.0)	22,762,000 (24.0)	24,042,000 (24.0)	24,046,000 (24.0)	242,000 (1.0)
Parkway wells												
22 (650)	24,091,000 (20.0)	21,545,000 (20.0)	22,829,000 (19.0)	16,555,000 (14.0)	22,447,000 (19.0)	22,729,000 (19.0)	21,731,000 (18.0)	23,052,000 (19.0)	20,691,000 (18.0)	16,919,000 (14.0)	9,556,000 (8.0)	3,869,000 (3.0)
23 (350)	12,311,000 (19.0)	11,097,000 (19.0)	11,730,000 (18.0)	9,630,000 (15.0)	11,513,000 (18.0)	11,618,000 (18.0)	11,017,000 (17.0)	11,259,000 (17.0)	9,885,000 (16.0)	8,442,000 (13.0)	7,468,000 (12.0)	0 (0.0)
24 (610)	19,697,000 (17.0)	17,490,000 (17.0)	18,748,000 (17.0)	11,026,000 (10.0)	5,361,000 (5.0)	18,793,000 (17.0)	18,456,000 (16.0)	20,210,000 (18.0)	18,154,000 (17.0)	15,150,000 (13.0)	20,126,000 (18.0)	22,595,000 (20.0)
25 (510)	5,540,000 (6.0)	4,963,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
26 (740)	19,055,000 (14.0)	17,689,000 (14.0)	16,103,000 (12.0)	15,602,000 (12.0)	19,526,000 (14.0)	19,932,000 (15.0)	19,253,000 (14.0)	7,960,000 (6.0)	0 (0.0)	13,885,000 (10.0)	12,763,000 (10.0)	0 (0.0)
27 (590)	4,924,000 (5.0)	2,990,000 (3.0)	4,433,000 (4.0)	4,112,000 (4.0)	1,193,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
28 (700)	20,121,000 (15.0)	15,494,000 (13.0)	18,632,000 (14.0)	15,574,000 (12.0)	19,305,000 (15.0)	18,334,000 (15.0)	18,385,000 (14.0)	18,864,000 (14.0)	16,700,000 (13.0)	11,742,000 (9.0)	12,218,000 (10.0)	0 (0.0)
29 (700)	17,797,000 (14.0)	15,873,000 (14.0)	16,711,000 (13.0)	13,703,000 (11.0)	16,857,000 (13.0)	17,076,000 (14.0)	16,186,000 (12.0)	16,962,000 (13.0)	15,344,000 (12.0)	12,192,000 (9.0)	10,981,000 (9.0)	1,107,000 (1.0)

Table B-26. Water-distribution system production and operating data, Dover Township area, New Jersey, 1987—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	32,628,000 (24.0)	29,096,000 (24.0)	32,411,000 (24.0)	21,941,000 (17.0)	31,398,000 (24.0)	29,710,000 (24.0)	28,651,000 (22.0)	30,325,000 (23.0)	28,045,000 (22.0)	29,390,000 (23.0)	28,632,000 (23.0)	29,659,000 (23.0)
Berkeley wells												
33 (1,000)	28,235,000 (15.0)	28,879,000 (17.0)	35,789,000 (19.0)	16,148,000 (9.0)	19,045,000 (10.0)	41,007,000 (23.0)	50,956,000 (24.0)	54,173,000 (24.0)	43,297,000 (24.0)	28,593,000 (15.0)	43,544,000 (24.0)	49,998,000 (24.0)
34 (1,000)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,500,000 (1.0)	15,929,000 (9.0)	24,589,000 (13.0)	37,826,000 (20.0)	3,826,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	234,516,000	**195,844,000**	**218,253,000**	**217,084,000**	**273,906,000**	**328,990,000**	**354,331,000**	**357,327,000**	**273,214,000**	**259,732,000**	**221,133,000**	**231,142,000**

1. Data from Board of Public Utilities, State of New Jersey (1987).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-27. Water-distribution system production and operating data, Dover Township area, New Jersey, 1988

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	3,950,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,518,000 (1.0)	16,709,000 (13.0)	22,727,000 (17.0)	14,268,000 (11.0)	0 (0.0)	0 (0.0)	2,653,000 (2.0)	0 (0.0)
30 (2,100)	53,617,000 (14.0)	64,277,000 (18.0)	42,449,000 (11.0)	48,259,000 (13.0)	58,857,000 (15.0)	73,059,000 (19.0)	82,918,000 (21.0)	81,743,000 (21.0)	43,681,000 (12.0)	41,782,000 (11.0)	33,928,000 (9.0)	0 (0.0)
Brookside well												
15 (700)	26,094,000 (20.0)	3,117,000 (3.0)	18,431,000 (14.0)	23,881,000 (19.0)	22,570,000 (17.0)	23,151,000 (18.0)	22,358,000 (17.0)	22,656,000 (17.0)	11,237,000 (9.0)	0 (0.0)	11,553,000 (9.0)	0 (0.0)
South Toms River wells												
32 (700)	9,278,000 (7.0)	10,609,000 (9.0)	12,457,000 (10.0)	9,801,000 (8.0)	11,560,000 (9.0)	22,781,000 (18.0)	22,317,000 (17.0)	17,552,000 (14.0)	10,226,000 (8.0)	9,090,000 (7.0)	11,066,000 (9.0)	8,996,000 (7.0)
38 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9,890,000 (8.0)	7,526,000 (6.0)	108,000 (1.0)	0 (0.0)	0 (0.0)	1,258,000 (1.0)
Indian Head well												
20 (500)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7,422,000 (8.0)	18,141,000 (20.0)	19,375,000 (21.0)	18,703,000 (21.0)	19,263,000 (21.0)	18,626,000 (21.0)	10,018,000 (11.0)
Parkway wells												
22 (650)	10,114,00 (8.0)	13,156,000 (12.0)	19,240,000 (16.0)	25,489,000 (22.0)	25,517,000 (21.0)	24,917,000 (21.0)	21,678,000 (18.0)	20,945,000 (17.0)	18,815,000 (16.0)	21,607,000 (18.0)	10,885,000 (9.0)	24,183,000 (20.0)
23 (350)	4,722,000 (7.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,591,000 (9.0)	12,415,000 (20.0)	10,983,000 (17.0)	10,502,000 (16.0)	9,762,000 (16.0)	11,405,000 (18.0)	2,199,000 (4.0)	0 (0.0)
24 (610)	22,404,000 (20.0)	22,130,000 (21.0)	23,791,000 (21.0)	24,482,000 (22.0)	22,910,000 (20.0)	23,775,000 (22.0)	20,412,000 (18.0)	18,806,000 (17.0)	17,629,000 (16.0)	19,930,000 (18.0)	10,320,000 (9.0)	23,068,000 (20.0)
26 (740)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	18,486,000 (13.0)	18,161,000 (13.0)	16,907,000 (13.0)	19,152,000 (14.0)	9,717,000 (7.0)	21,280,000 (15.0)
28 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,345,000 (5.0)	23,799,000 (19.0)	21,290,000 (16.0)	20,230,000 (16.0)	18,533,000 (15.0)	20,801,000 (16.0)	7,717,000 (6.0)	23,445,000 (18.0)
29 (700)	7,473,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,814,000 (2.0)	18,763,000 (15.0)	17,800,000 (14.0)	17,139,000 (13.0)	23,098,000 (18.0)	17,589,000 (14.0)	9,171,000 (7.0)	19,113,000 (15.0)
Route 70 well												
31 (700)	30,011,000 (23.0)	28,212,000 (23.0)	29,779,000 (23.0)	28,684,000 (23.0)	29,858,000 (23.0)	28,781,000 (23.0)	28,064,000 (22.0)	28,602,000 (22.0)	26,585,000 (21.0)	28,504,000 (22.0)	28,384,000 (23.0)	28,782,000 (22.0)

Table B-27. Water-distribution system production and operating data, Dover Township area, New Jersey, 1988—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Berkeley wells												
33 (1,000)	52,199,000 (24.0)	48,723,000 (24.0)	52,125,000 (24.0)	48,662,000 (24.0)	51,714,000 (24.0)	49,869,000 (24.0)	50,633,000 (24.0)	40,448,000 (22.0)	40,005,000 (22.0)	44,100,000 (24.0)	43,011,000 (24.0)	44,140,000 (24.0)
34 (1,000)	14,792,000 (8.0)	20,945,000 (12.0)	31,772,000 (17.0)	29,394,000 (16.0)	31,962,000 (17.0)	47,762,000 (24.0)	42,709,000 (23.0)	32,914,000 (18.0)	30,269,000 (17.0)	25,382,000 (14.0)	26,772,000 (15.0)	24,234,000 (13.0)
35 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	22,386,000 (17.0)	17,404,000 (13.0)	17,489,000 (14.0)	3,474,000 (3.0)	9,728,000 (8.0)	11,700,000 (9.0)
TOTAL PRODUCTION												
	234,654,000	**211,169,000**	**230,044,000**	**238,652,000**	**271,216,000**	**373,203,000**	**432,792,000**	**388,271,000**	**303,047,000**	**282,079,000**	**235,730,000**	**240,217,000**

1. Data from Board of Public Utilities, State of New Jersey (1988).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-28. Water-distribution system production and operating data, Dover Township area, New Jersey, 1989

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,740,000 (3.0)	902,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	3,260,000 (1.0)	21,138,000 (6.0)	25,265,000 (7.0)	48,463,000 (13.0)	74,644,000 (19.0)	96,483,000 (24.0)	76,384,000 (20.0)	78,085,000 (20.0)	98,001,000 (24.0)	77,891,000 (20.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	80,000 (1.0)	849,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,855,000 (2.0)	5,154,000 (4.0)	3,133,000 (3.0)	5,784,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	9,098,000 (7.0)	10,560,000 (9.0)	0 (0.0)	1,992,000 (2.0)	12,090,000 (9.0)	9,566,000 (8.0)	15,181,000 (12.0)	15,148,000 (12.0)	13,639,000 (11.0)	4,417,000 (3.0)	12,114,000 (10.0)	9,896,000 (8.0)
38 (700)	0 (0.0)	0 (0.0)	15,084,000 (12.0)	1,256,000 (1.0)	0 (0.0)	0 (0.0)	2,412,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	21,523,000 (23.0)	17,919,000 (20.0)	18,466,000 (20.0)	22,540,000 (24.0)	17,953,000 (20.0)	17,941,000 (19.0)	22,288,000 (24.0)	162,000 (1.0)
Parkway wells												
22 (650)	22,382,000 (19.0)	23,028,000 (21.0)	29,222,000 (24.0)	22,849,000 (20.0)	24,305,000 (20.0)	18,957,000 (16.0)	19,032,000 (16.0)	22,026,000 (18.0)	17,978,000 (15.0)	18,124,000 (15.0)	21,995,000 (19.0)	19,138,000 (16.0)
23 (350)	0 (0.0)	0 (0.0)	8,438,000 (13.0)	12,366,000 (20.0)	14,320,000 (22.0)	10,667,000 (17.0)	10,262,000 (16.0)	6,970,000 (11.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
24 (610)	20,405,000 (18.0)	20,231,000 (20.0)	26,807,000 (24.0)	20,243,000 (18.0)	24,133,000 (21.0)	12,296,000 (11.0)	13,044,000 (12.0)	17,497,000 (15.0)	10,700,000 (10.0)	3,080,000 (3.0)	4,607,000 (4.0)	1,911,000 (2.0)
26 (740)	19,397,000 (14.0)	19,533,000 (16.0)	24,602,000 (18.0)	18,714,000 (14.0)	22,334,000 (16.0)	17,042,000 (13.0)	17,771,000 (13.0)	19,647,000 (14.0)	17,460,000 (13.0)	16,483,000 (12.0)	19,745,000 (15.0)	15,425,000 (11.0)
28 (700)	21,688,000 (17.0)	21,844,000 (19.0)	25,541,000 (20.0)	19,762,000 (16.0)	23,308,000 (18.0)	19,841,000 (16.0)	18,035,000 (14.0)	23,378,000 (18.0)	17,524,000 (14.0)	16,736,000 (13.0)	23,076,000 (18.0)	7,581,000 (6.0)
29 (700)	18,311,000 (14.0)	19,806,000 (17.0)	23,463,000 (18.0)	18,283,000 (15.0)	21,791,000 (17.0)	16,436,000 (13.0)	15,023,000 (12.0)	18,158,000 (14.0)	12,206,000 (10.0)	13,958,000 (11.0)	18,500,000 (15.0)	15,039,000 (12.0)

Table B-28. Water-distribution system production and operating data, Dover Township area, New Jersey, 1989—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	26,184,00 (20.0)	26,306,000 (22.0)	28,246,000 (22.0)	25,696,000 (20.0)	32,109,000 (24.0)	24,325,000 (19.0)	26,288,000 (20.0)	31,891,000 (24.0)	25,303,000 (20.0)	23,483,000 (18.0)	31,425,000 (24.0)	25,737,000 (20.0)
Berkeley wells												
33 (1,000)	41,639,000 (22.0)	39,859,000 (24.0)	22,155,000 (12.0)	14,416,000 (8.0)	27,730,000 (15.0)	27,133,000 (15.0)	26,985,000 (15.0)	26,130,000 (14.0)	31,184,000 (17.0)	27,159,000 (15.0)	51,293,000 (24.0)	41,683,000 (22.0)
34 (1,000)	23,390,000 (13.0)	20,179,000 (12.0)	27,322,000 (15.0)	21,882,000 (12.0)	49,676,000 (24.0)	40,068,000 (22.0)	45,736,000 (24.0)	49,939,000 (24.0)	32,774,000 (18.0)	35,671,000 (19.0)	5,076,000 (3.0)	13,384,000 (7.0)
35 (700)	9,897,000 (8.0)	3,733,000 (3.0)	29,812,000 (23.0)	32,489,000 (24.0)	21,941,000 (17.0)	22,371,000 (18.0)	26,187,000 (20.0)	28,030,000 (22.0)	24,620,000 (20.0)	16,941,000 (13.0)	18,508,000 (15.0)	0 (0.0)
TOTAL PRODUCTION												
	212,391,000	**205,079,000**	**263,952,000**	**231,086,000**	**320,525,000**	**287,939,000**	**338,040,000**	**382,721,000**	**303,509,000**	**272,078,000**	**326,628,000**	**227,847,000**

Data from Board of Public Utilities, State of New Jersey (1989) and Flegal (1997).

o determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;

Q_P = production of water, in gallons per month;

C = rated capacity of the well, in gallons per minute;

D = number of days per month; and

60 = number of minutes per hour.

Table B-29. Water-distribution system production and operating data, Dover Township area, New Jersey, 1990

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,533,000 (3.0)	7,730,000 (6.0)	1,635,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	12,121,000 (3.0)	0 (0.0)	0 (0.0)	2,080,000 (1.0)	17,038,000 (4.0)	68,315,000 (18.0)	86,027,000 (22.0)	83,836,000 (21.0)	82,146,000 (22.0)	78,438,000 (20.0)	14,870,000 (4.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,878,000 (2.0)	390,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,591,000 (1.0)	16,763,000 (13.0)	4,271,000 (3.0)	14,899,000 (12.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	11,220,000 (9.0)	8,499,000 (7.0)	9,855,000 (8.0)	9,307,000 (7.0)	11,016,000 (8.0)	17,838,000 (14.0)	19,947,000 (15.0)	12,339,000 (9.0)	10,721,000 (9.0)	9,430,000 (7.0)	11,448,000 (9.0)	10,125,000 (8.0)
38 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,025,000 (2.0)	541,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	17,666,00 (19.0)	13,263,000 (16.0)	18,961,000 (20.0)	16,518,000 (18.0)	18,979,000 (20.0)	17,988,000 (20.0)	18,233,000 (20.0)	17,637,000 (19.0)	18,148,000 (20.0)	15,956,000 (17.0)	15,538,000 (17.0)	5,523,000 (6.0)
Parkway wells												
22 (650)	23,101,000 (19.0)	21,933,000 (20.0)	24,432,000 (20.0)	22,719,000 (19.0)	22,862,000 (19.0)	22,891,000 (20.0)	23,314,000 (19.0)	14,692,000 (12.0)	0 (0.0)	0 (0.0)	1,152,000 (1.0)	21,134,000 (17.0)
24 (610)	16,056,000 (14.0)	11,038,000 (11.0)	14,502,000 (13.0)	18,220,000 (17.0)	19,377,000 (17.0)	19,673,000 (18.0)	20,767,000 (18.0)	21,857,000 (19.0)	23,203,000 (21.0)	20,541,000 (18.0)	19,212,000 (18.0)	18,937,000 (17.0)
26 (740)	19,992,000 (15.0)	19,543,000 (16.0)	19,687,000 (14.0)	19,190,000 (14.0)	20,293,000 (15.0)	18,779,000 (14.0)	19,462,000 (14.0)	18,205,000 (13.0)	18,431,000 (14.0)	19,185,000 (14.0)	19,229,000 (14.0)	18,970,000 (14.0)
28 (700)	16,754,000 (13.0)	21,323,000 (18.0)	21,698,000 (17.0)	21,109,000 (17.0)	22,986,000 (18.0)	21,629,000 (17.0)	21,981,000 (17.0)	20,594,000 (16.0)	20,451,000 (16.0)	21,431,000 (16.0)	22,002,000 (17.0)	21,090,000 (16.0)
29 (700)	18,905,000 (15.0)	18,524,000 (16.0)	19,136,000 (15.0)	18,596,000 (15.0)	19,611,000 (15.0)	19,058,000 (15.0)	18,905,000 (15.0)	17,572,000 (14.0)	18,164,000 (14.0)	18,671,000 (14.0)	18,909,000 (15.0)	18,506,000 (14.0)
Route 70 well												
31 (700)	28,018,000 (22.0)	25,517,000 (22.0)	31,127,000 (24.0)	29,419,000 (23.0)	30,271,000 (23.0)	28,791,000 (23.0)	28,997,000 (22.0)	27,428,000 (21.0)	26,815,000 (21.0)	27,626,000 (21.0)	26,500,000 (21.0)	27,553,000 (21.0)

Table B-29. Water-distribution system production and operating data, Dover Township area, New Jersey, 1990—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Berkeley wells												
33 (1,000)	45,317,000 (24.0)	41,710,000 (24.0)	45,841,000 (24.0)	41,793,000 (23.0)	41,995,000 (23.0)	37,392,000 (21.0)	36,724,000 (20.0)	38,927,000 (21.0)	39,351,000 (22.0)	41,863,000 (23.0)	40,745,000 (23.0)	42,225,000 (23.0)
34 (1,000)	25,306,000 (14.0)	22,833,000 (14.0)	22,420,000 (12.0)	21,960,000 (12.0)	25,742,000 (14.0)	27,130,000 (15.0)	30,101,000 (16.0)	21,709,000 (12.0)	21,582,000 (12.0)	13,315,000 (7.0)	23,303,000 (13.0)	24,457,000 (13.0)
35 (700)	0 (0.0)	0 (0.0)	6,309,000 (5.0)	21,530,000 (17.0)	21,772,000 (17.0)	23,002,000 (18.0)	23,513,000 (18.0)	15,714,000 (12.0)	17,323,000 (14.0)	15,607,000 (12.0)	18,131,000 (15.0)	19,389,000 (15.0)
TOTAL PRODUCTION												
	234,456,000	**204,183,000**	**233,968,000**	**242,441,000**	**271,942,000**	**327,610,000**	**377,367,000**	**317,347,000**	**311,234,000**	**282,063,000**	**231,039,000**	**227,909,000**

1. Data from Board of Public Utilities, State of New Jersey (1990) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-30. Water-distribution system production and operating data, Dover Township area, New Jersey, 1991

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10,046,000 (8.0)	10,825,000 (9.0)	7,776,000 (6.0)	9,895,000 (8.0)	6,429,000 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	771,000 (1.0)	4,767,000 (2.0)	25,928,000 (7.0)	43,828,000 (12.0)	62,773,000 (16.0)	83,018,000 (22.0)	85,949,000 (22.0)	84,320,000 (22.0)	83,036,000 (22.0)	65,188,000 (17.0)	0 (0.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,109,000 (2.0)	5,463,000 (4.0)	4,362,000 (3.0)	2,059,000 (2.0)	278,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17,316,000 (13.0)	17,390,000 (14.0)	11,873,000 (9.0)	10,536,000 (8.0)	12,787,000 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	8,574,000 (7.0)	10,416,000 (9.0)	13,056,000 (10.0)	12,016,000 (10.0)	18,973,000 (15.0)	17,426,000 (14.0)	18,875,000 (15.0)	17,029,000 (13.0)	13,676,000 (11.0)	10,189,000 (8.0)	11,999,000 (10.0)	11,682,000 (9.0)
38 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,022,000 (2.0)	7,749,000 (6.0)	8,791,000 (7.0)	8,586,000 (7.0)	2,402,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	5,867,000 (6.0)	11,296,000 (13.0)	15,853,000 (17.0)	7,993,000 (9.0)	12,321,000 (13.0)	11,280,000 (13.0)	11,031,000 (12.0)	11,146,000 (12.0)	9,638,000 (11.0)	5,932,000 (6.0)	6,400,000 (7.0)	7,200,000 (8.0)
Parkway wells												
22 (650)	21,434,000 (18.0)	19,271,000 (18.0)	24,066,000 (20.0)	23,345,000 (20.0)	24,930,000 (21.0)	23,524,000 (20.0)	22,846,000 (19.0)	22,706,000 (19.0)	21,565,000 (18.0)	21,196,000 (18.0)	23,064,000 (20.0)	23,335,000 (19.0)
24 (610)	18,848,000 (17.0)	17,352,000 (17.0)	19,799,000 (17.0)	18,867,000 (17.0)	20,898,000 (18.0)	15,676,000 (14.0)	14,893,000 (13.0)	16,044,000 (14.0)	12,567,000 (11.0)	16,271,000 (14.0)	18,618,000 (17.0)	17,848,000 (16.0)
26 (740)	18,839,000 (14.0)	16,845,000 (14.0)	18,141,000 (13.0)	15,318,000 (12.0)	16,621,000 (12.0)	15,682,000 (12.0)	16,105,000 (12.0)	15,584,000 (11.0)	14,684,000 (11.0)	14,371,000 (10.0)	15,426,000 (12.0)	15,018,000 (11.0)
28 (700)	20,350,000 (16.0)	16,602,000 (14.0)	21,037,000 (16.0)	21,593,000 (17.0)	24,478,000 (19.0)	20,694,000 (16.0)	22,973,000 (18.0)	22,536,000 (17.0)	21,564,000 (17.0)	21,697,000 (17.0)	22,987,000 (18.0)	22,920,000 (18.0)
29 (700)	18,509,000 (14.0)	16,417,000 (14.0)	18,652,000 (14.0)	17,889,000 (14.0)	20,725,000 (16.0)	18,656,000 (15.0)	17,626,000 (14.0)	17,185,000 (13.0)	16,329,000 (13.0)	16,534,000 (13.0)	17,710,000 (14.0)	17,621,000 (14.0)
39 (300)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,417,000 (4.0)	8,163,000 (15.0)	8,358,000 (15.0)	6,247,000 (11.0)	6,968,000 (13.0)	388,000 (1.0)	0 (0.0)	0 (0.0)

Table B-30. Water-distribution system production and operating data, Dover Township area, New Jersey, 1991—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	27,725,00 (21.0)	26,362,000 (22.0)	2,489,000 (2.0)	30,099,000 (24.0)	27,621,000 (21.0)	26,193,000 (21.0)	26,769,000 (21.0)	26,688,000 (21.0)	25,977,000 (21.0)	26,586,000 (21.0)	26,583,000 (21.0)	27,358,000 (21.0)
Berkeley wells												
33 (1,000)	40,745,000 (22.0)	38,176,000 (23.0)	44,412,000 (24.0)	42,960,000 (24.0)	38,520,000 (21.0)	35,758,000 (20.0)	34,863,000 (19.0)	36,032,000 (19.0)	35,840,000 (20.0)	40,598,000 (22.0)	40,336,000 (22.0)	41,938,000 (23.0)
34 (1,000)	24,953,000 (13.0)	23,408,000 (14.0)	21,684,000 (12.0)	603,000 (1.0)	26,627,000 (14.0)	25,311,000 (14.0)	27,102,000 (15.0)	26,005,000 (14.0)	22,749,000 (13.0)	18,727,000 (10.0)	23,143,000 (13.0)	24,020,000 (13.0)
35 (700)	17,680,000 (14.0)	2,171,000 (2.0)	0 (0.0)	16,678,000 (13.0)	27,120,000 (21.0)	24,572,000 (20.0)	26,129,000 (20.0)	25,192,000 (19.0)	21,372,000 (17.0)	13,131,000 (10.0)	18,232,000 (14.0)	17,953,000 (14.0)
Windsor well												
40 (1,900)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,852,000 (1.0)	4,117,000 (1.0)	657,000 (1.0)	0 (0.0)	0 (0.0)	349,000 (1.0)	0 (0.0)
TOTAL PRODUCTION												
	224,295,000	**203,083,000**	**225,117,000**	**251,189,000**	**356,517,000**	**370,232,000**	**370,438,000**	**358,447,000**	**327,861,000**	**270,808,000**	**224,847,000**	**226,893,000**

1. Data from Board of Public Utilities, State of New Jersey (1991) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-31. Water-distribution system production and operating data, Dover Township area, New Jersey, 1992

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	415,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	827,000 (1.0)	21,050,000 (5.0)	41,741,000 (11.0)	81,800,000 (21.0)	84,519,000 (22.0)	86,824,000 (22.0)	85,099,000 (22.0)	81,439,000 (22.0)	83,354,000 (21.0)	17,628,000 (5.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,928,000 (5.0)	7,291,000 (6.0)	11,510,000 (9.0)	5,205,000 (4.0)	2,899,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
0 (0.0)	0 (0.0)	0 (0.0)	0 0.0	3,155,000 (3.0)	14,436,000 (11.0)	20,603,000 (16.0)	28,565,000 (22.0)	28,840,000 (22.0)	20,163,000 (16.0)	3,678,000 (3.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	11,204,000 (11.0)	9,162,000 (10.0)	10,756,000 (11.0)	6,062,000 (6.0)	6,311,000 (6.0)	16,348,000 (17.0)	13,922,000 (14.0)	12,891,000 (13.0)	11,533,000 (12.0)	8,141,000 (8.0)	12,342,000 (13.0)	13,860,000 (14.0)
38 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,545,000 (2.0)	5,222,000 (5.0)	6,120,000 (5.0)	5,391,000 (5.0)	4,822,000 (4.0)	249,000 (1.0)	4,606,000 (4.0)	7,215,000 (6.0)
Indian Head well												
20 (500)	7,142,000 (9.0)	7,022,000 (9.0)	9,125,000 (11.0)	9,223,000 (12.0)	11,261,000 (14.0)	10,676,000 (13.0)	11,495,000 (14.0)	7,638,000 (9.0)	7,888,000 (10.0)	3,382,000 (4.0)	7,915,000 (10.0)	8,236,000 (10.0)
Parkway wells												
22 (650)	23,741,000 (20.0)	21,611,000 (19.0)	8,743,000 (7.0)	23,637,000 (20.0)	22,984,000 (19.0)	20,780,000 (18.0)	20,302,000 (17.0)	18,922,000 (16.0)	20,421,000 (17.0)	19,503,000 (16.0)	22,010,000 (19.0)	25,211,000 (21.0)
24 (610)	17,833,000 (16.0)	15,248,000 (14.0)	12,714,000 (11.0)	0 (0.0)	11,585,000 (10.0)	10,638,000 (10.0)	9,670,000 (9.0)	9,359,000 (8.0)	10,697,000 (10.0)	10,281,000 (9.0)	12,061,000 (11.0)	14,522,000 (13.0)
26 (740)	15,730,000 (11.0)	13,807,000 (11.0)	11,981,000 (9.0)	13,664,000 (10.0)	15,865,000 (10.0)	14,776,000 (11.0)	14,929,000 (11.0)	13,978,000 (10.0)	13,721,000 (10.0)	13,316,000 (10.0)	14,323,000 (11.0)	15,476,000 (11.0)
28 (700)	23,306,000 (18.0)	20,624,000 (17.0)	23,422,000 (18.0)	21,439,000 (17.0)	20,455,000 (16.0)	20,189,000 (16.0)	21,147,000 (16.0)	19,733,000 (15.0)	20,774,000 (16.0)	20,553,000 (16.0)	21,080,000 (17.0)	24,355,000 (19.0)
29 (700)	17,661,000 (14.0)	16,424,000 (14.0)	18,394,000 (14.0)	16,506,000 (13.0)	16,548,000 (13.0)	15,392,000 (12.0)	14,724,000 (11.0)	14,927,000 (11.0)	15,824,000 (13.0)	15,449,000 (12.0)	17,118,000 (14.0)	11,594,000 (9.0)
39 (300)	374,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	7,755,000 (14.0)	6,767,000 (13.0)	4,993,000 (9.0)	4,498,000 (8.0)	4,336,000 (8.0)	3,605,000 (6.0)	3,464,000 (6.0)	4,395,000 (8.0)

Table B-31. Water-distribution system production and operating data, Dover Township area, New Jersey, 1992—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	27,233,000 (22.0)	24,926,000 (22.0)	26,740,000 (22.0)	26,507,000 (22.0)	28,286,000 (23.0)	27,419,000 (23.0)	25,640,000 (21.0)	28,442,000 (23.0)	28,930,000 (24.0)	29,675,000 (24.0)	28,752,000 (24.0)	29,645,000 (24.0)
Berkeley wells												
33 (1,000)	40,784,000 (24.0)	38,847,000 (24.0)	45,196,000 (24.0)	44,311,000 (24.0)	32,130,000 (19.0)	34,386,000 (21.0)	36,821,000 (22.0)	40,053,000 (24.0)	39,196,000 (24.0)	41,133,000 (24.0)	40,309,000 (24.0)	41,155,000 (24.0)
34 (1,000)	23,748,000 (14.0)	22,401,000 (14.0)	23,407,000 (14.0)	22,871,000 (14.0)	22,928,000 (14.0)	24,678,000 (15.0)	27,933,000 (17.0)	24,725,000 (15.0)	19,110,000 (12.0)	19,301,000 (12.0)	20,212,000 (13.0)	23,810,000 (14.0)
35 (700)	18,020,000 (16.0)	18,160,000 (17.0)	18,649,000 (16.0)	21,024,000 (19.0)	19,880,000 (17.0)	22,289,000 (20.0)	21,993,000 (19.0)	15,981,000 (14.0)	17,623,000 (16.0)	12,902,000 (11.0)	15,673,000 (14.0)	20,267,000 (18.0)
Windsor well												
40 (1,900)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6,034,000 (2.0)	17,227,000 (5.0)	19,432,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	226,776,000	**209,059,000**	**230,177,000**	**250,140,000**	**327,146,000**	**359,200,000**	**376,020,000**	**335,682,000**	**319,376,000**	**284,522,000**	**237,493,000**	**239,741,000**

1. Data from Board of Public Utilities, State of New Jersey (1992) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-32. Water-distribution system production and operating data, Dover Township area, New Jersey, 1993

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,091,000 (3.0)	3,859,000 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	42,598,000 (11.0)	84,764,000 (22.0)	75,711,000 (20.0)	82,799,000 (21.0)	80,322,000 (21.0)	82,525,000 (22.0)	42,269,000 (11.0)	0 (0.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8,669,000 (7.0)	19,943,000 (16.0)	23,535,000 (18.0)	9,247,000 (7.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	19,361,000 (15.0)	22,225,000 (18.0)	19,238,000 (15.0)	24,681,000 (19.0)	21,622,000 (17.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	11,457,000 (12.0)	12,251,000 (14.0)	18,956,000 (19.0)	15,991,000 (17.0)	17,370,000 (18.0)	17,850,000 (19.0)	18,587,000 (19.0)	14,719,000 (15.0)	10,190,000 (11.0)	6,668,000 (7.0)	15,609,000 (16.0)	8,141,000 (8.0)
38 (700)	3,535,000 (3.0)	5,460,000 (5.0)	9,310,000 (8.0)	6,947,000 (6.0)	11,804,000 (10.0)	13,409,000 (12.0)	15,802,000 (14.0)	9,972,000 (9.0)	4,134,000 (4.0)	238,000 (1.0)	252,000 (1.0)	30,000 (1.0)
Indian Head well												
20 (500)	8,600,000 (10.0)	9,492,000 (13.0)	15,764,000 (19.0)	11,567,000 (14.0)	11,209,000 (13.0)	7,201,000 (9.0)	11,584,000 (14.0)	9,668,000 (12.0)	8,296,000 (10.0)	12,707,000 (15.0)	16,353,000 (20.0)	16,246,000 (20.0)
Parkway wells												
22 (650)	25,366,000 (21.0)	23,603,000 (22.0)	26,926,000 (22.0)	23,760,000 (20.0)	25,310,000 (21.0)	24,208,000 (21.0)	25,047,000 (21.0)	23,627,000 (20.0)	21,002,000 (18.0)	22,695,000 (19.0)	24,005,000 (21.0)	22,996,000 (19.0)
24 (610)	15,047,000 (13.0)	14,334,000 (14.0)	16,157,000 (14.0)	14,578,000 (13.0)	15,821,000 (14.0)	15,623,000 (14.0)	16,079,000 (14.0)	14,555,000 (13.0)	12,168,000 (11.0)	13,614,000 (12.0)	14,450,000 (13.0)	13,366,000 (12.0)
26 (740)	14,531,000 (11.0)	12,949,000 (10.0)	14,092,000 (10.0)	12,602,000 (9.0)	13,045,000 (9.0)	11,948,000 (9.0)	12,064,000 (9.0)	13,210,000 (10.0)	12,600,000 (9.0)	13,322,000 (10.0)	13,788,000 (10.0)	14,483,000 (11.0)
28 (700)	24,413,000 (19.0)	22,599,000 (19.0)	25,441,000 (20.0)	22,891,000 (18.0)	24,791,000 (19.0)	24,049,000 (19.0)	24,728,000 (19.0)	22,122,000 (17.0)	18,552,000 (15.0)	19,523,000 (15.0)	20,954,000 (17.0)	20,574,000 (16.0)
29 (700)	17,960,000 (14.0)	16,683,000 (14.0)	18,706,000 (14.0)	16,364,000 (13.0)	18,490,000 (14.0)	18,126,000 (14.0)	17,721,000 (14.0)	16,005,000 (12.0)	13,376,000 (11.0)	14,953,000 (12.0)	15,583,000 (12.0)	14,999,000 (12.0)
39 (300)	4,938,000 (9.0)	1,525,000 (3.0)	0 (0.0)	387,000 (1.0)	5,328,000 (10.0)	5,076,000 (9.0)	5,232,000 (9.0)	4,556,000 (8.0)	3,847,000 (7.0)	2,133,000 (4.0)	0 (0.0)	8,000 (1.0)
41 (250)	0 (0.0)	0 (0.0)	0 (0.0)	7,753,000 (17.0)	8,754,000 (19.0)	8,119,000 (18.0)	8,201,000 (18.0)	8,365,000 (18.0)	8,507,000 (19.0)	9,802,000 (21.0)	9,116,000 (20.0)	8,105,000 (17.0)

Table B-32. Water-distribution system production and operating data, Dover Township area, New Jersey, 1993—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Route 70 well												
31 (700)	29,465,000 (24.0)	26,658,000 (24.0)	29,764,000 (24.0)	28,681,000 (24.0)	26,707,000 (22.0)	29,094,000 (24.0)	26,796,000 (22.0)	25,486,000 (20.0)	26,030,000 (22.0)	31,831,000 (24.0)	29,938,000 (24.0)	30,308,000 (24.0)
Berkeley wells												
33 (1,000)	41,489,000 (24.0)	37,506,000 (24.0)	42,096,000 (24.0)	40,494,000 (24.0)	37,134,000 (22.0)	34,133,000 (21.0)	33,837,000 (20.0)	34,978,000 (21.0)	35,186,000 (22.0)	36,651,000 (22.0)	39,145,000 (24.0)	37,641,000 (23.0)
34 (1,000)	23,866,000 (14.0)	13,838,000 (9.0)	0 (0.0)	0 (0.0)	21,604,000 (13.0)	30,463,000 (19.0)	29,102,000 (18.0)	25,618,000 (15.0)	19,566,000 (12.0)	29,192,000 (18.0)	20,605,000 (13.0)	38,561,000 (23.0)
35 (700)	19,489,000 (17.0)	17,795,000 (17.0)	19,561,000 (17.0)	18,134,000 (16.0)	20,384,000 (18.0)	22,626,000 (20.0)	23,252,000 (20.0)	20,571,000 (18.0)	17,446,000 (16.0)	21,034,000 (18.0)	25,571,000 (23.0)	25,502,000 (22.0)
Windsor well												
40 (1,900)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9,260,000 (5.0)	43,721,000 (24.0)	71,461,000 (24.0)	29,198,000 (15.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
TOTAL PRODUCTION												
	240,156,000	**214,693,000**	**236,773,000**	**262,747,000**	**379,805,000**	**427,616,000**	**468,924,000**	**386,900,000**	**315,047,000**	**276,632,000**	**245,369,000**	**250,960,000**

1. Data from Board of Public Utilities, State of New Jersey (1993) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-33. Water-distribution system production and operating data, Dover Township area, New Jersey, 1994

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1,914,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	1,574,000 (1.0)	31,555,000 (8.0)	81,433,000 (22.0)	84,932,000 (22.0)	67,628,000 (17.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,032,000 (3.0)	618,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	4,734,000 (4.0)	29,566,000 (24.0)	17,208,000 (14.0)	9,977,000 (8.0)	27,794,000 (22.0)	15,539,000 (13.0)	737,000 (1.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	21,505,000 (22.0)	21,797,000 (24.0)	23,440,000 (24.0)	20,173,000 (21.0)	20,003,000 (21.0)	19,568,000 (21.0)	13,626,000 (14.0)	15,808,000 (16.0)	21,060,000 (22.0)	21,907,000 (22.0)	21,134,000 (22.0)	21,060,000 (22.0)
38 (700)	3,211,000 (3.0)	5,998,000 (6.0)	2,016,000 (2.0)	0 (0.0)	0 (0.0)	15,523,000 (16.0)	9,216,000 (9.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	16,591,000 (20.0)	15,284,000 (20.0)	16,558,000 (20.0)	16,142,000 (20.0)	16,811,000 (20.0)	15,749,000 (20.0)	16,309,000 (20.0)	16,437,000 (20.0)	16,259,000 (20.0)	16,608,000 (20.0)	8,542,000 (11.0)	0 (0.0)
Parkway wells												
22 (650)	26,661,000 (22.0)	23,188,000 (21.0)	23,050,000 (19.0)	24,825,000 (21.0)	24,903,000 (21.0)	27,814,000 (24.0)	25,675,000 (21.0)	21,205,000 (18.0)	27,434,000 (23.0)	27,165,000 (22.0)	22,201,000 (19.0)	23,224,000 (19.0)
24 (610)	16,885,000 (15.0)	14,425,000 (14.0)	14,571,000 (13.0)	15,149,000 (14.0)	15,227,000 (13.0)	17,010,000 (15.0)	15,809,000 (14.0)	11,657,000 (10.0)	16,790,000 (15.0)	16,799,000 (15.0)	13,439,000 (12.0)	14,185,000 (13.0)
26 (740)	16,178,000 (12.0)	13,203,000 (11.0)	12,890,000 (9.0)	11,896,000 (9.0)	10,766,000 (8.0)	10,861,000 (8.0)	8,462,000 (6.0)	8,048,000 (6.0)	9,942,000 (7.0)	10,404,000 (8.0)	8,282,000 (6.0)	8,984,000 (7.0)
28 (700)	23,309,000 (18.0)	20,137,000 (17.0)	18,193,000 (14.0)	16,050,000 (13.0)	16,318,000 (13.0)	18,809,000 (15.0)	17,400,000 (13.0)	14,244,000 (11.0)	18,487,000 (15.0)	18,144,000 (14.0)	3,210,000 (3.0)	12,096,000 (9.0)
29 (700)	17,627,000 (14.0)	15,235,000 (13.0)	15,859,000 (12.0)	15,794,000 (13.0)	16,121,000 (12.0)	18,585,000 (15.0)	17,381,000 (13.0)	14,505,000 (11.0)	18,626,000 (15.0)	18,420,000 (14.0)	15,062,000 (12.0)	7,711,000 (6.0)
39 (300)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
41 (250)	8,798,000 (19.0)	9,368,000 (22.0)	7,141,000 (15.0)	7,247,000 (16.0)	10,499,000 (23.0)	12,257,000 (24.0)	9,350,000 (20.0)	8,002,000 (17.0)	12,923,000 (24.0)	7,144,000 (15.0)	0 (0.0)	0 (0.0)

Table B-33. Water-distribution system production and operating data, Dover Township area, New Jersey, 1994—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
42 (1,200)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,002,000 (2.0)	34,388,000 (16.0)	29,913,000 (13.0)	13,227,000 (6.0)	37,191,000 (17.0)	34,432,000 (15.0)	36,670,000 (17.0)	39,563,000 (18.0)
31 (700)	30,786,000 (24.0)	28,902,000 (24.0)	31,432,000 (24.0)	28,887,000 (24.0)	30,131,000 (24.0)	29,244,000 (24.0)	30,870,000 (24.0)	30,689,000 (24.0)	29,592,000 (24.0)	30,351,000 (24.0)	28,449,000 (24.0)	27,795,000 (24.0)
33 (1,000)	41,459,000 (24.0)	38,750,000 (24.0)	39,362,000 (24.0)	37,326,000 (24.0)	36,177,000 (22.0)	32,650,000 (21.0)	33,063,000 (20.0)	35,067,000 (21.0)	36,183,000 (23.0)	37,191,000 (23.0)	36,018,000 (23.0)	37,017,000 (23.0)
34 (1,000)	13,415,000 (8.0)	0 (0.0)	27,404,000 (17.0)	39,543,000 (24.0)	39,039,000 (24.0)	38,600,000 (24.0)	41,245,000 (24.0)	42,695,000 (24.0)	43,353,000 (24.0)	43,532,000 (24.0)	38,920,000 (24.0)	34,989,000 (21.0)
35 (700)	28,636,000 (24.0)	25,462,000 (24.0)	24,751,000 (22.0)	23,992,000 (22.0)	24,071,000 (21.0)	24,872,000 (22.0)	26,749,000 (23.0)	21,332,000 (19.0)	25,996,000 (23.0)	26,318,000 (23.0)	25,368,000 (23.0)	24,510,000 (21.0)
40 (1,900)	0 (0.0)	0 (0.0)	0 (0.0)	1,170,000 (1.0)	0 (0.0)	33,685,000 (17.0)	41,289,000 (21.0)	0 (0.0)	18,480,000 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)
	265,061,000	**231,749,000**	**256,667,000**	**264,502,000**	**325,189,000**	**453,202,000**	**431,884,000**	**348,338,000**	**347,855,000**	**309,152,000**	**257,295,000**	**251,134,000**

1. Data from Board of Public Utilities, State of New Jersey (1994) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-34. Water-distribution system production and operating data, Dover Township area, New Jersey, 1995

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	0 (0.0)	8,787,000 (5.0)	46,459,000 (12.0)	73,315,000 (19.0)	87,086,000 (22.0)	89,924,000 (23.0)	80,550,000 (21.0)	37,631,000 (10.0)	0 (0.0)	0 (0.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,630,000 (2.0)	3,218,000 (3.0)	13,607,000 (10.0)	507,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,922,000 (2.0)	6,471,000 (5.0)	18,893,000 (15.0)	12,373,000 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	22,888,000 (24.0)	15,315,000 (17.0)	6,156,000 (6.0)	22,275,000 (24.0)	24,172,000 (24.0)	18,806,000 (20.0)	17,969,000 (18.0)	20,737,000 (21.0)	14,453,000 (15.0)	0 (0.0)	0 (0.0)	4,563,000 (5.0)
38 (700)	0 (0.0)	554,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	4,028,000 (4.0)	18,496,000 (19.0)	22,683,000 (24.0)	11,109,000 (12.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	15,103,000 (18.0)	15,564,000 (21.0)	17,383,000 (21.0)	16,033,000 (20.0)	16,272,000 (20.0)	15,505,000 (19.0)	16,237,000 (20.0)	16,333,000 (20.0)	15,884,000 (20.0)	16,653,000 (20.0)	16,349,000 (20.0)	16,513,000 (20.0)
Parkway wells												
22 (650)	19,724,000 (17.0)	18,036,000 (18.0)	24,833,000 (21.0)	23,407,000 (23.0)	22,056,000 (18.0)	25,009,000 (21.0)	25,691,000 (21.0)	26,532,000 (22.0)	23,041,000 (20.0)	28,115,000 (23.0)	27,817,000 (21.0)	26,924,000 (20.0)
24 (610)	12,457,000 (17.0)	12,247,000 (18.0)	16,701,000 (21.0)	16,967,000 (23.0)	17,457,000 (15.0)	17,302,000 (16.0)	17,774,000 (16.0)	18,756,000 (17.0)	15,830,000 (14.0)	13,455,000 (12.0)	14,755,000 (21.0)	4,850,000 (20.0)
26 (740)	5,651,000 (17.0)	0 (0.0)	13,783,000 (21.0)	20,465,000 (23.0)	17,077,000 (12.0)	21,083,000 (16.0)	21,665,000 (16.0)	21,536,000 (16.0)	17,781,000 (13.0)	20,028,000 (15.0)	20,853,000 (21.0)	17,711,000 (20.0)
28 (700)	19,041,000 (17.0)	18,175,000 (18.0)	23,886,000 (21.0)	23,150,000 (23.0)	19,419,000 (15.0)	20,894,000 (17.0)	21,867,000 (17.0)	20,645,000 (16.0)	17,718,000 (14.0)	19,159,000 (15.0)	19,217,000 (21.0)	18,739,000 (20.0)
29 (700)	3,996,000 (17.0)	14,063,000 (18.0)	18,761,000 (21.0)	18,791,000 (23.0)	19,191,000 (15.0)	19,566,000 (16.0)	20,757,000 (16.0)	20,578,000 (16.0)	19,197,000 (15.0)	21,627,000 (17.0)	21,814,000 (21.0)	20,245,000 (20.0)
39 (300)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
41 (250)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-34. Water-distribution system production and operating data, Dover Township area, New Jersey, 1995—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
42 (1,200)	35,171,000 (17.0)	28,325,000 (18.0)	18,403,000 (21.0)	19,653,000 (23.0)	29,091,000 (13.0)	**27,118,000** (13.0)	30,750,000 (14.0)	37,473,000 (17.0)	27,425,000 (13.0)	11,483,000 (5.0)	7,778,000 (21.0)	26,040,000 (20.0)
Route 70 well												
31 (700)	26,999,000 (22.0)	26,405,000 (24.0)	30,056,000 (24.0)	29,717,000 (24.0)	30,290,000 (24.0)	29,554,000 (24.0)	30,408,000 (24.0)	30,398,000 (24.0)	29,496,000 (24.0)	30,352,000 (24.0)	28,832,000 (24.0)	30,119,000 (24.0)
Berkeley wells												
33 (1,000)	35,256,000 (21.0)	33,391,000 (22.0)	38,574,000 (23.0)	36,125,000 (23.0)	35,459,000 (21.0)	34,481,000 (22.0)	33,409,000 (20.0)	34,273,000 (21.0)	33,493,000 (21.0)	37,251,000 (23.0)	36,287,000 (23.0)	36,660,000 (22.0)
34 (1,000)	34,286,000 (21.0)	22,599,000 (15.0)	40,468,000 (24.0)	38,683,000 (24.0)	40,240,000 (24.0)	40,505,000 (24.0)	42,042,000 (24.0)	42,821,000 (24.0)	40,888,000 (24.0)	42,877,000 (24.0)	43,786,000 (24.0)	44,736,000 (24.0)
35 (700)	24,010,000 (21.0)	22,899,000 (22.0)	12,145,000 (11.0)	24,235,000 (22.0)	26,247,000 (23.0)	25,783,000 (23.0)	26,690,000 (23.0)	26,685,000 (23.0)	26,163,000 (23.0)	25,881,000 (23.0)	26,628,000 (24.0)	27,504,000 (24.0)
Windsor well												
40 (1,900)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3,329,000 (2.0)	12,601,000 (7.0)	11,149,000 (6.0)	52,046,000 (24.0)	14,250,000 (8.0)	10,399,000 (6.0)	5,795,000 (3.0)	0 (0.0)
TOTAL PRODUCTION												
	254,582,000	**227,573,000**	**261,149,000**	**298,288,000**	**346,759,000**	**391,102,000**	**431,679,000**	**513,920,000**	**400,158,000**	**314,911,000**	**269,911,000**	**274,604,000**

1. Data from Board of Public Utilities, State of New Jersey (1995) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

Table B-35. Water-distribution system production and operating data, Dover Township area, New Jersey, 1996

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Holly wells												
21 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
30 (2,100)	0 (0.0)	0 (0.0)	15,356,000 (4.0)	74,131,000 (20.0)	86,019,000 (22.0)	82,080,000 (22.0)	83,507,000 (21.0)	86,236,000 (22.0)	54,945,000 (15.0)	8,743,000 (2.0)	39,440,000 (24.0)	82,503,000 (21.0)
37 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2,327,000 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Brookside well												
15 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5,193,000 (4.0)	5,472,000 (4.0)	765,000 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
South Toms River wells												
32 (700)	8,372,000 (8.0)	8,046,000 (9.0)	11,766,000 (12.0)	18,938,000 (20.0)	17,786,000 (18.0)	10,411,000 (11.0)	25,958,000 (24.0)	25,442,000 (24.0)	26,945,000 (24.0)	26,370,000 (24.0)	12,676,000 (13.0)	0 (0.0)
38 (700)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	338,000 (1.0)	12,532,000 (13.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Indian Head well												
20 (500)	16,669,000 (20.0)	15,796,000 (20.0)	16,491,000 (20.0)	7,509,000 (9.0)	1,516,000 (2.0)	0 (0.0)	4,892,000 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Parkway wells												
22 (650)	18,369,000 (15.0)	25,691,000 (23.0)	27,155,000 (22.0)	25,473,000 (22.0)	28,009,000 (23.0)	24,254,000 (21.0)	27,266,000 (23.0)	24,280,000 (20.0)	26,045,000 (22.0)	26,730,000 (24.0)	11,306,000 (12.0)	0 (0.0)
24 (610)	11,078,000 (10.0)	16,843,000 (16.0)	17,882,000 (16.0)	16,988,000 (15.0)	18,781,000 (17.0)	16,201,000 (15.0)	18,529,000 (16.0)	16,975,000 (15.0)	15,242,000 (14.0)	18,445,000 (24.0)	7,974,000 (12.0)	0 (0.0)
26 (740)	18,294,000 (13.0)	17,478,000 (14.0)	15,624,000 (11.0)	17,833,000 (13.0)	19,331,000 (14.0)	16,776,000 (13.0)	18,628,000 (14.0)	17,972,000 (13.0)	18,363,000 (14.0)	19,140,000 (24.0)	8,107,000 (12.0)	0 (0.0)
28 (700)	19,766,000 (15.0)	18,548,000 (15.0)	19,229,000 (15.0)	18,116,000 (14.0)	19,654,000 (15.0)	17,172,000 (14.0)	19,410,000 (15.0)	20,835,000 (16.0)	21,289,000 (17.0)	22,106,000 (24.0)	9,206,000 (12.0)	0 (0.0)
29 (700)	20,592,000 (16.0)	19,488,000 (9.0)	20,555,000 (16.0)	17,326,000 (14.0)	13,748,000 (11.0)	12,177,000 (10.0)	13,965,000 (11.0)	15,253,000 (12.0)	15,892,000 (13.0)	15,837,000 (24.0)	6,793,000 (12.0)	0 (0.0)
39 (300)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
41 (250)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table B-35. Water-distribution system production and operating data, Dover Township area, New Jersey, 1996—Continued

Well Number (rated capacity, in gallons per minute)	Well Production, in gallons per month[1] (average hours per day operated)[2]											
	January 31 days	February 28 days	March 31 days	April 30 days	May 31 days	June 30 days	July 31 days	August 31 days	September 30 days	October 31 days	November 30 days	December 31 days
Parkway wells—Continued												
42 (1,200)	24,363,000 (11.0)	24,545,000 (9.0)	23,566,000 (11.0)	13,528,000 (6.0)	36,867,000 (17.0)	38,919,000 (18.0)	11,324,000 (5.0)	18,017,000 (8.0)	30,778,000 (14.0)	45,313,000 (24.0)	18,895,000 (12.0)	0 (0.0)
Route 70 well												
31 (700)	29,786,000 (24.0)	27,455,000 (24.0)	30,087,000 (24.0)	8,479,000 (7.0)	9,431,000 (7.0)	28,991,000 (24.0)	29,782,000 (24.0)	29,707,000 (24.0)	28,402,000 (24.0)	29,722,000 (24.0)	29,101,000 (24.0)	30,074,000 (24.0)
Berkeley wells												
33 (1,000)	36,275,000 (22.0)	31,327,000 (20.0)	33,443,000 (20.0)	30,215,000 (19.0)	31,074,000 (19.0)	32,323,000 (20.0)	32,489,000 (20.0)	34,969,000 (21.0)	31,522,000 (20.0)	34,322,000 (21.0)	32,228,000 (20.0)	36,888,000 (22.0)
34 (1,000)	44,685,000 (24.0)	40,038,000 (24.0)	40,865,000 (24.0)	37,249,000 (23.0)	41,139,000 (24.0)	40,340,000 (24.0)	41,917,000 (24.0)	41,442,000 (24.0)	42,425,000 (24.0)	45,105,000 (24.0)	41,146,000 (24.0)	46,209,000 (24.0)
35 (700)	21,473,000 (18.0)	0 (0.0)	0 (0.0)	0 (0.0)	429,000 (1.0)	29,409,000 (24.0)	29,089,000 (24.0)	29,757,000 (24.0)	29,265,000 (24.0)	31,017,000 (24.0)	20,377,000 (18.0)	0 (0.0)
Windsor well												
40 (1,900)	0 0.0	0 0.0	0 0.0	0 0.0	21,907,000 12.0	49,607,000 24.0	32,427,000 17.0	49,588,000 24.0	19,286,000 11.0	0 0.0	36,515,000 20.0	76,803,000 24.0
TOTAL PRODUCTION												
	269,722,000	**245,255,000**	**272,019,000**	**285,785,000**	**353,549,000**	**416,664,000**	**389,948,000**	**410,473,000**	**360,399,000**	**322,850,000**	**273,764,000**	**272,477,000**

1. Data from Board of Public Utilities, State of New Jersey (1996) and Flegal (1997).
2. To determine the average number of hours each day a well operated, the following formula was used $T_{avg} = \frac{Q_p}{(C \times D \times 60)}$ where:

T_{avg} = average time a well was operated, in hours per day;
Q_P = production of water, in gallons per month;
C = rated capacity of the well, in gallons per minute;
D = number of days per month; and
60 = number of minutes per hour.

APPENDIX C

TABLES OF WATER-DISTRIBUTION SYSTEM OPERATIONS USED IN EPANET 2, DOVER TOWNSHIP AREA, NEW JERSEY, 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

NOTES ON SYSTEM OPERATION TABLES

The following tables are contained in Appendix C and describe the monthly operation of the water-distribution system as simulated using the EPANET 2 (Rossman 2000) water-distribution system model:

Table C-1: January 1962–December 1962

Table C-2: January 1965–December 1965

Table C-3: January 1971–December 1971

Table C-4: January 1978–December 1978

Table C-5: January 1988–December 1988

Table C-6: January 1995–December 1995

Table C-7: January 1996–December 1996

Description of operations are taken from the EPANET 2 input data files for the appropriate month and year and are described in the tables according to the following basic format:

Month	Description of Operations
January	Name of storage tank: Initial Water Level (*e.g.*, WL=17.0 feet) *(Notes are provided in italics to describe tank status, how represented in EPANET 2, or hours of operation of booster pumps obtaining water from the tank and supplying the system)* well location and identification (*e.g.*, Brookside well #15), hours of operation (*e.g.*, [0000 to 2400]), and flow rate (*e.g.*, 700 gpm) *(Notes are provided in italics to describe well operational status*)

Table C-1. Water-distribution system operations, Dover Township area, New Jersey, January 1962–December 1962

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
January	Horner Street elevated storage tank in service: Initial WL=63.0 feet Holly well #13 on [1300 to 1500] at 376 gpm Holly well #14 on [1500 to 1700] at 402 gpm Brookside well #15 on [0000 to 1300] and [2200 to 2400] at 678 gpm
February (Minimum-Demand Month)	Horner Street elevated storage tank in service: Initial WL=63.0 feet Holly well #13 on [1300 to 1400] at 595 gpm Holly well #14 on [1400 to 1500] at 640 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 673 gpm
March	Horner Street elevated storage tank in service: Initial WL=63.0 feet Holly well #13 on [1400 to 1600] at 567 gpm Holly well #14 on [1600 to 1700] at 591 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 688 gpm
April	Horner Street elevated storage tank in service Initial WL=70.0 feet Holly well #13 on [1400 to 1600] at 556 gpm Holly well #14 on [1600 to 1900] at 648 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 699 gpm
May (Maximum-Demand Month)	Horner Street elevated storage tank in service Initial WL=87.0 feet Holly well #13 on [0900 to 1600] at 599 gpm Holly well #14 on [1600 to 2200] at 631 gpm Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 713 gpm
June	Horner Street elevated storage tank in service: Initial WL=80.0 feet Holly well #13 on [0800 to 1500] at 595 gpm Holly well #14 on [1500 to 2200] at 578 gpm Brookside well #15 on [0000 to 1600] and [2200 to 2400] at 711 gpm
July	Horner Street elevated storage tank in service: Initial WL=85.0 feet Holly well #13 on [1000 to 1500] at 645 gpm Holly well #14 on [1500 to 2200] at 635 gpm Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 691 gpm
August	Horner Street elevated storage tank in service: Initial WL=80.0 feet Holly well #13 on [1200 to 1600] at 605 gpm Holly well #14 on [1600 to 2200] at 561 gpm Brookside well #15 on [0000 to 1500] and [2200 to 2400] at 701 gpm
September	Horner Street elevated storage tank in service: Initial WL=80.0 feet Holly well #13 on [0900 to 1400] at 556 gpm Holly well #14 on [1400 to 2200] at 608 gpm Brookside well #15 on [0000 to 1500] and [2200 to 2400] at 715 gpm

Table C-1. Water-distribution system operations, Dover Township area, New Jersey, January 1962–December 1962—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
October (Average-Demand Month)	Horner Street elevated storage tank in service: Initial WL=75.0 feet Holly well #13 on [1300 to 1700] at 562 gpm Holly well #14 on [1700 to 2200] at 626 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 692 gpm
November	Horner Street elevated storage tank in service: Initial WL=63.0 feet Holly well #13 on [1400 to 1600] at 559 gpm Holly well #14 on [1600 to 1900] at 652 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 703 gpm
December	Horner Street elevated storage tank in service: Initial WL=63.0 feet Holly well #13 on [1400 to 1600] at 548 gpm Holly well #14 on [1600 to 1900] at 639 gpm Brookside well #15 on [0000 to 1400] and [2200 to 2400] at 689 gpm

Table C-2. Water-distribution system operations, Dover Township area, New Jersey, January 1965–December 1965

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
January	South Toms River elevated storage tank in service: Initial WL=10.0 feet *(note: Holly well #13 out of service)* *(note: Holly well #14 out of service)* Holly well #16 on [1400 to 2200] at 799 gpm Brookside well #15 on [0000 to 1500] and [2200 to 2400] at 700 gpm
February (Minimum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=10.0 feet Holly well #16 on [1400 to 2200] at 846 gpm Brookside well #15 on [0000 to 1600] and [2200 to 2400] at 701 gpm
March	South Toms River elevated storage tank in service: Initial WL=10.0 feet Holly well #16 on [1300 to 2200] at 765 gpm Brookside well #15 on [0000 to 1600] and [2200 to 2400] at 711 gpm
April	South Toms River elevated storage tank in service: Initial WL=15.0 feet Holly well #14 on [1400 to 1600] at 696 gpm Holly well #16 on [1600 to 2200] at 785 gpm Holly well #18 on [0900 to 1400] at 699 gpm Brookside well #15 on [0000 to 1500] and [2200 to 2400] at 690 gpm
May	South Toms River elevated storage tank in service: Initial WL=14.0 feet Holly well #14 on [0600 to 1000] at 627 gpm Holly well #16 on [1000 to 2000] at 812 gpm Holly well #18 on [0600 to 1700] at 738 gpm Brookside well #15 on [0000 to 1500] and [1800 to 2400] at 692 gpm
June (Maximum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=17.0 feet Holly well #14 on [0600 to 1000] at 628 gpm Holly well #16 on [1000 to 2100] at 807 gpm Holly well #18 on [0600 to 1800] at 740 gpm Brookside well #15 on [0000 to 1600] and [1800 to 2400] at 696 gpm
July	South Toms River elevated storage tank in service: Initial WL=14.0 feet Holly well #14 on [0600 to 1000] at 628 gpm Holly well #16 on [1000 to 2000] at 806 gpm Holly well #18 on [0600 to 1700] at 733 gpm Brookside well #15 on [0000 to 1500] and [1800 to 2400] at 681 gpm
August	South Toms River elevated storage tank in service: Initial WL=15.0 feet Holly well #14 on [0600 to 1000] at 614 gpm Holly well #16 on [1000 to 2100] at 782 gpm Holly well #18 on [0600 to 1700] at 782 gpm Brookside well #15 on [0000 to 1500] and [1800 to 2400] at 700 gpm

Table C-2. Water-distribution system operations, Dover Township area, New Jersey, January 1965–December 1965—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
September	South Toms River elevated storage tank in service: Initial WL=10.0 feet Holly well #14 on [0600 to 1000] at 570 gpm Holly well #16 on [1000 to 1900] at 833 gpm Holly well #18 on [0600 to 1600] at 750 gpm Brookside well #15 on [0000 to 1400] and [1800 to 2400] at 697 gpm
October (Average-Demand Month)	South Toms River elevated storage tank in service: Initial WL=10.0 feet Holly well #14 on [0600 to 0900] at 538 gpm Holly well #16 on [0900 to 1600] at 768 gpm Holly well #18 on [1600 to 2100] at 800 gpm Brookside well #15 on [0000 to 1600] and [2100 to 2400] at 695 gpm
November	South Toms River elevated storage tank in service: Initial WL=15.0 feet *(note: Holly well #14 out of service)* Holly well #16 on [1200 to 2200] at 835 gpm *(note: Holly well #18 out of service)* Brookside well #15 on [0000 to 1800] and [2200 to 2400] at 694 gpm
December	South Toms River elevated storage tank in service: Initial WL=15.0 feet Holly well #16 on [1300 to 2200] at 829 gpm Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 716 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
January	South Toms River elevated storage tank in service: Initial WL=16.0 feet Indian Hill elevated storage tank in service: Initial WL=14.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1300 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1300] at 1,422 gpm) Holly well #14 on [0600 to 1300] at 5 gpm Holly well #16 on [0600 to 1300] at 240 gpm and [1300 to 2400] at 900 gpm Holly well #18 on [0600 to 1300] at 616 gpm Holly well #19 on [0600 to 1300] at 555 gpm Holly well #21 on [0600 to 1300] at 5 gpm Brookside well #15 on [0000 to 1800] and [2200 to 2400] at 692 gpm South Toms River well #17 on [1800 to 2100] at 693 gpm Indian Head well #20 on [1800 to 2200] at 499 gpm
February (Minimum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=18.0 feet Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1300 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1300] at 1,365 gpm) *(note:Holly well #14 out of service)* Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1300] at 245 gpm; [1300 to 2400] at 900 gpm Holly well #18 on [0600 to 1300] at 807 gpm Holly well #19 on [0600 to 1300] at 313 gpm *(note:Holly well #21 out of service)* Brookside well #15 on [0000 to 1100] and [2200 to 2400] at 685 gpm South Toms River well #17 on [1700 to 2100] at 788 gpm Indian Head well #20 on [0900 to 2200] at 490 gpm Anchorage well #98 on [0700 to 0800] at 252 gpm Silver Bay well #99 on [0800 to 0900] at 212 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
March	South Toms River elevated storage tank in service: Initial WL=18.0 feet Indian Hill elevated storage tank in service: Initial WL=10.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1800 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1800] at 1,373 gpm) Holly well #14 on [0600 to 1800] at 9 gpm Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1800] at 364 gpm; [1800 to 2400] at 900 gpm Holly well #18 on [0600 to 1800] at 928 gpm Holly well #19 on [0600 to 1800] at 73 gpm Brookside well #15 on [0000 to 1600] and [2200 to 2400] at 705 gpm South Toms River well #17 on [1600 to 2100] at 745 gpm Indian Head well #20 on [1700 to 2200] at 494 gpm *(note:Anchorage well #98 out of service)* *(note:Silver Bay well #99 out of service)*
April	South Toms River elevated storage tank in service: Initial WL=18.0 feet Indian Hill elevated storage tank in service: Initial WL=8.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1800] at 1,254 gpm) Holly well #14 on [0600 to 1800] at 125 gpm Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1800] at 493 gpm; [1800 to 2400] at 900 gpm Holly well #18 on [0600 to 1800] at 1,032 gpm Holly well #19 on [0600 to 1800] at 430 gpm Holly well #21 on [0600 to 1800] at 74 gpm Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 697 gpm South Toms River well #17 on [1600 to 2100] at 684 gpm Indian Head well #20 on [1100 to 2200] at 510 gpm Anchorage well #98 on [0700 to 1000] at 426 gpm Silver Bay well #99 on [1000 to 1400] at 380 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
May	South Toms River elevated storage tank in service: Initial WL=20.0 feet Indian Hill elevated storage tank in service: Initial WL=15.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 2100] at 1,237 gpm) Holly well #14 on [0600 to 2100] at 114 gpm Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 2100] at 583 gpm; [2100 to 2400] at 900 gpm Holly well #18 on [0600 to 2100] at 768 gpm Holly well #19 on [0600 to 2100] at 646 gpm Holly well #21 on [0600 to 2100] at 27 gpm Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 692 gpm South Toms River well #17 on [0600 to 1200] and [2100 to 2200] at 783 gpm Indian Head well #20 on [0800 to 1800] at 501 gpm Anchorage well #98 on [0600 to 1200] at 379 gpm Silver Bay well #99 on [1200 to 2100] at 394 gpm
June	South Toms River elevated storage tank in service: Initial WL=22.0 feet Indian Hill elevated storage tank in service: Initial WL=9.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0000 to 2400] at 1,409 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 0900] at 3195 gpm) Holly well #14 on [0000 to 2400] at 249 gpm Holly well #16 on [0000 to 2400] at 701 gpm Holly well #18 on [0000 to 2400] at 561 gpm Holly well #19 on [0000 to 2400] at 452 gpm Holly well #21 on [0000 to 2400] at 345 gpm Parkway well #22 on [0800 to 0900] at 1,304 gpm Parkway well #23 on [0800 to 0900] at 651 gpm Parkway well #27 on [0800 to 0900] at 1,239 gpm Brookside well #15 on [0000 to 1500] and [1900 to 2400] at 710 gpm South Toms River well #17 on [0700 to 1200] and [1500 to 2000] at 784 gpm Indian Head well #20 on [0600 to 2100] at 488 gpm Anchorage well #98 on [0600 to 2000] at 404 gpm Silver Bay well #99 on [0500 to 2100] at 406 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
July (Maximum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=22.0 feet Indian Hill elevated storage tank in service: Initial WL=10.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0000 to 2400] at 1,445 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0700 to 1700] at 2,820 gpm) Holly well #14 on [0000 to 2400] at 249 gpm Holly well #16 on [0000 to 2400] at 699 gpm Holly well #18 on [0000 to 2400] at 554 gpm Holly well #19 on [0000 to 2400] at 490 gpm Holly well #21 on [0000 to 2400] at 353 gpm Parkway well #22 on [0700 to 1700] at 1,122 gpm Parkway well #23 on [0700 to 1700] at 533 gpm Parkway well #26 on [0700 to 1700] at 555 gpm Parkway well #27 on [0700 to 1700] at 610 gpm Brookside well #15 on [0000 to 2100] at 695 gpm South Toms River well #17 on [0500 to 0700] and [1700 to 2200] at 729 gpm Indian Head well #20 on [1000 to 2200] at 500 gpm Anchorage well #98 on [0000 to 1000] and [1700 to 2400] at 403 gpm Silver Bay well #99 on [0000 to 1000] and [1700 to 2400] at 399 gpm
August	South Toms River elevated storage tank in service: Initial WL=19.0 feet Indian Hill elevated storage tank in service: Initial WL=17.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 2300] at 1,351 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 1100] at 3,109 gpm) Holly well #14 on [0600 to 2300] at 253 gpm Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 2300] at 634 gpm; [2300 to 2400] at 900 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
August—Continued	Holly well #18 on [0600 to 2300] at 625 gpm Holly well #19 on [0600 to 2300] at 661 gpm Holly well #21 on [0600 to 2300] at 78 gpm Parkway well #22 on [0800 to 1100] at 917 gpm Parkway well #23 on [0800 to 1100] at 444 gpm Parkway well #26 on [0800 to 1100] at 954 gpm Parkway well #27 on [0800 to 1100] at 794 gpm Brookside well #15 on [0000 to 1900] and [2200 to 2400] at 692 gpm South Toms River well #17 on [0600 to 0800] and [1900 to 2200] at 701 gpm Indian Head well #20 on [1300 to 2200] at 508 gpm Anchorage well #98 on [0000 to 1000] and [1800 to 2400] at 406 gpm Silver Bay well #99 on [0000 to 1000] and [1800 to 2400] at 405 gpm
September	South Toms River elevated storage tank in service: Initial WL=15.0 feet Indian Hill elevated storage tank in service: Initial WL=16.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1600] at 1,297 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0700 to 0900] at 2,719 gpm) Holly well #14 on [0600 to 1600] at 201 gpm Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1600] at 467 gpm; [1600 to 2400] at 900 gpm Holly well #18 on [0600 to 1600] at 703 gpm Holly well #19 on [0600 to 1600] at 785 gpm Holly well #21 on [0600 to 1600] at 41 gpm Parkway well #22 on [0700 to 0900] at 825 gpm Parkway well #23 on [0700 to 0900] at 421 gpm Parkway well #26 on [0700 to 0900] at 810 gpm Parkway well #27 on [0700 to 0900] at 664 gpm Brookside well #15 on [0000 to 1800] and [2200 to 2400] at 689 gpm South Toms River well #17 on [2000 to 2200] at 883 gpm Indian Head well #20 on [1200 to 2200] at 497 gpm Anchorage well #98 on [0600 to 2200] at 403 gpm Silver Bay well #99 on [0600 to 2200] at 398 gpm
October	South Toms River elevated storage tank in service: Initial WL=14.0 feet Indian Hill elevated storage tank in service: Initial WL=16.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1500] at 1,273 gpm) *(note:Parkway ground-level storage tank out of service)* *(note:Holly well #14 out of service)* Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1500] at 423 gpm; [1500 to 2400] at 900 gpm

Table C-3. Water-distribution system operations, Dover Township area, New Jersey, January 1971–December 1971—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
October—Continued (Average-Demand Month)	Holly well #18 on [0600 to 1500] at 898 gpm Holly well #19 on [0600 to 1500] at 851 gpm *(note:Holly well #21 out of service)* *(note:Parkway well #22 out of service)* *(note:Parkway well #23 out of service)* *(note:Parkway well #26 out of service)* *(note:Parkway well #27 out of service)* Brookside well #15 on [0000 to 1700] and [2200 to 2400] at 701 gpm South Toms River well #17 on [2000 to 2200] at 641 gpm Indian Head well #20 on [1800 to 2200] at 449 gpm Anchorage well #98 on [0600 to 2200] at 399 gpm Silver Bay well #99 on [0600 to 2200] at 398 gpm
November	South Toms River elevated storage tank in service: Initial WL=15.0 feet Indian Hill elevated storage tank in service: Initial WL=14.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1200 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1200] at 1,429 gpm) Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 1200] at 106 gpm; [1200 to 2400] at 900 gpm Holly well #18 on [0600 to 1200] at 444 gpm Holly well #19 on [0600 to 1200] at 878 gpm Brookside well #15 on [0000 to 1800] and [2200 to 2400] at 709 gpm South Toms River well #17 on [2100 to 2200] at 818 gpm Indian Head well #20 on [1300 to 2200] at 478 gpm Anchorage well #98 on [0600 to 1100] at 415 gpm Silver Bay well #99 on [0600 to 1300] at 402 gpm
December	South Toms River elevated storage tank in service: Initial WL=13.0 feet Indian Hill elevated storage tank in service: Initial WL=15.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [2200 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 2200] at 1,415 gpm) Holly well #16 on [0000 to 0600] at 900 gpm; [0600 to 2200] at 593 gpm; [2200 to 2400] at 900 gpm Holly well #18 on [0600 to 2200] at 308 gpm Holly well #19 on [0600 to 2200] at 514 gpm Brookside well #15 on [0000 to 1900] and [2200 to 2400] at 712 gpm *(note:South Toms River well #17 out of service)* Indian Head well #20 on [0800 to 2200] at 489 gpm *(note:Anchorage well #98 out of service)* *(note:Silver Bay well #99 out of service)*

[1]The Anchorage and Silver Bay wells were not assigned identification numbers by the water utility. For simulation and analysis purposes in this report, the two wells are assigned the following identification numbers: Anchorage well #98 and Silver Bay well #99.

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
January	South Toms River elevated storage tank in service: Initial WL=17.0 feet Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1900 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1900] at 1,417 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0600 to 1300] and [1700 to 2300] at 2,837 gpm) Holiday City ground-level storage tank in service: Initial WL=18.0 Holiday City booster pump off and bypass pipe open [0000 to 07:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30] Holiday City booster pump off and bypass pipe closed [12:30 to 2200] Holiday City booster pump off and bypass pipe open [2200 to 2400] Holly well #16 on [0000 to 0600 at 900 gpm, [0600 to 1900] at 521 gpm, [1900 to 2400] at 900 gpm Holly well #18 on [0600 to 1900] at 896 gpm *(note:Holly well #19 out of service)* Parkway well #22 on [0600 to 1300] and [1700 to 2300] at 974 gpm *(note:Parkway well #23 out of service)* Parkway well #24 on [0600 to 1300] and [1700 to 2300] at 264 gpm Parkway well #26 on [0600 to 1300] and [1700 to 2300] at 365 gpm *(note:Parkway well #27 out of service)* Parkway well #28 on [0600 to 1300] and [1700 to 2300] at 579 gpm Parkway well #29 on [0600 to 1300] and [1700 to 2300] at 656 gpm South Toms River well #17 on [0000 to 0400] and [2300 to 2400] at 788 gpm Indian Head well #20 on [0000 to 2100] and [2200 to 2400] at 491gpm
February	South Toms River elevated storage tank in service: Initial WL=17.0 feet Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 896 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0600 to 1400] and [1700 to 2300] at 2,963 gpm) Holiday City ground-level storage tank in service: Initial WL=18.0 Holiday City booster pump off and bypass pipe open [0000 to 07:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30] Holiday City booster pump off and bypass pipe closed [12:30 to 2200] Holiday City booster pump off and bypass pipe open [2200 to 2400] Holly well #16 on [0000 to 2400] at 694 gpm Holly well #18 on [0000 to 2400] at 202 gpm Parkway well #22 on [0600 to 1400] and [1700 to 2300] at 1,009 gpm Parkway well #24 on [0600 to 1400] and [1700 to 2300] at 29 gpm Parkway well #26 on [0600 to 1400] and [1700 to 2300] at 733gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
February—Continued (Minimum-Demand Month)	Parkway well #28 on [0600 to 1400] and [1700 to 2300] at 540 gpm Parkway well #29 on [0600 to 1400] and [1700 to 2300] at 652 gpm South Toms River well #17 on [0000 to 0400] and [2300 to 2400] at 815 gpm Indian Head well #20 on [0000 to 2100] and [2200 to 2400] at 495 gpm
March	South Toms River elevated storage tank in service: Initial WL=17.0 feet Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 832 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0600 to 1500] and [1700 to 2300] at 2,895 gpm) Holiday City ground-level storage tank in service: Initial WL=18.0 Holiday City booster pump off and bypass pipe open [0000 to 07:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30] Holiday City booster pump off and bypass pipe closed [12:30 to 2200] Holiday City booster pump off and bypass pipe open [2200 to 2400] Holly well #16 on [0000 to 2400] at 694 gpm Holly well #18 on [0000 to 2400] at 138 gpm Parkway well #22 on [0600 to 1500] and [1700 to 2300] at 861 gpm Parkway well #23 on [0600 to 1500] and [1700 to 2300] at 3 gpm Parkway well #24 on [0600 to 1500] and [1700 to 2300] at 512 gpm Parkway well #26 on [0600 to 1500] and [1700 to 2300] at 626 gpm Parkway well #27 on [0600 to 1500] and [1700 to 2300] at 330 gpm Parkway well #28 on [0600 to 1500] and [1700 to 2300] at 209 gpm Parkway well #29 on [0600 to 1500] and [1700 to 2300] at 353 gpm South Toms River well #17 on [0000 to 0500] and [2300 to 2400] at 719 gpm Indian Head well #20 on [0000 to 2100] and [2200 to 2400] at 491 gpm
April	South Toms River elevated storage tank in service: Initial WL=15.0 feet Indian Hill elevated storage tank in service: Initial WL=8.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 0600] and [1900 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1900] at 1380 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0700 to 1900] at 3004 gpm) Holiday City ground-level storage tank in service: Initial WL=18.0 Holiday City booster pump off and bypass pipe open [0000 to 07:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30] Holiday City booster pump off and bypass pipe closed [12:30 to 2200] Holiday City booster pump off and bypass pipe open [2200 to 2400] Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1900] at 521 gpm, [1900 to 2400] at 900 gpm Holly well #18 on [0600 to 1900] at 474 gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
	Holly well #19 on [0600 to 1900] at 386 gpm
	Parkway well #22 on [0700 to 1900] at 606 gpm
	(note:Parkway well #23 out of service)
	Parkway well #24 on [0700 to 1900] at 529 gpm
	Parkway well #26 on [0700 to 1900] at 431 gpm
April—Continued	Parkway well #27 on [0700 to 1900] at 460 gpm
	Parkway well #28 on [0700 to 1900] at 515 gpm
	Parkway well #29 on [0700 to 1900] at 463 gpm
	Brookside well #15 on [0000 to 0800] and [2200 to 2400] at 713 gpm
	South Toms River well #17 on [0000 to 0400] and [2200 to 2400] at 732 gpm
	Indian Head well #20 on [0000 to 1300] and [2200 to 2400] at 500 gpm
	South Toms River elevated storage tank in service: Initial WL=16.0 feet
	Indian Hill elevated storage tank in service: Initial WL=9.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note:Holly wells pump directly into system and represent Holly high-service pump flows)
	Holly high-service pump #1 on [0000 to 0600] and [1700 to 2400] at 900 gpm
	Holly high-service pump #2 on [0600 to 1700] at 1379 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [0600 to 1900] at 2978 gpm)
	Holiday City ground-level storage tank in service: Initial WL=19.0
	Holiday City booster pump off and bypass pipe open [0000 to 06:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:40]
	Holiday City booster pump off and bypass pipe open [11:40 to 16:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30]
	Holiday City booster pump off and bypass pipe open [20:30 to 2400]
May	Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1700] at 452 gpm, [1700 to 2400] at 900 gpm
	Holly well #18 on [0600 to 1700] at 765 gpm
	Holly well #19 on [0600 to 1700] at 162 gpm
	Parkway well #22 on [0600 to 1900] at 542 gpm
	Parkway well #23 on [0600 to 1900] at 150 gpm
	Parkway well #24 on [0600 to 1900] at 394 gpm
	Parkway well #25 on [0600 to 1900] at 113 gpm
	Parkway well #26 on [0600 to 1900] at 439 gpm
	Parkway well #27 on [0600 to 1900] at 438 gpm
	Parkway well #28 on [0600 to 1900] at 443 gpm
	Parkway well #29 on [0600 to 1900] at 459 gpm
	Brookside well #15 on [0000 to 1200] and [2200 to 2400] at 706 gpm
	South Toms River well #17 on [0000 to 0500] and [2200 to 2400] at 737 gpm
	Indian Head well #20 on [0000 to 2400] at 505 gpm
	Anchorage well #98 on [0000 to 0600] and [2200 to 2400] at 384 gpm
	Silver Bay well #99 on [0000 to 0600] and [2200 to 2400] at 390 gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
June (Maximum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=16.0 feet
	Indian Hill elevated storage tank in service: Initial WL=9.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note:Holly wells pump directly into system and represent Holly high-service pump flows)
	Holly high-service pump #1 on [0000 to 2400] at 900 gpm
	Holly high-service pump #2 on [0600 to 1700] at 1,267 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [0400 to 0800] and [1100 to 1700] at 2,884 gpm
	Parkway high-service pump #2 on [0800 to 1100] at 3985 gpm, [1700 to 2100] at 3,957 gpm)
	Holiday City ground-level storage tank in service: Initial WL=19.0
	Holiday City booster pump off and bypass pipe open [0000 to 06:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:40]
	Holiday City booster pump off and bypass pipe open [11:40 to 16:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30]
	Holiday City booster pump off and bypass pipe open [20:30 to 2400]
	St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=35.0
	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [0000 to 0900]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [0900 to 12:30]
	St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [12:30 to 17:30]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [17:30 to 21:15]
	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [21:15 to 2400]
	Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1700] at 452 gpm, [1700 to 2400] at 900 gpm
	Holly well #18 on [0600 to 1700] at 1104 gpm
	Holly well #19 on [0600 to 1700] at 496 gpm
	Holly well #21 on [0600 to 1700] at 116 gpm
	Parkway well #22 on [0400 to 0800] and [1100 to 1700] at 469 gpm, [0800 to 1100] and [1700 to 2100] at 669 gpm
	Parkway well #23 on [0400 to 0800], [1100 to 1700] at 618 gpm
	Parkway well #24 on [0400 to 0800] and [1100 to 1700] at 491 gpm, [0800 to 1100] at 613 gpm
	Parkway well #25 on [0400 to 0800] and [1100 to 1700] at 106 gpm, [0800 to 1100] and [1700 to 2100] at 530 gpm
	Parkway well #26 on [0400 to 0800] and [1100 to 1700] at 149 gpm, [0800 to 1100] and [1700 to 2100] at 745 gpm
	Parkway well #27 on [0400 to 0800] and [1100 to 1700] at 410 gpm, [1700 to 2100] at 585 gpm
	Parkway well #28 on [0400 to 0800] and [1100 to 1700] at 354 gpm, [0800 to 1100] and [1700 to 2100] at 708 gpm
	Parkway well #29 on [0400 to 0800] and [1100 to 1700] at 288 gpm, [0800 to 1100] and [1700 to 2100] at 720 gpm
	Brookside well #15 on [0000 to 1600] and [2200 to 2400] at 708 gpm
	South Toms River well #17 on [0000 to 0600] and [2300 to 2400] at 774 gpm
	Indian Head well #20 on [0000 to 2400] at 489 gpm
	Anchorage well #98 on [0000 to 1100] and [1800 to 2400] at 394 gpm
	Silver Bay well #99 on [0000 to 1000] and [1800 to 2400] at 409 gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
	South Toms River elevated storage tank in service: Initial WL=16.0 feet
	Indian Hill elevated storage tank in service: Initial WL=10.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note:Holly wells pump directly into system and represent Holly high-service pump flows)
	Holly high-service pump #1 on [00:00 to 24:00] at 900 gpm
	Holly high-service pump #2 on [06:00 to 18:00] at 1,274 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [02:00 to 08:00] and [11:00 to 17:00] at 2,986 gpm
	Parkway high-service pump #2 on [08:00 to 11:00] and [17:00 to 21:00] at 4,000 gpm)
	Holiday City ground-level storage tank in service: Initial WL=18.0
	Holiday City booster pump off and bypass pipe open [00:00 to 06:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:40]
	Holiday City booster pump off and bypass pipe open [11:40 to 16:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30]
	Holiday City booster pump off and bypass pipe open [20:30 to 24:00]
	St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=35.0
	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [00:00 to 09:00]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [09:00 to 12:30]
	St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [12:30 to 17:30]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [17:30 to 21:15]
July	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [21:15 to 24:00]
	Holly well #16 on [00:00 to 06:00] at 900 gpm, [06:00 to 18:00] at 489 gpm, [18:00 to 24:00] at 900 gpm
	Holly well #18 on [06:00 to 18:00] at 998 gpm
	Holly well #19 on [06:00 to 18:00] at 570 gpm
	Holly well #21 on [06:00 to 18:00] at 118 gpm
	Parkway well #22 on [02:00 to 08:00] and [11:00 to 17:00] at 428 gpm [08:00 to 11:00] and [17:00 to 21:00] at 641 gpm
	Parkway well #23 on [02:00 to 08:00] and [11:00 to 17:00] at 324 gpm, [08:00 to 11:00] and [17:00 to 21:00] at 354 gpm
	Parkway well #24 on [02:00 to 08:00] and [11:00 to 17:00] at 560 gpm, [08:00 to 11:00] at 611 gpm
	Parkway well #25 on [02:00 to 08:00] and [11:00 to 17:00] at 253 gpm, [08:00 to 11:00] and [17:00 to 21:00] at 505 gpm
	Parkway well #26 on [02:00 to 08:00] and [11:00 to 17:00] at 320 gpm, [08:00 to 11:00] and [17:00 to 21:00] at 512 gpm
	Parkway well #27 on [02:00 to 08:00] and [11:00 to 17:00] at 356 gpm, [17:00 to 21:00] at 609 gpm
	Parkway well #28 on [02:00 to 08:00] and [11:00 to 17:00] at 398 gpm, [08:00 to 11:00] and [17:00 to 21:00] at 682 gpm
	Parkway well #29 on [02:00 to 08:00] and [11:00 to 17:00] at 348 gpm, [08:00 to 11:00] and [17:00 to 21:00] at 696 gpm
	Brookside well #15 on [00:00 to 19:00] and [22:00 to 24:00] at 685 gpm
	South Toms River well #17 on [00:00 to 07:00] and [23:00 to 24:00] at 788 gpm
	Indian Head well #20 on [00:00 to 24:00] at 490 gpm
	Anchorage well #98 on [00:00 to 12:00] and [18:00 to 24:00] at 389 gpm
	Silver Bay well #99 on [00:00 to 11:00] and [18:00 to 24:00] at 401 gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
August	South Toms River elevated storage tank in service: Initial WL=17.0 feet Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1300] at 1,187 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 2000] at 2,967 gpm) Holiday City ground-level storage tank in service: Initial WL=19.0 Holiday City booster pump off and bypass pipe open [0000 to 06:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:40] Holiday City booster pump off and bypass pipe open [11:40 to 16:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30] Holiday City booster pump off and bypass pipe open [20:30 to 2400] St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=35.0 St. Catherine's (Rt. 37) booster pump off and bypass pipe open [0000 to 0900] St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [0900 to 12:30] St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [12:30 to 17:30] St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [17:30 to 21:15] St. Catherine's (Rt. 37) booster pump off and bypass pipe open [21:15 to 2400] Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1300] at 195 gpm, [1300 to 2400] at 900 gpm Holly well #18 on [0600 to 1300] at 1,608 gpm Holly well #19 on [0600 to 1300] at 283 gpm *(note:Holly well #21 out of service)* Parkway well #22 on [0500 to 2000] at 366 gpm Parkway well #23 on [0500 to 2000] at 308 gpm Parkway well #24 on [0500 to 2000] at 409 gpm Parkway well #25 on [0500 to 2000] at 346 gpm Parkway well #26 on [0500 to 2000] at 333 gpm Parkway well #27 on [0500 to 2000] at 319 gpm Parkway well #28 on [0500 to 2000] at 459 gpm Parkway well #29 on [0500 to 2000] at 427 gpm Brookside well #15 on [0000 to 1900] and [2200 to 2400] at 685 gpm South Toms River well #17 on [0000 to 0500] and [2300 to 2400] at 690 gpm Indian Head well #20 on [0000 to 2400] at 503 gpm Anchorage well #98 on [0000 to 1000] and [1800 to 2400] at 410 gpm Silver Bay well #99 on [0000 to 1000] and [1800 to 2400] at 406 gpm
September	South Toms River elevated storage tank in service: Initial WL=16.0 feet Indian Hill elevated storage tank in service: Initial WL=10.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 900 gpm Holly high-service pump #2 on [0600 to 1300] at 1,174 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)*

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
	Parkway high-service pump #1 on [0500 to 1900] at 2,883 gpm)
	Holiday City ground-level storage tank in service: Initial WL=19.0
	Holiday City booster pump off and bypass pipe open [0000 to 06:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:40]
	Holiday City booster pump off and bypass pipe open [11:40 to 16:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30]
	Holiday City booster pump off and bypass pipe open [20:30 to 2400]
	St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=35.0
	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [0000 to 0900]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [0900 to 12:30]
	St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [12:30 to 17:30]
	St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [17:30 to 21:15]
	St. Catherine's (Rt. 37) booster pump off and bypass pipe open [21:15 to 2400]
	Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1400] at 283 gpm, [1400 to 2400] at 900 gpm
September—Continued	Holly well #18 on [0600 to 1400] at 1,705 gpm
	Holly well #19 on [0600 to 1400] at 86 gpm
	(note:Parkway well #22 out of service)
	Parkway well #23 on [0500 to 1900] at 225 gpm
	Parkway well #24 on [0500 to 1900] at 596 gpm
	Parkway well #25 on [0500 to 1900] at 243 gpm
	Parkway well #26 on [0500 to 1900] at 466 gpm
	Parkway well #27 on [0500 to 1900] at 235 gpm
	Parkway well #28 on [0500 to 1900] at 524 gpm
	Parkway well #29 on [0500 to 1900] at 594 gpm
	Brookside well #15 on [0000 to 1800] and [2200 to 2400] at 696 gpm
	South Toms River well #17 on [0000 to 0400] and [2300 to 2400] at 810 gpm
	Indian Head well #20 on [0000 to 2400] at 492 gpm
	Anchorage well #98 on [0000 to 0700] and [2000 to 2400] at 389 gpm
	Silver Bay well #99 on [0000 to 0700] and [2000 to 2400] at 387 gpm

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
	South Toms River elevated storage tank in service: Initial WL=18.0 feet
	Indian Hill elevated storage tank in service: Initial WL=15.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note:Holly wells pump directly into system and represent Holly high-service pump flows)
	Holly high-service pump #1 on [0000 to 0600] and [2200 to 2400] at 900 gpm
	Holly high-service pump #2 on [0600 to 2200] at 1,478 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [0600 to 1300] and [1800 to 2300] at 2,953 gpm)
	Holiday City ground-level storage tank in service: Initial WL=18.0
	Holiday City booster pump off and bypass pipe open [0000 to 07:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30]
	Holiday City booster pump off and bypass pipe closed [12:30 to 2200]
	Holiday City booster pump off and bypass pipe open [2200 to 2400]
October	*(note:St. Catherine's (Rt. 37) ground-level storage tank out of service)*
	Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 2200] at 592 gpm, [2200 to 2400] at 900 gpm
	Holly well #18 on [0600 to 2200] at 820 gpm
	Holly well #19 on [0600 to 2200] at 67 gpm
	(note:Parkway well #23 out of service)
	Parkway well #24 on [0600 to 1300] and [1800 to 2300] at 793 gpm
	(note:Parkway well #25 out of service)
	Parkway well #26 on [0600 to 1300] and [1800 to 2300] at 607 gpm
	(note:Parkway well #27 out of service)
	Parkway well #28 on [0600 to 1300] and [1800 to 2300] at 788 gpm
	Parkway well #29 on [0600 to 1300] and [1800 to 2300] at 765 gpm
	Brookside well #15 on [0000 to 1900] and [2200 to 2400] at 698 gpm
	South Toms River well #17 on [0000 to 0500] and [2300 to 2400] at 714 gpm
	Indian Head well #20 on [0000 to 2400] at 487 gpm
	(note:Anchorage well #98 out of service)
	(note:Silver Bay well #99 out of service)

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
	South Toms River elevated storage tank in service: Initial WL=15.0 feet
	Indian Hill elevated storage tank in service: Initial WL=13.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note:Holly wells pump directly into system and represent Holly high-service pump flows)
	Holly high-service pump #1 on [0000 to 0600] and [2200 to 2400] at 900 gpm
	Holly high-service pump #2 on [0600 to 2200] at 1,416 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [0600 to 1300] and [1600 to 2300] at 2,905 gpm)
	Holiday City ground-level storage tank in service: Initial WL=18.0
	Holiday City booster pump off and bypass pipe open [0000 to 07:30]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30]
November	Holiday City booster pump off and bypass pipe closed [12:30 to 2200]
	Holiday City booster pump off and bypass pipe open [2200 to 2400]
	Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 2200] at 587 gpm, [2200 to 2400] at 900 gpm
	Holly well #18 on [0600 to 2200] at 812 gpm
	Holly well #19 on [0600 to 2200] at 17 gpm
	Parkway well #22 on [0600 to 1300] and [1600 to 2300] at 360 gpm
	Parkway well #24 on [0600 to 1300] and [1600 to 2300] at 641 gpm
	Parkway well #26 on [0600 to 1300] and [1600 to 2300] at 550 gpm
	Parkway well #28 on [0600 to 1300] and [1600 to 2300] at 684 gpm
	Parkway well #29 on [0600 to 1300] and [1600 to 2300] at 671 gpm
	Brookside well #15 on [0000 to 0600] at 670 gpm
	South Toms River well #17 on [0000 to 0200] at 871 gpm
	Indian Head well #20 on [0000 to 1900] and [2200 to 2400] at 504 gpm
	South Toms River elevated storage tank in service: Initial WL=19.0 feet
	Indian Hill elevated storage tank in service: Initial WL=14.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
December	*(note:Holly wells pump directly into system and represent Holly high-service pump flows)*
	Holly high-service pump #1 on [0000 to 0600] and [1000 to 2400] at 900 gpm
	Holly high-service pump #2 on [0600 to 1000] at 1,390 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)

Table C-4. Water-distribution system operations, Dover Township area, New Jersey, January 1978–December 1978—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations[1]
December—Continued	*(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 2200] at 2,951 gpm) Holiday City ground-level storage tank in service: Initial WL=18.0 Holiday City booster pump off and bypass pipe open [0000 to 07:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [07:30 to 12:30] Holiday City booster pump off and bypass pipe closed [12:30 to 2200] Holiday City booster pump off and bypass pipe open [2200 to 2400] Holly well #16 on [0000 to 0600] at 900 gpm, [0600 to 1000] at 117 gpm, [1200 to 2400] at 900 gpm Holly well #18 on [0600 to 1000] at 1,263 gpm, [1000 to 1200] at 900 gpm Holly well #19 on [0600 to 1000] at 10 gpm Parkway well #22 on [0500 to 2200] at 304 gpm Parkway well #24 on [0500 to 2200] at 721 gpm Parkway well #26 on [0500 to 2200] at 431 gpm Parkway well #28 on [0500 to 2200] at 762 gpm Parkway well #29 on [0500 to 2200] at 733 gpm *(note:Brookside well #15 out of service)* South Toms River well #17 on [0000 to 0500] at 809 gpm *(note:Indian Head well #20 out of service)*

[1]The Anchorage and Silver Bay wells were not assigned identification numbers by the water utility. For simulation and analysis purposes in this report, the two wells are assigned the following identification numbers: Anchorage well #98 and Silver Bay well #99.

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
January	South Toms River elevated storage tank in service: Initial WL=8.0 feet South Toms River booster pump #1 and #2 off and bypass pipe open [0000 to 0700] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0700 to 0900] South Toms River booster pump #1 and #2 off and bypass pipe open [0900 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 1900] South Toms River booster pump #1 and #2 off and bypass pipe open [1900 to 2400] Indian Hill elevated storage tank in service: Initial WL=10.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0800 to 1300] at 893 gpm Holly high-service pump #2 on [0000 to 0800] and [1300 to 2400] at 1394 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 1200] and [1600 to 2000] at 3,005 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] Holly well #21 on [0800 to 1300] at 425 gpm Holly well #30 on [0800 to 1300] at 468 gpm, [0000 to 0800] and [1300 to 2400] at 1,394 gpm Parkway well #22 on [0800 to 1200] and [1600 to 2000] at 680 gpm Parkway well #23 on [0800 to 1200] and [1600 to 2000] at 317 gpm Parkway well #24 on [0800 to 1200] and [1600 to 2000] at 1,506 gpm Parkway well #29 on [0800 to 1200] and [1600 to 2000] at 502 gpm Brookside well #15 on [0000 to 0200] and [0600 to 2400] at 701 gpm *(note:Indian Head well #20 out of service)* Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 702 gpm South Toms River well #32 on [1200 to 1900] at 713 gpm Berkeley well #33 on [0000 to 2400] at 1,169 gpm Berkeley well #34 on [0900 to 1700] at 994 gpm
February (Minimum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=6.0 feet South Toms River booster pump #1 and #2 off and bypass pipe open [0000 to 0700] South Toms River booster pump #1 on, Booster Pump #2, bypass pipe closed [0700 to 0900] South Toms River booster pump #1 and #2 off, bypass pipe open [0900 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 2000] South Toms River booster pump #1 and #2 off, bypass pipe open [2000 to 2400] Indian Hill elevated storage tank in service: Initial WL=6.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0800 to 1200] at 900 gpm Holly high-service pump #2 on [0800 to 1200] at 1,306 gpm,[0000 to 0800] and [1200 to 2400] at 1,406 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 1100] and [1600 to 2000] at 2,897 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] *(note:Holly well #21 out of service)* Holly well #30 on [0800 to 1200] at 2206 gpm, [0000 to 0800] and [1200 to 2400] at 1,406 gpm

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
February—Continued (Minimum-Demand Month)	Parkway well #22 on [0800 to 1100] and [1600 to 2000] at 1,080 gpm *(note:Parkway well #23 out of service)* Parkway well #24 on [0800 to 1100] and [1600 to 2000] at 1,817 gpm *(note:Parkway well #29 out of service)* Brookside well #15 on [0000 to 0300] at 597 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 705 gpm South Toms River well #32 on [1100 to 2000] at 677 gpm Berkeley well #33 on [0000 to 2400] at 1,167 gpm Berkeley well #34 on [0800 to 2000] at 1,003 gpm
March	South Toms River elevated storage tank in service: Initial WL=6.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 0700] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0700 to 0900] South Toms River booster pump #1 and #2 off, bypass pipe open [0900 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 2000] South Toms River booster pump #1 and #2 off, bypass pipe open [2000 to 2400] Indian Hill elevated storage tank in service: Initial WL=6.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (*note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 951 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) (*note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 1200] and [1600 to 2000] at 2,892 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] Holly well #30 on [0000 to 2400] at 951 gpm Parkway well #22 on [0800 to 1200] and [1600 to 2000] at 1,293 gpm Parkway well #24 on [0800 to 1200] and [1600 to 2000] at 1,599 gpm Brookside well #15 on [0000 to 1000] and [2000 to 2400] at 708 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 696 gpm South Toms River well #32 on [1000 to 2000] at 670 gpm Berkeley well #33 on [0000 to 2400] at 1,168 gpm Berkeley well #34 on [0500 to 2200] at 1,005 gpm
April	South Toms River elevated storage tank in service: Initial WL=14.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 0700] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0700 to 0900] South Toms River booster pump #1 and #2 off, bypass pipe open [0900 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 1800] South Toms River booster pump #1 and #2 off, bypass pipe open [1800 to 2400] Indian Hill elevated storage tank in service: Initial WL=16.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0800 to 2200] at 915 gpm Holly high-service pump #2 on [0000 to 800] and [2200 to 2400] at 1,400 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0800 to 1200] and [1500 to 2000] at 3,085 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45]

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
April—Continued	Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] Holly well #30 on [0800 to 2200] at 915 gpm, [0000 to 800] and [2200 to 2400] at 1,400 gpm Parkway well #22 on [0800 to 1200] and [1500 to 2000] at 1,573 gpm Parkway well #24 on [0800 to 1200] and [1500 to 2000] at 1,511 gpm Brookside well #15 on [0000 to 1500] and [2000 to 2400] at 698 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 693 gpm South Toms River well #32 on [1000 to 1800] at 681 gpm Berkeley well #33 on [0000 to 2400] at 1,126 gpm Berkeley well #34 on [0600 to 2200] at 1,021 gpm
May	South Toms River elevated storage tank in service: Initial WL=20.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [00:00 to 07:00] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [07:00 to 09:00] South Toms River booster pump #1 and #2 off, bypass pipe open [09:00 to 14:00] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [14:00 to 18:00] South Toms River booster pump #1 and #2 off, bypass pipe open [18:00 to 24:00] Indian Hill elevated storage tank in service: Initial WL=22.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (*note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #2 on [0000 to 2400] at 1,352 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) (*note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0700 to 1200] and [1500 to 2100] at 3,088 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] Holly well #21 on [0000 to 2400] at 34 gpm Holly well #30 on [0000 to 2400] at 1,318 gpm Parkway well #22 on [0700 to 1200] and [1500 to 2100] at 1,247 gpm Parkway well #23 on [0700 to 1200] and [1500 to 2100] at 273 gpm Parkway well #24 on [0700 to 1200] and [1500 to 2100] at 1,120 gpm Parkway well #28 on [0700 to 1200] and [1500 to 2100] at 310 gpm Parkway well #28 on [0700 to 1200] and [1500 to 2100] at 138 gpm Brookside well #15 on [0000 to 1300] and [2000 to 2400] at 714 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 698 gpm South Toms River well #32 on [0900 to 1800] at 691 gpm Berkeley well #33 on [0000 to 2400] at 1,158 gpm Berkeley well #34 on [0500 to 2200] at 1,011 gpm
June	South Toms River elevated storage tank in service: Initial WL=17.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 0700] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0700 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 1600] South Toms River booster pump #1 and #2 off, bypass pipe open [1600 to 2000] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [2000 to 21:30] South Toms River booster pump #1 and #2 off, bypass pipe open [21:30 to 2400] Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 0900], [1200 to 1800], [2100 to 2200] at 900 gpm

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
June—Continued	Windsor ground-level storage tank in service: Initial WL=24.0 Windsor high-service pump #1 and #2 off, bypass pipe open [0000 to 08:30] Windsor high-service pump #1 on, Booster Pump #2 off, bypass pipe closed [08:30 to 1500] Windsor high-service pump #1 and #2 off, bypass pipe open [1500 to 2400] Holly well #21 on [0000 to 0600] and [2200 to 2400] at 1,160 gpm Holly well #30 on [0000 to 0600] and [2200 to 2400] at 236 gpm, [0600 to 0900], [1200 to 1800] and [2100 to 2200] at 2,194 gpm, [0900 to 1200] and [1800 to 2100] at 2,794 gpm Parkway well #22 on [0500 to 0700], [0700 to 1000] at 4000 gpm, [1200 to 1700] at 263 gpm Parkway well #23 on [0500 to 0700] and [1200 to 1700] at 985 gpm Parkway well #24 on [0500 to 0700] and [1200 to 1700] at 173 gpm, 1000 to 1200] and [1700 to 1800] at 4,000 gpm Parkway well #28 on [0500 to 0700] and [1200 to 1700] at 174 gpm, 1800 to 2100] at 4,000 gpm Parkway well #29 on [0500 to 0700] and [1200 to 1700] at 1,489 gpm Brookside well #15 on [0000 to 0900] and [1500 to 2400] at 715 gpm Indian Head #20 on [0000 to 0800] at 515 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 695 gpm South Toms River well #32 on [0400 to 2200] at 703 gpm Berkeley well #33 on [0000 to 2400] at 1,154 gpm Berkeley well #34 on [0000 to 2400] at 1,106 gpm
July (Maximum-Demand Month)	South Toms River elevated storage tank in service: Initial WL=20.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 0400] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0400 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 1900] South Toms River booster pump #1 and #2 off, bypass pipe open [1900 to 2400] Indian Hill elevated storage tank in service: Initial WL=13.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0500 to 0800] and [1300 to 1700] at 900 gpm Holly high-service pump #2 on [0500 to 0800] and [1300 to 1700] at 1,300 gpm, [0000 to 0500] and [2200 to 2400] at 1,628 gpm Holly high-service pump #3 on [0800 to 1300] and [1700 to 2200] at 3,000 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0700] and [1200 to 1700] at 2,936 gpm Parkway high-service pump #2 on [0700 to 1200] and [1700 to 2100] at 4,000 gpm) Holiday City ground-level storage tank in service: Initial WL=20.0 Holiday City booster pump off and bypass pipe open [0000 to 06:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:30] Holiday City booster pump off and bypass pipe open [11:30 to 16:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30] Holiday City booster pump off and bypass pipe open [20:30 to 2400] St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=40.0 St. Catherine's (Rt. 37) booster pump off and bypass pipe open [0000 to 09:30] St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [09:30 to 14:45] St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [14:45 to 2000] St. Catherine's (Rt. 37) booster pump off and bypass pipe open [2000 to 2400] Windsor ground-level storage tank in service: Initial WL=24.0 Windsor high-service pump #1 and #2 off, bypass pipe open [0000 to 08:30] Windsor high-service pump #1 on, Booster Pump #2 off, bypass pipe closed [08:30 to 1400] Windsor high-service pump #1 and #2 off, bypass pipe open [1400 to 2400] Holly well #21 on [0000 to 0500] and [0500 to 0600] at 2,200 gpm, [2200 to 2400] at 1,431 gpm

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
July—Continued (Maximum-Demand Month)	Holly well #30 on [0000 to 0500] and [2200 to 2400] at 197 gpm, [0600 to 0800] and [1300 to 1700] at 2200 gpm, [0800 to 1300] and [1700 to 2200] at 3,000 gpm Parkway well #22 on [0400 to 0700] at 457 gpm, [0700 to 0900] at 4000 gpm, [1200 to 1700] at 457 gpm Parkway well #23 on [0400 to 0700] and [1200 to 1700] at 738 gpm Parkway well #24 on [0400 to 0700] at 372 gpm, [0900 to 1100] at 4000 gpm, [1200 to 1700] at 372 gpm Parkway well #26 on [0400 to 0700] and [1200 to 1700] at 242 gpm, [1100 to 1200] and [1700 to 1800] at 4,000 gpm Parkway well #28 on [0400 to 0700] and [1200 to 1700] at 431 gpm, [1800 to 2000] at 4,000 gpm Parkway well #29 on [0400 to 0700] and [1200 to 1700] at 696 gpm, [2000 to 2100] at 4,000 gpm Brookside well #15 on [0000 to 0900] and [1600 to 2400] at 707 gpm Indian Head #20 on [0000 to 1800] and [2200 to 2400] at 488 gpm Route 70, well #31 on [0000 to 2000] and [2200 to 2400] at 686 gpm South Toms River well #32 on [0500 to 2200] at 706 gpm South Toms River well #38 on [0400 to 1200] at 665 gpm Berkeley well #33 on [0000 to 2400] at 1,134 gpm Berkeley well #34 on [0000 to 2100] and [2200 to 2400] at 998 gpm Berkeley well #35 on [0500 to 2200] at 708 gpm
August	South Toms River elevated storage tank in service: Initial WL=10.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 0500] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [0500 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 1600] South Toms River booster pump #1 and #2 off, bypass pipe open [1600 to 1900] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1900 to 21:30] South Toms River booster pump #1 and #2 off, bypass pipe open [21:30 to 2400] Indian Hill elevated storage tank in service: Initial WL=11.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 0800], [1200 to 1700], [2100 to 2200] at 900 gpm Holly high-service pump #2 on [0600 to 0800], [1200 to 1700], [2100 to 2200] at 1,300 gpm, [0000 to 0600] and [2200 to 2400] at 1,400 gpm Holly high-service pump #3 on [0800 to 1200] and [1700 to 2100] at 2,852 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0800] and [1200 to 1800] at 2,887 gpm Parkway high-service pump #2 on [0800 to 1200] and [1800 to 2100] at 4,000 gpm) Holiday City ground-level storage tank in service: Initial WL=21.0 Holiday City booster pump off and bypass pipe open [0000 to 06:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:30 to 11:30] Holiday City booster pump off and bypass pipe open [11:30 to 16:30] Holiday City booster pump on (set at 0.87) and bypass pipe closed [16:30 to 20:30] Holiday City booster pump off and bypass pipe open [20:30 to 2400] St. Catherine's (Rt. 37) ground-level storage tank in service: Initial WL=40.0 St. Catherine's (Rt. 37) booster pump off and bypass pipe open [0000 to 09:30] St. Catherine's (Rt. 37) booster pump on and bypass pipe closed [09:30 to 14:45] St. Catherine's (Rt. 37) booster pump off and bypass pipe closed [14:45 to 2000] St. Catherine's (Rt. 37) booster pump off and bypass pipe open [2000 to 2400] Windsor ground-level storage tank in service: Initial WL=24.0 Windsor high-service pump #1 and #2 off, bypass pipe open [0000 to 08:30] Windsor high-service pump #1 on, Booster Pump #2 off, bypass pipe closed [08:30 to 1500]

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
August—Continued	Windsor high-service pump #1 and #2 off, bypass pipe open [1500 to 2400] Holly well #21 on [0800 to 1200] and [1700 to 2100] at 959 gpm Holly well #30 on [0000 to 0600] and [2200 to 2400] at 1,400 gpm, [0800 to 1200] at 1,893 gpm, [1700 to 2100] at 1,893 gpm, [0600 to 0800], [1200 to 1700], [2100 to 2200] at 2,200 gpm Parkway well #22 on [0400 to 0800] at 726 gpm, [0800 to 0900] at 4,000 gpm, [1200 to 1800] at 726 gpm Parkway well #23 on [0400 to 0800] and [1200 to 1800] at 565 gpm Parkway well #24 on [0400 to 0800] at 211 gpm, [0900 to 1100] at 4,000 gpm, [1200 to 1800] at 211 gpm Parkway well #26 on [0400 to 0800] at 576 gpm, [1100 to 1200] at 4,000 gpm, [1200 to 1800] at 576 gpm Parkway well #28 on [0400 to 0800] and [1200 to 1800] at 288 gpm, [1800 to 2000] at 4,000 gpm Parkway well #29 on [0400 to 0800] and [1200 to 1800] at 521 gpm, [2000 to 2100] at 4,000 gpm Brookside well #15 on [0000 to 0800] and [1500 to 2400] at 716 gpm Indian Head #20 on [0000 to 0800] and [1100 to 2400] at 596 gpm Route 70, well #31 on [0000 to 2000] and [2200 to 2400] at 699 gpm South Toms River well #32 on [0500 to 1900] at 674 gpm South Toms River well #38 on [0500 to 1100] at 674 gpm Berkeley well #33 on [0000 to 2000] and [2200 to 2400] at 988 gpm Berkeley well #34 on [0000 to 1100] and [1700 to 2400] at 983 gpm Berkeley well #35 on [0600 to 1900] at 720 gpm
September	South Toms River elevated storage tank in service: Initial WL=12.0 feet South Toms River booster pump #1 and #2, bypass pipe open [0000 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 2000] South Toms River booster pump #1 and #2 off, bypass pipe open [2000 to 2400] Indian Hill elevated storage tank in service: Initial WL=17.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows* Holly high-service pump #1 on [0400 to 2300] at 909 gpm Holly high-service pump #2 on [0000 to 0400] and [2300 to 2400] at 1,400 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) (*note:Parkway wells pump directly into system and represent Parkway high-service pump flows* Parkway high-service pump #1 on [0400 to 0800] and [1200 to 1700] at 2,910 gpm Parkway high-service pump #2 on [0800 to 1200] and [1700 to 2100] at 4,000 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] *(note:St. Catherine's (Rt. 37) ground-level storage tank out of service)* *(note:Windsor ground-level storage tank out of service)* *(note:Holly well #21 out of service)* Holly well #30 on [0000 to 0400] at 1,400 gpm, [0400 to 2300] at 909 gpm, [2300 to 2400] at 1,400 gpm Parkway well #22 on [0400 to 0800] a 272 gpm, [0800 to 1000] at 4,000 gpm, [1200 to 1700] at 272 gpm Parkway well #23 on [0400 to 0800] and [1200 to 1700] at 603 gpm Parkway well #24 on [0400 to 0800] at 199 gpm, [1000 to 1200] at 4,000 gpm, [1200 to 1700] at 199 gpm Parkway well #26 on [0400 to 0800] and [1200 to 1700] at 155 gpm, [1700 to 1900] at 4,000 gpm Parkway well #28 on [0400 to 0800] and [1200 to 1700] at 255 gpm, [1900 to 2100] at 4,000 gpm Parkway well #29 on [0400 to 0800] and [1200 to 1700] at 1,426 gpm Brookside well #15 on [0000 to 0700] and [2200 to 2400] at 694 gpm

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
September—Continued	Indian Head #20 on [0000 to 1900] and [2200 to 2400] at 495 gpm Route 70, well #31 on [0000 to 1900] and [2200 to 2400] at 703 gpm South Toms River well #32 on [1200 to 2000] at 710 gpm South Toms River well #38 on [0600 to 0700] at 60 gpm Berkeley well #33 on [0000 to 2000] and [2200 to 2400] at 1,010 gpm Berkeley well #34 on [0500 to 2200] at 989 gpm Berkeley well #35 on [0700 to 2100] at 694 gpm
October (Average-Demand Month)	South Toms River elevated storage tank in service: Initial WL=8.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 1400] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [1400 to 2000] South Toms River booster pump #1 and #2 off, bypass pipe open [2000 to 2400] Indian Hill elevated storage tank in service: Initial WL=11.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 936 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0700] and [1200 to 1700] at 2,925 gpm Parkway high-service pump #2 on [0700 to 1200] and [1700 to 2100] at 4,000 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] Holly well #30 on [0000 to 2400] at 936 gpm Parkway well #22 on [0400 to 0700] at 452 gpm, [0700 to 0900] at 4,000 gpm, [1200 to 1700] at 452 gpm Parkway well #23 on [0400 to 0700] and [1200 to 1700] at 766 gpm Parkway well #24 on [0400 to 0700] at 339 gpm, [0900 to 1100] at 4,000 gpm, [1200 to 1700] at 339 gpm Parkway well #26 on [0400 to 0700] and [1200 to 1700] at 287 gpm, [1100 to 1200] and [1700 to 1800] at 4,000 gpm Parkway well #28 on [0400 to 0700] and [1200 to 1700] at 398 gpm, [1800 to 2000] at 4,000 gpm Parkway well #28 on [0400 to 0700] and [1200 to 1700] at 682 gpm, [2000 to 2100] at 4,000 gpm Indian Head #20 on [0000 to 1900] and [2200 to 2400] at 493 gpm Route 70, well #31 on [0000 to 2000] and [2200 to 2400] at 697 gpm South Toms River well #32 on [1300 to 2000] at 698 gpm *(note:South Toms River well #38 out of service)* Berkeley well #33 on [0000 to 2400] at 988 gpm Berkeley well #34 on [0700 to 2100] at 975 gpm Berkeley well #35 on [0600 to 0900] at 623 gpm
November	South Toms River elevated storage tank in service: Initial WL=8.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [00:00 to 07:00] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [07:00 to 09:00] South Toms River booster pump #1 and #2 off, bypass pipe open [09:00 to 14:00] South Toms River booster pump #1 off, Booster Pump #2 on, bypass pipe closed [14:00 to 20:00] South Toms River booster pump #1 & #2 off and bypass pipe open [20:00 to 24:00] Indian Hill elevated storage tank in service: Initial WL=10.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [00:00 to 24:00] at 847 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [04:00 to 07:00] and [12:00 to 17:00] at 2,925 gpm Parkway high-service pump #2 on [07:00 to 12:00] and [17:00 to 21:00] at 4,000 gpm)

Table C-5. Water-distribution system operations, Dover Township area, New Jersey, January 1988–December 1988—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
November—Continued	Holiday City ground-level storage tank in service: Initial WL=24.0 Holiday City booster pump off and bypass pipe open [00:00 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 24:00] Holly well #21 on [00:00 to 24:00] at 61 gpm Holly well #30 on [00:00 to 24:00] at 785 gpm Parkway well #22 on [08:00 to 12:00] and [15:00 to 20:00] at 672 gpm Parkway well #23 on [08:00 to 12:00] and [15:00 to 20:00] at 136 gpm Parkway well #24 on [0800 to 1200] and [1500 to 2000] at 637 gpm Parkway well #26 on [0800 to 1200] and [1500 to 2000] at 600 gpm Parkway well #28 on [0800 to 1200] and [1500 to 2000] at 476 gpm Parkway well #29 on [0800 to 1200] and [1500 to 2000] at 566 gpm Brookside well #15 on [0000 to 0400] and [1900 to 2400] at 713 gpm Indian Head #20 on [0000 to 1900] and [2200 to 2400] at 493 gpm Route 70, well #31 on [0000 to 2100] and [2200 to 2400] at 686 gpm South Toms River well #32 on [1100 to 2000] at 683 gpm (*note:South Toms River well #38 out of service)* Berkeley well #33 on [0000 to 2400] at 996 gpm Berkeley well #34 on [0700 to 2200] at 992 gpm Berkeley well #35 on [0700 to 1500] at 676 gpm
December	South Toms River elevated storage tank in service: Initial WL=12.0 feet South Toms River booster pump #1 and #2 off, bypass pipe open [0000 to 1000] South Toms River booster pump #1 on, Booster Pump #2 off, bypass pipe closed [1000 to 1400] South Toms River booster pump #1 and #2 off, bypass pipe open [1400 to 2400] Indian Hill elevated storage tank in service: Initial WL=16.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (*note:Holly wells pump directly into system and represent Holly high-service pump flows)* Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0900], [1200 to 1800], [2100 to 2300] at 2,977 gpm Parkway high-service pump #2 on [0900 to 1200] and [1800 to 2100] at 4,000 gpm) Holiday City ground-level storage tank in service: Initial WL=24.0 oliday City booster pump off and bypass pipe open [0000 to 06:45] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:45 to 12:30] Holiday City booster pump off and bypass pipe open [12:30 to 2400] *(note:Holly well #21 out of service)* *(note:Holly well #30 out of service)* Parkway well #22 on [0500 to 0900], [1200 to 1800], [2100 to 2300] at 83 gpm, [0900 to 1200] at 4,000 gpm *(note:Parkway well #23 out of service)* Parkway well #24 on [0500 to 0900], [1200 to 1800] and [2100 to 2300] at 34 gpm; [1800 to 2100] at 4,000 gpm Parkway well #26 on [0500 to 0900], [1200 to 1800], [2100 to 2300] at 953 gpm Parkway well #28 on [0500 to 0900], [1200 to 1800], [2100 to 2300] at 1,050 gpm Parkway well #29 on [0500 to 0900], [1200 to 1800], [2100 to 2300] at 856 gpm (*note: Brookside well #15 out of service)* Indian Head well #20 on [0000 to 0600] and [1900 to 2400] at 490 gpm Route 70, well #31 on [0000 to 1000] and [1200 to 2400] at 703 gpm South Toms River well #32 on [0700 to 1400] at 691 gpm South Toms River well #38 on [0600 to 0700] at 676 gpm Berkeley well #33 on [0000 to 2400] at 989 gpm Berkeley well #34 on [0600 to 1900] at 1,002 gpm Berkeley well #35 on [1000 to 1900] at 699 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
January	Indian Hill elevated storage tank in service: Initial WL=18.0 feet Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 2200] at 3037 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=26.0 feet Parkway well #22 on [0500 to 2200] at 624 gpm Parkway well #24 on [0500 to 2200] at 394 gpm Parkway well #26 on [0500 to 2200] at 179 gpm Parkway well #28 on [0500 to 2200] at 602 gpm Parkway well #29 on [0500 to 2200] at 126 gpm Parkway well #42 on [0500 to 2200] at 1,112 gpm Indian Head well #20 on [0000 to 1100] and [1700 to 2400] at 451 gpm Route 70, well #31 on [0000 to 1300] and [1500 to 2400] at 660 gpm South Toms River well #32 on [0000 to 2400] at 513 gpm Berkeley well #33 on [0000 to 1300] and [1600 to 2400] at 903 gpm Berkeley well #34 on [0200 to 2300] at 878 gpm Berkeley well #35 on [0200 to 2300] at 615 gpm
February (Minimum-Demand Month)	Indian Hill elevated storage tank in service: Initial WL=18.0 feet Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 2300] at 3004 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=26.0 feet Parkway well #22 on [0500 to 2300] at 596 gpm Parkway well #24 on [0500 to 2300] at 405 gpm *(note:Parkway well #26 out of service)* Parkway well #28 on [0500 to 2300] at 601 gpm Parkway well #29 on [0500 to 2300] at 465 gpm Parkway well #42 on [0500 to 2300] at 937 gpm Indian Head well #20 on [0000 to 1300] and [1600 to 2400] at 441 gpm Route 70, well #31 on [0000 to 2400] at 655 gpm South Toms River well #32 on [0500 to 2200] at 536 gpm South Toms River well #38 on [0600 to 0700] at 330 gpm Berkeley well #33 on [0000 to 1300] and [1500 to 2400] at 903 gpm Berkeley well #34 on [0600 to 2100] at 897 gpm Berkeley well #35 on [0100 to 2300] at 620 gpm
March	Indian Hill elevated storage tank in service: Initial WL=22.0 feet Parkway ground-level storage tank in service (closed in EPANET 2) (note:Parkway wells pump directly into system and represent Parkway high-service pump flows Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 2,966 gpm Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
March—Continued	Holiday City ground-level storage tank in service: Initial WL=18.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=30.0 feet Parkway well #22 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 289 gpm; [0700 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 321 gpm; [0900 to 1000] at 4,800 gpm Parkway well #26 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 570 gpm Parkway well #28 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 249 gpm; [1800 to 2000] at 4,800 gpm Parkway well #29 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 776 gpm Parkway well #42 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 761 gpm Indian Head well #20 on [0000 to 1300] and [1600 to 2400] at 445 gpm Route 70, well #31 on [0000 to 2400] at 673 gpm South Toms River well #32 on [0600 to 1200] at 552 gpm *(note:South Toms River well #38 out of service)* Berkeley well #33 on [0000 to 1400] and [1500 to 2400] at 902 gpm Berkeley well #34 on [0000 to 2400] at 907 gpm Berkeley well #35 on [0600 to 1700] at 594 gpm
April	Indian Hill elevated storage tank in service: Initial WL=32.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (note:Holly wells pump directly into system and represent Holly high-service pump flows Holly high-service pump #1 on [1100 to 1600] at 976 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 3,129 gpm Parkway high-service pump #2 on [0700 to 1100] and [1800 to 2100] at 4,800 gpm Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=35.0 feet Holly well #30 on [1100 to 1600] at 976 gpm Parkway well #22 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 309 gpm; on [0700 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 421 gpm; on [2000 to 2100] at 4,800 gpm Parkway well #26 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 1,034 gpm Parkway well #28 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 296 gpm; on [0900 to 1100] at 4,800 gpm Parkway well #29 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 76 gpm; on [1800 to 2000] at 4,800 gpm Parkway well #42 on [0500 to 0700], [1100 to 1800] and [2100 to 2300] at 993 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 445 gpm Route 70, well #31 on [0000 to 2400] at 688 gpm South Toms River well #32 on [0000 to 2400] at 516 gpm Berkeley well #33 on [0000 to 1400] and [1500 to 2400] at 873 gpm Berkeley well #34 on [0000 to 2400] at 895 gpm Berkeley well #35 on [0100 to 2300] at 612 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
	Indian Hill elevated storage tank in service: Initial WL=33.0 feet
	Holly ground-level storage tank in service (closed in EPANET 2)
	(note: Holly wells pump directly into system and represent Holly high-service pump flows
	Holly high-service pump #1 on [0500 to 2200] at 893 gpm
	Holly high-service pump #2 on [0000 to 0500] and [2200 to 2400] at 1,400 gpm)
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows
	Parkway high-service pump #1 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 2,953 gpm
	Parkway high-service pump #2 on [0700 to 1200] and [1700 to 2100] at 4,800 gpm)
	Holiday City ground-level storage tank in service: Initial WL=17.0 feet
	Holiday City booster pump off and bypass pipe open from [0000 to 0600]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100]
	Holiday City booster pump off and bypass pipe closed from [1100 to 2300]
	Holiday City booster pump off and bypass pipe open from [2300 to 2400]
	North Dover elevated storage tank in service: Initial WL=31.0 feet
	Windsor ground-level storage tank in service (closed in EPANET 2)
May	(*note:Windsor well pumps directly into system and represents Windsor high-service pump flows)*
	Windsor high-service pump #1 on [0600 to 0800] at 895 gpm)
	Holly well #30 on [0500 to 2200] at 893 gpm; on [0000 to 0500] and [2200 to 2400] at 1,400 gpm
	Parkway well #22 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 282 gpm; on [0700 to 0900] at 4,800 gpm
	Parkway well #24 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 1,173 gpm
	Parkway well #26 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 1,148 gpm
	Parkway well #28 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 105 gpm; on [0900 to 1100] at 4,800 gpm
	Parkway well #29 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 90 gpm; on [1900 to 2100] at 4,800 gpm
	Parkway well #42 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 155 gpm; on [1100 to 1200] and [1700 to 1900] at 4,800 gpm
	Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 437 gpm
	Route 70, well #31 on [0000 to 2400] at 679 gpm
	South Toms River well #32 on [0000 to 2400] at 541 gpm
	Berkeley well #33 on [0000 to 1300] and [1600 to 2400] at 908 gpm
	Berkeley well #34 on [0000 to 2400] at 901 gpm
	Berkeley well #35 on [0000 to 2300] at 614 gpm
	Windsor well #40 on [0600 to 0800] at 895 gpm
	Parkway high-service pump #2 on [0600 to 1200] and [1700 to 2200] at 4,800 gpm)
	Holiday City ground-level storage tank in service: Initial WL=17.0 feet
	Holiday City booster pump off and bypass pipe open from [0000 to 0600]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100]
	Holiday City booster pump off and bypass pipe closed from [1100 to 2300]
	Holiday City booster pump off and bypass pipe open from [2300 to 2400]
	North Dover elevated storage tank in service: Initial WL=32.0 feet
	Windsor ground-level storage tank in service (closed in EPANET 2)
June	*(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)*
	Windsor high-service pump #1 on [0600 to 1300] at 1,000 gpm)
	Holly well #30 on [0000 to 0600] and [1700 to 2400] at 1,400 gpm; [0600 to 1700] at 2,048 gpm
	Holly well #37 on [0600 to 1700] at 133 gpm
	Parkway well #22 on [0400 to 0600] and [1200 to 1700] at 613 gpm;[0600 to 0800] at 4,800 gpm
	Parkway well #24 on [0400 to 0600] and [1200 to 1700] at 1,373 gpm
	Parkway well #26 on [0400 to 0600] and [1200 to 1700] at 302 gpm;[0800 to 1000] at 4,800 gpm
	Parkway well #28 on [0400 to 0600] and [1200 to 1700] at 287 gpm;[1000 to 1200] at 4,800 gpm
	Parkway well #29 on [0400 to 0600] and [1200 to 1700] at 181 gpm;[1700 to 1900] at 4,800 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
June—Continued	Parkway well #42 on [0400 to 0600] and [1200 to 1700] at 95 gpm; [1900 to 2200] at 4,800 gpm Brookside well #15 on [0000 to 0100] and [2300 to 2400] at 812 gpm Indian Head well #20 on [0000 to 1200] and [1700 to 2400] at 453 gpm Route 70, well #31 on [0000 to 2400] at 684 gpm South Toms River well #32 on [0300 to 2300] at 522 gpm South Toms River well #38 on [0600 to 1000] at 559 gpm Berkeley well #33 on [0000 to 1300] and [1500 to 2400] at 871 gpm Berkeley well #34 on [0000 to 2400] at 938 gpm Berkeley well #35 on [0000 to 2300] at 623 gpm Windsor well #40 on [0600 to 1300] at 1,000 gpm
July	Indian Hill elevated storage tank in service: Initial WL=31.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 0900], [1100 to 1800] and [2000 to 2200] at 900 gpm Holly high-service pump #2 on [0600 to 0900], [1100 to 1800] and [2000 to 2200] at 1,290 gpm; on [0000 to 0600] and [2200 to 2400] at 1,390 gpm Holly high-service pump #3 on [0900 to 1100] and [1800 to 2000] at 2,790 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) (*note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0600] and [1200 to 1700] at 3,095 gpm Parkway high-service pump #2 on [0600 to 1200] and [1700 to 2200] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=32.0 feet Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 1200] at 999 gpm) Holly well #30 on [0000 to 0600] and [2200 to 2400] at 1,173 gpm; on [0600 to 0900], [1100 to 1800] and [2000 to 2200] at 2,190 gpm; on [0900 to 1100] and [1800 to 2000] at 2,790 gpm Holly well #37 on [0000 to 0600] and [2200 to 2400] at 216 gpm Parkway well #22 on [0400 to 0600] and [1200 to 1700] at 602 gpm; [0600 to 0800] at 4,800 gpm Parkway well #24 on [0400 to 0600] and [1200 to 1700] at 1,365 gpm Parkway well #26 on [0400 to 0600] and [1200 to 1700] at 293 gpm; [0800 to 1000] at 4,800 gpm Parkway well #28 on [0400 to 0600] and [1200 to 1700] at 308 gpm; [1000 to 1200] at 4,800 gpm Parkway well #29 on [0400 to 0600] and [1200 to 1700] at 223 gpm; [2000 to 2200] at 4,800 gpm Parkway well #42 on [0400 to 0600] and [1200 to 1700] at 305 gpm; [1700 to 2000] at 4,800 gpm Brookside well #15 on [0000 to 0500] at 696 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 436 gpm Route 70, well #31 on [0000 to 2400] at 681 gpm South Toms River well #32 on [0500 to 2300] at 537 gpm South Toms River well #38 on [0400 to 2300] at 523 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 898 gpm Berkeley well #34 on [0000 to 2400] at 942 gpm Berkeley well #35 on [0000 to 2300] at 624 gpm Windsor well #40 on [0600 to 1200] at 999 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
August (Maximum-Demand Month)	Indian Hill elevated storage tank in service: Initial WL=34.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0500 to 0800], [1200 to 1700] and [2100 to 2400] at 900 gpm Holly high-service pump #2 on [0500 to 0800], [1200 to 1700] and [2100 to 2400] at 1,300 gpm; on [0000 to 0500] at 1,492 gpm Holly high-service pump #3 on [0800 to 1200] and [1700 to 2100] at 3,000 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 3,180 gpm Parkway high-service pump #2 on [0600 to 1200] and [1700 to 2200] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=22.0 feet Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0000 to 2400] at 1,166 gpm) Holly well #30 on [0000 to 0500] at 29 gpm; on [0500 to 0800], [1200 to 1700] and [2100 to 2400] at 2,200 gpm; on [0800 to 1200] and [1700 to 2100] at 3,000 gpm Holly well #37 on [0000 to 0500] at 1,463 gpm Parkway well #22 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 583 gpm; on [0600 to 0800] at 4,800 gpm Parkway well #24 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 60 gpm; on [0800 to 1000] at 4,800 gpm Parkway well #26 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 247 gpm; on [1000 to 1200] at 4,800 gpm Parkway well #28 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 787 gpm; on [2100 to 2200] at 4,800 gpm Parkway well #29 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 1,383 gpm Parkway well #42 on [0400 to 0600], [1200 to 1700] and [2200 to 2300] at 118 gpm; on [1700 to 2100] at 4,800 gpm Brookside well #15 on [0000 to 1300] and [2200 to 2400] at 677 gpm Indian Head well #20 on [0000 to 1700] and [2100 to 2400] at 439 gpm Route 70, well #31 on [0000 to 2400] at 681 gpm South Toms River well #32 on [0200 to 2300] at 531 gpm South Toms River well #38 on [0500 to 2200] at 717 gpm Berkeley well #33 on [0000 to 1500] and [1800 to 2400] at 877 gpm Berkeley well #34 on [0000 to 2400] at 959 gpm Berkeley well #35 on [0000 to 2300] at 624 gpm Windsor well #40 on [0000 to 2400] at 1,166 gpm
September	Indian Hill elevated storage tank in service: Initial WL=33.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 2000] at 900 gpm Holly high-service pump #2 on [0600 to 2000] at 1,310 gpm; [0000 to 0600] and [2000 to 2400] at 1,409 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 3,002 gpm Parkway high-service pump #2 on [0700 to 1200] and [1700 to 2100] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300]

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
September—Continued	Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=34.0 feet Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 1400] at 990 gpm) Holly well #30 on [0000 to 0600] and [2000 to 2400] at 1381 gpm; [0600 to 2000] at 2,210 gpm Holly well #37 on [0000 to 0600] and [2000 to 2400] at 28 gpm Parkway well #22 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 400 gpm; on [0700 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 1,099 gpm Parkway well #26 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 35 gpm; on [0900 to 1100] at 4,800 gpm Parkway well #28 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 30 gpm; on [1100 to 1200] and [1700 to 1800] at 4,800 gpm Parkway well #29 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 1,333 gpm Parkway well #42 on [0500 to 0700], [1200 to 1700] and [2100 to 2200] at 105 gpm; on [1800 to 2100] at 4,800 gpm Brookside well #15 on [0000 to 0700] and [2100 to 2400] at 687 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 441 gpm Route 70, well #31 on [0000 to 2400] at 683 gpm South Toms River well #32 on [0600 to 2100] at 535 gpm South Toms River well #38 on [0600 to 1800] at 514 gpm Berkeley well #33 on [0000 to 1300] and [1600 to 2400] at 886 gpm Berkeley well #34 on [0000 to 2400] at 946 gpm Berkeley well #35 on [0000 to 2300] at 632 gpm Windsor well #40 on [0600 to 1400] at 990 gpm
October (Average-Demand Month)	Indian Hill elevated storage tank in service: Initial WL=28.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0100 to 2300] at 920 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows* Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 3,102 gpm Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=35.0 feet Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 1200] at 932 gpm Holly well #30 on [0100 to 2300] at 920 gpm *(note:Holly well #37 out of service)* Parkway well #22 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 60 gpm; on [0700 to 1000] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 603 gpm Parkway well #26 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 97 gpm; on [1800 to 2000] at 4,800 gpm Parkway well #28 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 858 gpm Parkway well #29 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 969 gpm Parkway well #42 on [0500 to 0700], [1000 to 1800] and [2000 to 2200] at 514 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
October—Continued	*(note:Brookside well #15 out of service)* Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 448 gpm Route 70, well #31 on [0000 to 2400] at 680 gpm *(note:South Toms River well #32 out of service)* *(note:South Toms River well #38 out of service)* Berkeley well #33 on [0000 to 1400] and [1500 to 2400] at 871 gpm Berkeley well #34 on [0000 to 2400] at 961 gpm Berkeley well #35 on [0000 to 2300] at 605 gpm Windsor well #40 on [0600 to 1200] at 932 gpm
November	Indian Hill elevated storage tank in service: Initial WL=20.0 feet *note: Holly ground-level storage tank out of service)* Parkway ground-level storage tank in service (closed in EPANET 2) *(note: Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 2,950 gpm Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 feet Holiday City booster pump off and bypass pipe open from [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100] Holiday City booster pump off and bypass pipe closed from [1100 to 2300] Holiday City booster pump off and bypass pipe open from [2300 to 2400] North Dover elevated storage tank in service: Initial WL=27.0 feet Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 0900] at 1,073 gpm) *(note:Holly well #30 out of service)* Parkway well #22 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 81 gpm; on [0700 to 1000] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 631 gpm Parkway well #26 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 153 gpm; on [1800 to 2000] at 4,800 gpm Parkway well #28 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 821 gpm Parkway well #29 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 932 gpm Parkway well #42 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 332 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 454 gpm Route 70, well #31 on [0000 to 2400] at 667 gpm Berkeley well #33 on [0000 to 1400] and [1500 to 2400] at 876 gpm Berkeley well #34 on [0000 to 2400] at 1,014 gpm Berkeley well #35 on [0000 to 2400] at 616 gpm Windsor well #40 on [0600 to 0900] at 1,073 gpm

Table C-6. Water-distribution system operations, Dover Township area, New Jersey, January 1995–December 1995—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
	Indian Hill elevated storage tank in service: Initial WL=20.0 feet
	Parkway ground-level storage tank in service (closed in EPANET 2)
	(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)
	Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 2,890 gpm
	Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm)
	Holiday City ground-level storage tank in service: Initial WL=17.0 feet
	Holiday City booster pump off and bypass pipe open from [0000 to 0600]
	Holiday City booster pump on (set at 0.87) and bypass pipe closed from [0600 to 1100]
	Holiday City booster pump off and bypass pipe closed from [1100 to 2300]
	Holiday City booster pump off and bypass pipe open from [2300 to 2400]
	(note:Windsor ground-level storage tank out of service)
	North Dover elevated storage tank in service: Initial WL=26.0 feet
December	Parkway well #22 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 6 gpm; on [0700 to 1000] at 4,800 gpm
	Parkway well #24 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 201 gpm
	Parkway well #26 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 732 gpm
	Parkway well #28 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 37 gpm; on [1800 to 2000] at 4,800 gpm
	Parkway well #29 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 837 gpm
	Parkway well #42 on [0500 to 0700], [1000 to 1800] and [2000 to 2300] at 1,077 gpm
	Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 444 gpm
	Route 70, well #31 on [0000 to 1400] and [1500 to 2400] at 704 gpm
	South Toms River well #32 on [0600 to 1000] at 613 gpm
	Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 985 gpm
	Berkeley well #34 on [0000 to 2400] at 1,002 gpm
	Berkeley well #35 on [0200 to 2300] at 704 gpm
	(note:Windsor well #40 out of service)

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
January	Indian Hill elevated storage tank in service: Initial WL=19.0 feet Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 3,039 gpm Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] North Dover elevated storage tank in service: Initial WL=31.0 feet Parkway well #22 on [0500 to 0700] at 23 gpm, [0700 to 0900] at 4,800 gpm, [1000 to 1800] and [2000 to 2200] at 23 gpm Parkway well #24 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 496 gpm Parkway well #26 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 820 gpm Parkway well #28 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 86 gpm, [0900 to 1000] and [1800 to 1900] at 4,800 gpm Parkway well #29 on [0500 to 0700] and [1000 to 1800] at 523 gpm, [1900 to 2000] at 4,800 gpm and [2000 to 2200] at 523 gpm Parkway well #42 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 1,091 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 448 gpm Route 70, well #31 on [0000 to 2400] at 667 gpm South Toms River well #32 on [0600 to 1400] at 563 gpm Berkeley well #33 on [0000 to 1300] and [1500 to 2400] at 886 gpm Berkeley well #34 on [0000 to 2400] at 1,001 gpm Berkeley well #35 on [0400 to 2200] at 641 gpm
February (Minimum-Demand Month)	Indian Hill elevated storage tank in service: Initial WL=22.0 feet Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 3,028 gpm Parkway high-service pump #2 on [0600 to 1100] and [1700 to 2100] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] North Dover elevated storage tank in service: Initial WL=29.0 feet Parkway well #22 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 41 gpm,[0600 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 9 gpm, [0900 to 1100] at 4,800 gpm Parkway well #26 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 49 gpm; [1700 to 1900] at 4,800 gpm Parkway well #28 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 118 gpm, [1900 to 2100] at 4,800 gpm Parkway well #29 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 1,244 gpm Parkway well #42 on [0500 to 0600], [1100 to 1700], [2100 to 2300] at 1,567 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 454 gpm Route 70, well #31 on [0000 to 2400] at 657 gpm South Toms River well #32 on [0600 to 1500] at 514 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 900 gpm Berkeley well #34 on [0000 to 2400] at 959 gpm *(note:Berkeley well #35 out of service)*

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
March	Indian Hill elevated storage tank in service: Initial WL=20.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 1500] at 917 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 3,007 gpm Parkway high-service pump #2 on [0700 to 1100] and [1800 to 2100] at 4,800 gpm Holiday City ground-level storage tank in service: Initial WL=17.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] North Dover elevated storage tank in service: Initial WL=27.0 feet Holly well #30 on [0600 to 1500] at 917 gpm Parkway well #22 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 18 gpm, [0700 to 1000] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 1gpm, [1000 to 1100] and [1800 to 1900] at 4,800 gpm Parkway well #26 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 764 gpm Parkway well #28 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 67 gpm, [1900 to 2100] at 4,800 gpm Parkway well #29 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 1,005 gpm Parkway well #42 on [0500 to 0700], [1100 to 1800], [2100 to 2300] at 1,152 gpm Indian Head well #20 on [0000 to 1200] and [1600 to 2400] at 443 gpm Route 70, well #31 on [0000 to 2400] at 674 gpm South Toms River well #32 on [0600 to 1800] at 527 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 899 gpm Berkeley well #34 on [0000 to 2400] at 915 gpm
April	Indian Hill elevated storage tank in service: Initial WL=26.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 1600] at 900 gpm Holly high-service pump #2 on [0600 to 1600] at 1,282 gpm, [0000 to 0600] and [1600 to 2400] at 1,382 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 3,058 gpm Parkway high-service pump #2 on [0700 to 1000] and [1800 to 2000] at 4,800 gpm Holiday City ground-level storage tank in service: Initial WL=17.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] North Dover elevated storage tank in service: Initial WL=23.0 feet Holly well #30 on [0000 to 0600] and [1600 to 2400] at 1,383 gpm, [0600 to 1600] at 2,182 gpm Parkway well #22 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 379 gpm, [0700 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 786 gpm Parkway well #26 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 826 gpm Parkway well #28 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 39 gpm, [0900 to 1000] and [1800 to 1900] at 4,800 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
April—Continued	Parkway well #29 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 402 gpm, [1900 to 2000] at 4,800 gpm Parkway well #42 on [0500 to 0700], [1000 to 1800], [2000 to 2200] at 626 gpm Indian Head well #20 on [0000 to 0700] and [2200 to 2400] at 464 gpm Route 70, well #31 on [0000 to 0600] and [2300 to 2400] at 673 gpm South Toms River well #32 on [0300 to 2300] at 526 gpm Berkeley well #33 on [0000 to 1200] and [1700 to 2400] at 883 gpm Berkeley well #34 on [0000 to 2300] at 900 gpm
May	Indian Hill elevated storage tank in service: Initial WL=31.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [05:00 to 22:00] at 900 gpm Holly high-service pump #2 on [05:00 to 22:00] at 1,312 gpm, [00:00 to 05:00] and [22:00 to 24:00] at 1,413 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [05:00 to 06:00], [12:00 to 17:00], [22:00 to 23:00] at 2,933 gpm Parkway high-service pump #2 on [06:00 to 12:00] and [17:00 to 22:00] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [00:00 to 06:00] Holiday City booster pump on (set at 0.87) and bypass pipe closed [06:00 to 11:00] Holiday City booster pump off and bypass pipe closed [11:00 to 23:00] Holiday City booster pump off and bypass pipe open [23:00 to 24:00] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [06:00 to 18:00] at 981 gpm) North Dover elevated storage tank in service: Initial WL=21.0 feet Holly well #30 on [00:00 to 05:00] at 1,235 gpm, [05:00 to 22:00] at 2212 gpm,[22:00 to 24:00] at 1,235 gpm Holly well #37 on [00:00 to 05:00] and [22:00 to 24:00] at 179 gpm Parkway well #22 on [0500 to 0600], [1200 to 1700], [2200 to 2300] at 94 gpm, [0600 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0600], [1200 to 1700], [2200 to 2300] at 1,442 gpm Parkway well #26 on [0500 to 0600], [1200 to 1700] and [2200 to 2300] at 113 gpm, [2000 to 2200] at 4,800 gpm Parkway well #28 on [0500 to 0600], [1200 to 1700] and [2200 to 2300] at 138 gpm, [1800 to 2000] at 4,800 gpm Holly well #37 on [0000 to 0500] and [2200 to 2400] at 179 gpm Parkway well #22 on [0500 to 0600], [1200 to 1700], [2200 to 2300] at 94 gpm, [0600 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0600], [1200 to 1700], [2200 to 2300] at 1,442 gpm Parkway well #26 on [0500 to 0600], [1200 to 1700] and [2200 to 2300] at 113 gpm, [2000 to 2200] at 4,800 gpm Parkway well #28 on [0500 to 0600], [1200 to 1700] and [2200 to 2300] at 138 gpm, [1800 to 2000] at 4,800 gpm Parkway well #29 on [0500 to 0600], [1200 to 1700], [2200 to 2300] at 1,056 gpm Parkway well #42 on [0500 to 0600], [1200 to 1700] and [2200 to 2300] at 89 gpm, [0900 to 1200] and [1700 to 1800] at 4,800 gpm Brookside well #15 on [0000 to 0400] at 698 gpm Indian Head well #20 on [0000 to 0200] at 408 gpm Route 70, well #31 on [0000 to 0500] and [2200 to 2400] at 724 gpm South Toms River well #32 on [0500 to 2300] at 531 gpm South Toms River well #38 on [0600 to 0700] at 182 gpm Berkeley well #33 on [0000 to 1300] and [1800 to 2400] at 879 gpm Berkeley well #34 on [0000 to 2400] at 922 gpm Berkeley well #35 on [0000 to 0100] at 231 gpm Windsor well #40 on [0600 to 1800] at 981 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
June (Maximum-Demand Month)	Indian Hill elevated storage tank in service: Initial WL=31.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 2100] at 900 gpm Holly high-service pump #2 on [0600 to 2100] at 1,300 gpm, [0000 to 0600] and [2100 to 2400] at 1,400 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0600] and [1100 to 1700] at 3,103 gpm Parkway high-service pump #2 on [0600 to 1100] and [1700 to 2200] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0000 to 2400] at 1,148 gpm) North Dover elevated storage tank in service: Initial WL=25.0 feet Holly well #30 on [0000 to 0600] at 1400 gpm, [0600 to 2100] at 2,200 gpm, [2100 to 2400] at 1,400 gpm; (*note:Holly well #37 out of service)* Parkway well #22 on [0500 to 0600] and [1100 to 1700] at 553 gpm, [0600 to 0800] at 4,800 gpm Parkway well #24 on [0500 to 0600] and [1100 to 1700] at 600 gpm, [0800 to 0900] at 4,800 gpm Parkway well #26 on [0500 to 0600] and [1100 to 1700] at 646 gpm, [0900 to 1000] at 4,800 gpm Parkway well #28 on [0500 to 0600] and [1100 to 1700] at 677 gpm, [1000 to 1100] at 4,800 gpm Parkway well #29 on [0500 to 0600] and [1100 to 1700] at 281 gpm, [1700 to 1800] at 4,800 gpm Parkway well #42 on [0500 to 0600] and [1100 to 1700] at 346 gpm, [1800 to 2200] at 4,800 gpm Brookside well #15 on [0000 to 0400] at 760 gpm *(note: Indian Head well #20 out of service)* Route 70, well #31 on [0000 to 2400] at 671 gpm South Toms River well #32 on [0700 to 1800] at 526 gpm South Toms River well #38 on [0700 to 1700] at 696 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 898 gpm Berkeley well #34 on [0000 to 2400] at 934 gpm Berkeley well #35 on [0000 to 2400] at 681 gpm Windsor well #40 on [0000 to 2400] at 1,148 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
July	Indian Hill elevated storage tank in service: Initial WL=32.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (*note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 2000] at 900 gpm Holly high-service pump #2 on [0600 to 2000] at 1,304 gpm, [0000 to 0600] and [2000 to 2400] at 1,404 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 2,889 gpm Parkway high-service pump #2 on [0700 to 1000] and [1900 to 2100] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 2300] at 1,025 gpm) North Dover elevated storage tank in service: Initial WL=29.0 feet Holly well #30 on [0000 to 0600], [2000 to 2400] at 1404 gpm, [0600 to 2000] at 2,204 gpm Parkway well #22 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 22 gpm, [0700 to 1000] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 30 gpm, [1900 to 2100] at 4,800 gpm Parkway well #26 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 834 gpm Parkway well #28 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 869 gpm Parkway well #29 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 626 gpm Parkway well #42 on [0500 to 0700], [1000 to 1900], [2100 to 2200] at 507 gpm Brookside well #15 on [0000 to 0100] at 411 gpm Indian Head well #20 on [0000 to 0500] and [2300 to 2400] at 438 gpm Route 70, well #31 on [0000 to 2400] at 667 gpm South Toms River well #32 on [0000 to 2400] at 581 gpm *(note: South Toms River well #38 out of service)* Berkeley well #33 on [0000 to 2000] at 873 gpm Berkeley well #34 on [0000 to 2400] at 939 gpm Berkeley well #35 on [0000 to 2400] at 652 gpm Windsor well #40 on [0600 to 2300] at 1,025 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
August	Indian Hill elevated storage tank in service: Initial WL=32.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 2200] at 900 gpm Holly high-service pump #2 on [0600 to 2200] at 1,300 gpm [0000 to 0600] and [2000 to 2400] at 1,395 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 3,078 gpm Parkway high-service pump #2 on [0600 to 1000] and [1800 to 2000] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0000 to 2400] at 1,111 gpm) North Dover elevated storage tank in service: Initial WL=27.0 feet Holly well #30 on [0000 to 0600] and [2200 to 2400] at 1,395 gpm, [0600 to 2200] at 2,200 gpm Parkway well #22 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 288 gpm, [0700 to 0900] at 4,800 gpm Parkway well #24 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 360 gpm Parkway well #26 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 805 gpm Parkway well #28 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 133 gpm, [0900 to 1000] and [1800 to 1900] at 4,800 gpm Parkway well #29 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 683 gpm, [1900 to 2000] at 4,800 gpm Parkway well #42 on [0500 to 0600], [1000 to 1800], [2000 to 2200] at 807 gpm *(note:Brookside well #15 out of service)* (*note:Indian Head well #20 out of service)* Route 70, well #31 on [0000 to 2400] at 665 gpm South Toms River well #32 on [0000 to 2400] at 570 gpm Berkeley well #33 on [0000 to 2100] at 895 gpm Berkeley well #34 on [0000 to 2400] at 928 gpm Berkeley well #35 on [0000 to 2400] at 667 gpm Windsor well #40 on [0000 to 2400] at 1,111 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
September	Indian Hill elevated storage tank in service: Initial WL=36.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0800 to 1500] at 917 gpm Holly high-service pump #2 on [0000 to 0800] and [1500 to 2400] at 1,418 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 3,077 gpm Parkway high-service pump #2 on [0700 to 1200] and [1700 to 2100] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0600 to 1700] at 974 gpm) North Dover elevated storage tank in service: Initial WL=30.0 feet Holly well #30 on [0000 to 0800] at 1418 gpm, [0800 to 1500] at 917 gpm, [1500 to 2400] at 1,418 gpm Parkway well #22 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 8 gpm, [0700 to 1000] at 4,800 gpm Parkway well #24 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 941 gpm Parkway well #26 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 67 gpm, [1000 to 1200] at 4,800 gpm Parkway well #28 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 247 gpm, [1700 to 1900] at 4,800 gpm Parkway well #29 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 981 gpm Parkway well #42 on [0500 to 0700], [1200 to 1700], [2100 to 2300] at 833 gpm, [1900 to 2100] at 4,800 gpm Route 70, well #31 on [0000 to 2400] at 657 gpm South Toms River well #32 on [0000 to 2400] at 624 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 876 gpm Berkeley well #34 on [0000 to 2400] at 982 gpm Berkeley well #35 on [0000 to 2400] at 677 gpm Windsor well #40 on [0600 to 1700] at 974 gpm
October Average-Demand Month	Indian Hill elevated storage tank in service: Initial WL=36.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0800 to 1300] at 940 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 2,949 gpm Parkway high-service pump #2 on [0600 to 1200] and [1700 to 2200] at 4,800 gpm) Holiday City ground-level storage tank in service: Initial WL=17.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] *(note:Windsor ground-level storage tank out of service)* North Dover elevated storage tank in service: Initial WL=33.0 feet Holly well #30 on [0800 to 1300] at 940 gpm Parkway well #22 on [0400 to 0600], [1200 to 1700] and [2200 to 2400] at 530 gpm, [0600 to 0800] at 4,800 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
October—Continued Average-Demand Month	Parkway well #24 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 35 gpm, [0800 to 1000] at 4,800 gpm Parkway well #26 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 77 gpm, [1000 to 1200] at 4,800 gpm Parkway well #28 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 1,320 gpm Parkway well #29 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 946 gpm Parkway well #42 on [0400 to 0600], [1200 to 1700], [2200 to 2400] at 40 gpm, [1700 to 2200] at 4,800 gpm Route 70, well #31 on [0000 to 2400] at 666 gpm South Toms River well #32 on [0000 to 2400] at 591 gpm Berkeley well #33 on [0000 to 1300] and [1600 to 2400] at 879 gpm Berkeley well #34 on [0000 to 2400] at 1,010 gpm Berkeley well #35 on [0000 to 2400] at 695 gpm
November	Indian Hill elevated storage tank in service: Initial WL=23.0 feet Holly ground-level storage tank in service (closed in EPANET 2) (*note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0000 to 2400] at 913 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) *(note:Parkway wells pump directly into system and represent Parkway high-service pump flows)* Parkway high-service pump #1 on [0900 to 2100] at 2,883 gpm) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0300 to 2300] at 1,014 gpm) North Dover elevated storage tank in service: Initial WL=26.0 feet Holly well #30 on [0000 to 2400] at 913 gpm Parkway well #22 on [0900 to 2100] at 523 gpm Parkway well #24 on [0900 to 2100] at 369 gpm Parkway well #26 on [0900 to 2100] at 375 gpm Parkway well #28 on [0900 to 2100] at 426 gpm Parkway well #29 on [0900 to 2100] at 314 gpm Parkway well #42 on [0900 to 2100] at 875 gpm Route 70, well #31 on [0000 to 2400] at 674 gpm South Toms River well #32 on [0700 to 2000] at 542 gpm Berkeley well #33 on [0000 to 1200] and [1600 to 2400] at 895 gpm Berkeley well #34 on [0000 to 2400] at 952 gpm Berkeley well #35 on [0400 to 2200] at 629 gpm Windsor well #40 on [0300 to 2300] at 1,014 gpm

Table C-7. Water-distribution system operations, Dover Township area, New Jersey, January 1996–December 1996—Continued

[WL, water level; gpm, gallons per minute; Operational time in hours is based on a 24-hour time clock. Thus, 600 a.m. is represented as 0600 hours and 600 p.m. is represented as 1800 hours]

Month	Description of Operations
December	Indian Hill elevated storage tank in service: Initial WL=12.0 feet Holly ground-level storage tank in service (closed in EPANET 2) *(note:Holly wells pump directly into system and represent Holly high-service pump flows)* Holly high-service pump #1 on [0600 to 1900] at 900 gpm Holly high-service pump #2 on [0600 to 1900] at 1,315 gpm, [0000 to 0600] and [1900 to 2400] at 1,415 gpm) Parkway ground-level storage tank in service (closed in EPANET 2) Holiday City ground-level storage tank in service: Initial WL=16.0 Holiday City booster pump off and bypass pipe open [0000 to 0600] Holiday City booster pump on (set at 0.87) and bypass pipe closed [0600 to 1100] Holiday City booster pump off and bypass pipe closed [1100 to 2300] Holiday City booster pump off and bypass pipe open [2300 to 2400] Windsor ground-level storage tank in service (closed in EPANET 2) *(note:Windsor well pumps directly into system and represents Windsor high-service pump flows)* Windsor high-service pump #1 on [0000 to 0600] and [2000 to 2400] at 1,049 gpm, [0600 to 2000] at 1,100 gpm) Windsor high-service pump #3 on [0600 to 2000] at 1,100 gpm North Dover elevated storage tank in service: Initial WL=10.0 feet Holly well #30 on [0000 to 0600] and [1900 to 2400] at 1,415 gpm, [0600 to 1900] at 2,215 gpm (*note:Parkway well #22 out of service)* *(note:Parkway well #24 out of service)* *(note:Parkway well #26 out of service)* *(note:Parkway well #28 out of service)* *(note:Parkway well #29 out of service)* *(note:Parkway well #42 out of service)* Route 70, well #31 on [0000 to 2400] at 674 gpm *(note: South Toms River well #32 out of service)* Berkeley well #33 on [0000 to 1300] and [1500 to 2400] at 901 gpm Berkeley well #34 on [0000 to 2400] at 1,035 gpm (*note:Berkeley well #35 out of service)* Windsor well #40 on [0000 to 0600] and [2000 to 2400] at 1,049 gpm, [0600 to 2000] at 2,200 gpm

APPENDIX D

TABLES OF GROUNDWATER-WELL AND HIGH-SERVICE AND BOOSTER PUMP OPERATIONS, DOVER TOWNSHIP AREA, NEW JERSEY, MINIMUM-, MAXIMUM-, AND AVERAGE-DEMAND MONTHS, 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

Table D-1. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1962

February is minimum-demand month for 1962; hour of day in color means well operating; Groundwater well; see Plate 3 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Holly (13)																								
Holly (14)																								
Brookside (15)																								

[1]Wells discharge directly into the distribution system. [2]Hour of day: 0 is midnight; 12 is noon, respectively.

Table D-2. Water-distribution system operating schedule, Dover Township area, New Jersey, May 1962

[May is maximum-demand month for 1962; hour of day in color means well operating; Groundwater well; see Plate 3 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Holly (13)																								
Holly (14)																								
Brookside (15)																								

[1]Wells discharge directly into the distribution system. [2]Hour of the day: 0 is midnight; 12 is noon, respectively.

Table D-3. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1962

[October is average-demand month for 1962; hour of day in color means well operating; Groundwater well; see Plate 3 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Holly (13)																								
Holly (14)																								
Brookside (15)																								

[1]Wells discharge directly into the distribution system. [2]Hour of the day: 0 is midnight; 12 is noon, respectively.

Table D-4. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1965

[February is minimum-demand month for 1965; hour of day in color means well operating; Groundwater well; see Plate 6 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Holly (16)																								

[1]Wells discharge directly into the distribution system. [2]Hour of the day: 0 is midnight; 12 is noon, respectively.

Table D-5. Water-distribution system operating schedule, Dover Township area, New Jersey, June1965

[June is maximum-demand month for 1965; hour of day in color means well operating; Grounwater well; see Plate 6 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells (maximum demand month)																							
Holly (14)																								
Brookside (15)																								
Holly (16)																								
Holly (18)																								

[1]Wells discharge directly into the distribution system. [2]Hour of the day: 0 is midnight; 12 is noon, respectively.

Table D-6. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1965

[October is average-demand month for 1965; hour of day in color means well operating; Grounwater well; see Plate 6 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Holly (14)																								
Brookside (15)																								
Holly (16)																								
Holly (18)																								

[1]Wells discharge directly into the distribution system. [2]Hour of the day: 0 is midnight; 12 is noon, respectively.

Table D-7. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1971

[February is minimum-demand month for 1971; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 12 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
Anchorage [3]																								
Silver Bay [3]																								
Pump ID	High-Service and Booser Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								

[1]Wells discharge directly into the disstribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay do not have well numbers designated by water utility.
[4]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 16, 18, and 19.

Table D-8. Water-distribution system operating schedule, Dover Township area, New Jersey, July 1971

[July is maxmim-demand month for 1971; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 12 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
Anchorage [3]																								
Silver Bay [3]																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								
Parkway pump 1 [5]																								
Parkway pump 2 [5]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay wells do not have numbers designated by water utility.
[4]Holly pump 1 and Holly pump 2 supplied by Holly ground-level storage tanks and Holly wells 14, 16, 18, 19, and 21.
[5]Parkway pump 1 and Parkway pump 2, supplied by Parkway ground-water level storage tank and Parkway wells 22, 23, 26, and 27.

Table D-9. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1971

[October is average-demand month for 1971; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 12 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
Anchorage [3]																								
Silver Bay [3]																								
Pump ID	High Service and Booster Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								
Parkway pump 1 [5]																								
Parkway pump 2 [5]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay do not have well numbers designated by water utility.
[4]Holly pump 1 and Holly pump 2 supplied by Holly ground-level storage tanks and Holly wells 16, 18, and 19. .
[5]Parkway pump 1 and Parkway pump 2 not used in October because Parkway ground-level storage tank and Parkway wells 22, 23, 26, and 27 out of service

Table D-10. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1978

[February is minimum-demand month for 1978; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 19 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
[3]																								
[3]																								
Pump ID	High-Service and Booser Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								
Parkway pump 1 [5]																								
Parkway pump 2 [5]																								
Holiday City pump [6]																								
St. Catherine's [7]																								

[1]Wells discharge directly into water-distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay do not have well numbers designated by water utility.
[4]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 16 and 18.
[5]Parkway pump 1 and Parkway pump 2 supplied by Parkway storage tank and Parkway wells 22, 24,26, 28, and 29.
[6]Holiday City pump operated between 0730 and 1230 hours in February.
[7]Also known as Route 37.

Table D-11. Water-distribution system operating schedule, Dover Township area, New Jersey, June 1978

[June is maximum-demand month for 1978; hour of day in color means well or pump operating; Groundwater well, High-Service or Booster pump; see Plate 19 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
Anchorage [3]																								
Silver Bay [3]																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								
Parkway pump 1 [5]																								
Parkway pump 2 [5]																								
Holiday City pump [6]																								
St. Catherine's [7, 8]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay wells do not have numbers designated by water utility.
[4]Holly pump 1 and Holly pump 2 supplied by Holly ground-level storage tanks and Holly wells 16, 18, 19 and 21.
[5]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and wells 22–29.
[6]Holiday City pump operated between 0630 to 1130 hours and 1630 to 2030 hours.
[7]Also known as Route 37.
[8]St. Catherine's operated between 0900 to 1230 hours and 1730 to 2115.

Table D-12. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1978

[October is average-demand month for 1978; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 19 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
South Toms River (17)																								
Indian Head (20)																								
Anchorage [3]																								
Silver Bay [3]																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [4]																								
Holly pump 2 [4]																								
Holly pump 3 [4]																								
Parkway pump 1 [5]																								
Parkway pump 2 [5]																								
Holiday City pump [6]																								
St. Catherine's [7]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Anchorage and Silver Bay wells do not have numbers designated by water utility.
[4]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 16, 18, and 19. .
[5]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and wells 24, 26, 28, and 29.
[6]Holly City pump operated between 0730 to 1230 hours.
[7] Also known as Route 37.

Table D-13. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1988

[February is the minimum-demand month in 1988; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 29 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	High-Service and Booser Pumps																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump [5]																								
St. Catherine's [6]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [7]																								
Windsor pump 2 [7]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly well 30 (Holly well 21 out of service).
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22 and 24 (Parkway wells 23 and 29 out of service).
[5]Holiday City pump operated 0645 to 1230 hours and 1630 to 2030 hours.
[6]Also known as Route 37.
[7]Windsor pump 1 and Windsor pump 2 supplied by Windsor ground-level storage tank.

Table D-14. Water-distribution system operating schedule, Dover Township area, New Jersey, July 1988

[July is the maximum-demand month for 1988; hour of day in color means wel or pumpl operating; Groundwater well; High-Service or Booster pump; see Plate 29 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump[5]																								
St. Catherine's [6, 7]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1[8]																								
Windsor pump 2 [8]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 21 and 30.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 23, 24, 26, 28, and 29.
[5]Holiday City pump operated 0630 to 1130 hours and 1630 to 2030 hours.
[6]Also known as Route 37.
[7]St. Catherine's pump operated 0930 to 1445 hours
[8]Windsor pump 1 and Windsor pump 2 supplied by Windsor ground-level storage tank; Windsor pump 1 operated 0830 to 1400 hours.

Table D-15. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1988

[October is the average-demand month in 1988; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 29 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	**High-Service and Booster Pumps**																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump[5]																								
St. Catherine's [6]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [7]																								
Windsor pump 2 [7]																								

[1]Wells discharge directly into water-distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1 supplied by Holly ground-level storage tanks and Holly well 30.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22–24 and 26
[5]Holly City pump operated 0645 and 1230 hours.
[6]Also known as Route 37.
[7]Windsor pump 1 and Windsor pump 2 supplied by Windsor ground-level storage tank.

Table D-16. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1995

[February is minimum-demand month of 1995; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 36 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
South Toms River (38)																								
Pump ID	**High-Service and Booser Pumps**																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution sysstem; Berkeley well 35 out of service.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 21, 30, and 37.
[4]Parkway pump 1 and Parkway 2 pump supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1, Windsor pump 2, and Windsor pump 3 supplied by Windsor ground-level storage tank and Windsor well 40.

Table D-17. Water-distribution system operating schedule, Dover Township area, New Jersey, August 1995

[August is the maximum-demand month in 1995; hour of day in color means wel or pumpl operating; Groundwater well; High-Service or Booster pump; see Plate 36 for well locations; Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution system; Indian Head well 20 out of service.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly well 30; Holly well 37 out of service.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1 Windsor pump 2, and Windsor pump 3 supplied by Windsor ground-level storage tank and Windsor well 40.

Table D-18. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1995

[October is average-demand month in 1995; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 38 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution system; Indian Head well 20 out of service.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly well 30.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1, Windsor pump 2, and Windsor pump 3 not operated because Windsor ground-level storage tank out of service.

Table D-19. Water-distribution system operating schedule, Dover Township area, New Jersey, February 1996

[February is the minimum-demand month for 1996; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster pump; see Plate 37 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
South Toms River (38)																								
Pump ID	**High-Service and Booser Pumps**																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution system; Berkeley well 35 out of service.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly wells 21, 30, and 37.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1, Windsor pump 2, and Windsor pump 3 supplied by Windsor ground-level storage tank and Windsor well 40.

Table D-20. Water-distribution system operating schedule, Dover Township area, New Jersey, June 1996

[June is the maximum-demand month for 1996; hour of day in color means well or pump operating; Groundwater well; High-Service or Booster Pump; see Plate 37 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
	Groundwater Wells																							
Brookside (15)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	High-Service and Booster Pumps																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution system; Indian Head well (20) out of service.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tank and Holly well 30.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1, Windsor pump 2, and Windsor pump 3 supplied by Windsor ground-level storage tank and Windsor well 40.

Table D-21. Water-distribution system operating schedule, Dover Township area, New Jersey, October 1996

[October is the average-demand month for 1996; hour of day in color means well operating; Groundwater well; High-Service or Booster pump; see Plate 37 for well locations; see Appendix C for details on operation]

Well ID[1]	Hour of the Day[2]																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Groundwater Wells																							
Brookside (15)																								
Indian Head (20)																								
Route 70 (31)																								
South Toms River (32)																								
Berkeley (33)																								
Berkeley (34)																								
Berkeley (35)																								
South Toms River (38)																								
Pump ID	**High-Service and Booster Pumps**																							
Holly pump 1 [3]																								
Holly pump 2 [3]																								
Holly pump 3 [3]																								
Parkway pump 1 [4]																								
Parkway pump 2 [4]																								
Holiday City pump																								
St. Catherine's [5]																								
South Toms River pump 1																								
South Toms River pump 2																								
Windsor pump 1 [6]																								
Windsor pump 2 [6]																								
Windsor pump 3 [6]																								

[1]Wells discharge directly into the distribution system.
[2]Hour of the day: 0 is midnight; 12 is noon, respectively.
[3]Holly pump 1, Holly pump 2, and Holly pump 3 supplied by Holly ground-level storage tanks and Holly well 30.
[4]Parkway pump 1 and Parkway pump 2 supplied by Parkway ground-level storage tank and Parkway wells 22, 24, 26, 28, 29, and 42.
[5]Also known as Route 37.
[6]Windsor pump 1, Windsor pump 1, and Windsor pump 3 not operated because Windsor ground-level storage tank out of service.

APPENDIX E

RECONSTRUCTION OF HYDRAULIC MANAGEMENT OF A WATER-DISTRIBUTION SYSTEM USING GENETIC ALGORITHMS

BY M.M. ARAL, J. GUAN, M.L. MASLIA, AND J.B. SAUTNER

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Atlanta, Georgia

October 2001

RECONSTRUCTION OF HYDRAULIC MANAGEMENT OF A WATER-DISTRIBUTION SYSTEM USING GENETIC ALGORITHMS

by M.M. Aral,[1] J. Guan,[2] M.L. Maslia,[3] and J.B. Sautner[4]

ABSTRACT

An epidemiologic study of childhood leukemia and central nervous system cancers that occurred in the period 1979 through 1996 in Dover Township, N.J., is being conducted. The study is exploring a wide variety of possible risk factors; one being the exposure to groundwater contaminants that occurred through private and community water supplies (*i.e.*, the water-distribution system serving the area). For this purpose a model of the complex water-distribution system has been developed and calibrated through an extensive field investigation. The components of this water-distribution system, such as number of pipes, number of tanks, and number of supply wells in the network, have changed significantly over a 35-year period (1962 through 1996)—the time frame established for the epidemiologic investigation. For the completion of the study, information on monthly distribution of water in the networks, based on a management strategy, is necessary for the period 1962 through 1996. For certain months of the analysis period, some data are available to estimate the operational characteristics and the management strategy employed to operate the water-distribution system. For other months, there are no data to predict the characteristics of this management system. Further complicating the study is that within a given month of any year, the water-distribution system may have operated under peak-, winter-, or average-demand conditions. Manual reconstruction of this management system is time consuming, labor intensive, and costly, given the complexity of the system and the time constraints imposed on the study. In an effort to reduce the required computational time, the problem was formulated as an optimization problem. For each month of the investigation, the management strategy was arrived at by obtaining a solution to the optimization problem. Thus, in this study, it is assumed that the water-distribution system was operated in an optimum manner at all times to satisfy the minimum and maximum pressure constraints and tank level constraints in the system. Given these assumptions, we have used Genetic Algorithms along with the EPANET2 water-distribution network solver to solve the optimization problem and to develop the historical management strategy used by the water-distribution system serving the Dover Township area, N.J. This process reduced the required solution time significantly and generated a historically consistent management strategy for the system.

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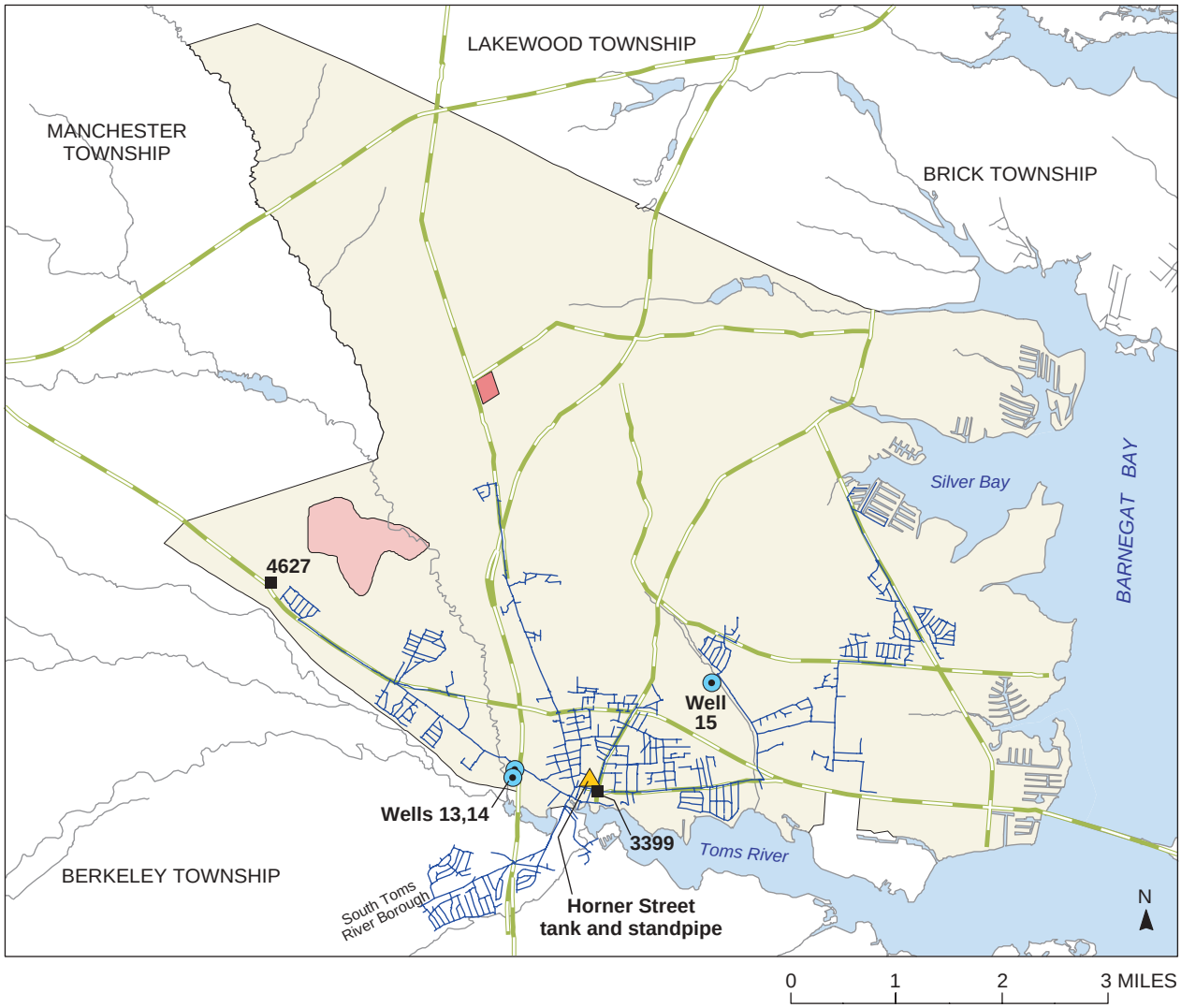
1. INTRODUCTION

An epidemiologic study of childhood leukemia and central nervous system cancers that occurred in the period 1979 through 1996 in Dover Township area of New Jersey is being conducted [Maslia *et al*., 2000a, 2000b]. The study is exploring a wide variety of possible risk and exposure factors. Groundwater is the source of potable water in the area. Approximately 85% of the current Dover Township area residents are served by a public water supply system which relies on groundwater resources. Potential groundwater contamination of water-supply wells in Dover Township has generally consisted of volatile organic compounds (VOCs) such as trichloroethylene (TCE) and semi-volatile organic compounds (SVOCs) such as styrene-acrylonitrile (SAN) trimer [NJDHSS, 1999]. The possibility of human exposure to these contaminants exists through the groundwater pathway which was distributed by the water-distribution system. Thus, an analysis of exposure of the public to contaminants through the water-distribution system is necessary. For this purpose a computational model of the complex water-distribution system has been developed and calibrated through an extensive field investigation by the Agency for Toxic Substance and Disease Registry (ASTDR) [Maslia *et al.*, 2000a, 2000b]. For the completion of the exposure study, information on monthly distribution of water in the network based on a management strategy is necessary for the period 1962 through 1996. The components of this water-distribution system, such as number of pipes, number of tanks, and number of supply wells in the network, have changed significantly over the past 35-year period (Figure E-1 and Figure E-2). For certain months of the study period, some data are available to estimate the characteristics of the management strategy employed to operate the water-distribution system. For other months and years, these data are not available to predict the characteristics of the management system. Manual reconstruction of this management system is time consuming, labor intensive, and costly, given the complexity of the system and the time constraints imposed on the study. In an effort to reduce the time to reconstruct the management strategy, the problem was formulated as an optimization problem by defining the goal of the management system as the objective function. The goal of the management system is to satisfy the minimum and maximum pressure constraints for each junction and water level constraint for each tank in the system. For each month of the investigation period, the management strategy was arrived at by obtaining an optimal solution to the problem formulated. A Progressive Optimality Genetic Algorithm (POGA) is developed to solve the optimization problem, which utilizes the EPANET2 water-distribution network model as a simulator.This approach is employed to reconstruct a historically consistent management strategy for the water-distribution system serving the Dover Township area, New Jersey.

2. Formulation of the Optimization Problem

2.1 Decision Variables and Constraints

A model of the water-distribution system serving Dover Township, N.J., has been developed and calibrated through an extensive field investigation. An EPANET2 input data file has been generated for each month for the period 1962 through 1996 by ATSDR; the data file generates an error-free run for the pipe network system. These EPANET2 input data files are the basis of our reconstruction of the management strategy. The management strategy of the water-distribution system includes the operation of tanks, booster pumps and water-supply wells in the network. In addition to other parameters defined in an EPANET2 input data file, the management strategy of tanks and booster pumps are represented by the “control rules.” The management strategy of the water-supply wells are represented by the “patterns” associated with these wells [Rossman, 2000]. The “control rules” represent the status (close, open, and pumping efficiency) of the booster pumps during the operation of the water-distribution system. A “pattern” in an EPANET2 input data file represents the water demand over time at a junction (node) of the network based on the “base demand” of the junctions [Rossman, 2000]. A “pattern” in an EPANET2 input data file includes one or more “pattern factors.” The number of such “pattern factors” in a “pattern” is generally equal to the number of time intervals in the operation period. In this study, the number of time intervals is always defined to be 24 in a one-day period. For instance, if the “base demand” of a junction is 100 gallons per minute (gpm) and the “pattern factor” of the junction at a time interval t is 0.5, the actual water demand of the junction at the time interval t is ($100 \times 0.5 = 50$) gpm. In an EPANET2 input data file for the Dover Township area water-distribution system, the “pattern” is assumed to be the same for all junctions except the junctions representing water-supply wells, and each water-supply

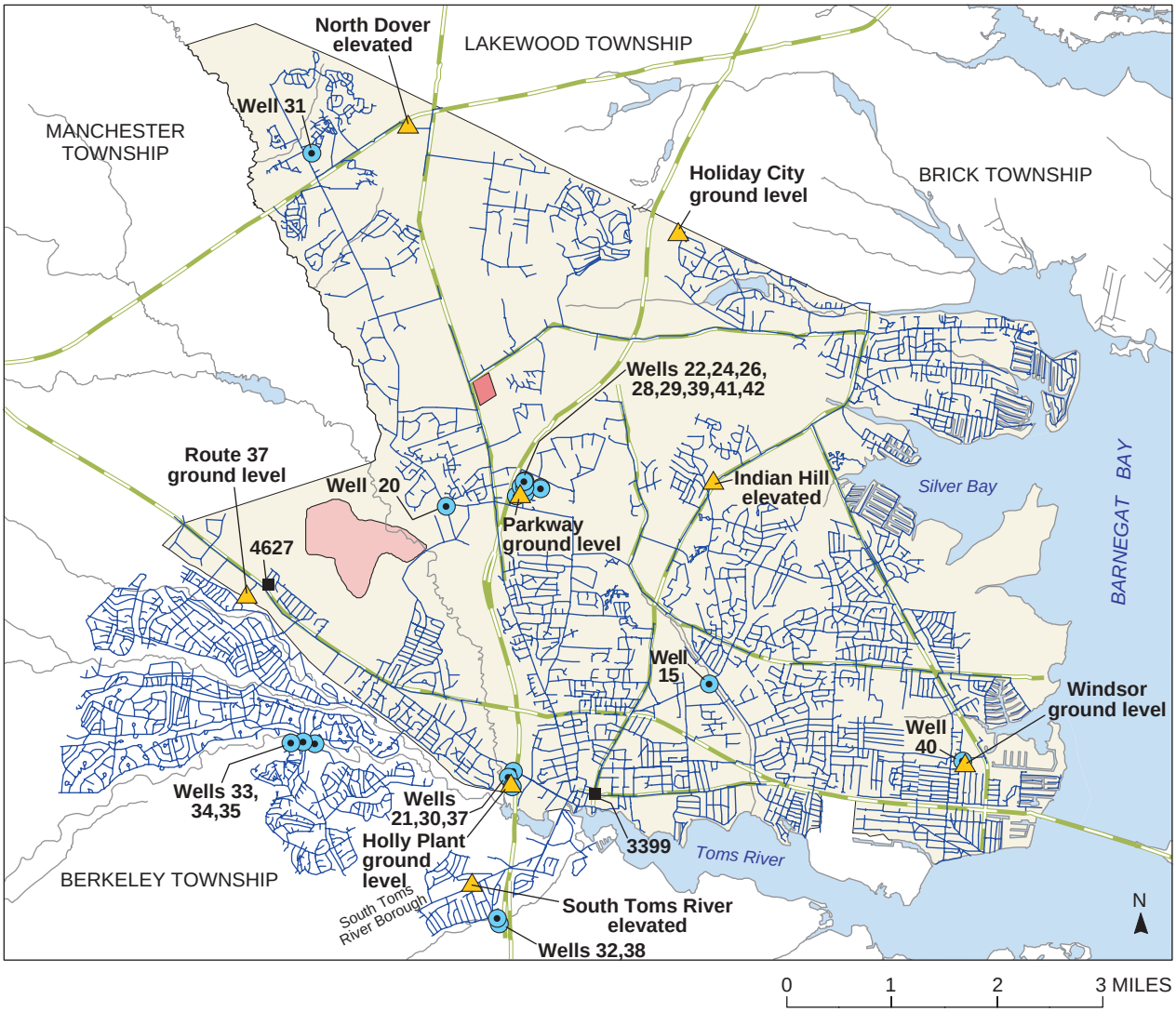


EXPLANATION

Reich Farm NPL Site	Water pipeline	Municipal well
Ciba–Geigy NPL Site	Major road	Storage tank
Dover Township	Hydrography	4627 Junction location and number
Water body		

Notes: (1) Water pipelines range in diameter from 2 inches to 12 inches
(2) Roads, hydrography, and boundaries based on 1995 TIGER/Line data
(3) Pipeline from water-utility database (Flegal 1997)

Figure E-1. Water-distribution system serving the Dover Township area, New Jersey, 1962.



EXPLANATION

- Reich Farm NPL Site
- Ciba–Geigy NPL Site
- Dover Township
- Water body
- Water pipeline
- Major road
- Hydrography
- Municipal well
- Storage tank
- 4627 Junction location and number

Notes: (1) Water pipelines range in diameter from 2 inches to 16 inches
(2) Roads, hydrography, and boundaries based on 1995 TIGER/Line data
(3) Pipeline from water-utility database (Flegal 1997)

Figure E-2. Water-distribution system serving the Dover Township area, New Jersey, 1996.

well has its own pattern. The major task for the reconstruction of the management strategy is to determine these patterns for the water-supply wells to satisfy the minimum and maximum pressure constraints for each junction and water level constraint for each tank in the network.

If there are N water-supply wells in the water-distribution system, we may denote these wells as $n = 1, 2, ..., N$. Each water-supply well has its own supply pattern. The pattern is defined for a 24-hour period of one day. Each pattern consists of 24 "pattern factors" and each "pattern factor" represents the water supplied by the water-supply well during that hour. Therefore, there are 24 "pattern factors" for each water-supply well. We may denote these "pattern factors" as $x_i(t)$ ($i = 1, 2, ..., N$, $t = 1, 2, ..., 24$), where subscript i represents the well number and t represents the time (hour). Because the total water supplied by each water-supply well in the period of one day is known, the following constraints should then be applied to these "pattern factors.

$$\sum_{t=1}^{24} x_i(t) = b_i \qquad i = 1,2,...,N \tag{E-1}$$

where b_i is the sum of the "pattern factors" of the ith well during a one-day period, which is a known constant because the total supply of the well is known for a day.

If the ith water-supply well is not operated at hour t, the "pattern factor" of the well i at hour t is zero, $x_i(t) = 0$. If the ith water-supply well is in operation at the hour t, the "pattern factor" of the ith well at hour t, $x_i(t)$ should be larger than a minimum value and smaller than a maximum value representing the operational range of the water-supply well. These constraints for each "pattern factor" $x_i(t)$ ($i = 1, 2, ..., N$, $t = 1, 2, ..., 24$) can be represented as

$$x_i(t) = 0 \quad or \quad x_{i\min} \le x_i(t) \le x_{imax} \tag{E-2}$$

where x_{imin} is the minimum and x_{imax} is the maximum "pattern factor" of the ith water-supply well. The pattern factors can be written in vector form as

$$X = [\, x_1(1),\ x_1(2),...,x_1(24),...,x_i(1),\ x_i(2),...,x_i(24),...,x_N(1),...,x_N(24)\,]^T \tag{E-3}$$

In this study, we assume the "control rules," which control the operation of the booster pumps are predefined based on the hydraulic characteristics of the equipment, and the variables described above (pattern factors) are the only decision variables for our optimization problem to reconstruct the management strategy of the water-distribution system.

2.2 Objective Function

The goal of the reconstruction of the management strategy is to determine the "pattern factors" for the water-supply wells to satisfy the water pressure requirements at every junction (node) and water level constraints at every tank in the water-distribution system. Suppose there are M junctions in the system, one of the objectives is to satisfy the minimum and maximum pressure constraints as

$$P_{\min} \le P_i(t) \le P_{\max} \quad i = 1,2,...,M, \quad t = 1,2,...,24 \tag{E-4}$$

where P_i (t) is the water pressure at the ith junction at hour t, P_{min} is the minimum pressure required at a junction, and P_{max} is the maximum pressure a junction may bear.

The other objective is to satisfy the water level constraints in tanks. The tank operation rules require that the water level in any tank should always be lower than its highest allowable water level and higher than its lowest allowable water level. If we assume there are T tanks in the system, then, we can define these constraints as

$$L_{jmin} \le L_j(t) \le L_{jmax} \quad j = 1,2,...,T; \quad t = 1,2,...,24 \tag{E-5}$$

where $L_j(t)$ is the water level in the jth tank at hour t and L_{jmin} and L_{jmax} are the lowest and highest allowable water levels of the jth tank.

In addition to the above two objectives, the initial (t = 0) water level in a tank is constrained to be equal to the water level in the tank at the end of the day (t = 24), because continuous simulations over a 24-hour period will be required during subsequent analysis for the epidemiologic study. We can define these constraints as

$$L_j(24) = L_j(0) \quad j = 1,2,...,T \tag{E-6}$$

In Equations (E-4) to (E-6), the variables, $P_i(t)$ and $L_j(t)$ are functions of the decision variables, $x_i(t)$. They can be obtained by solving the hydraulic simulation of the water-distribution system using EPANET2 water-distribution model. Due to the complexity of the network and the EPANET2 water-distribution model, $P_i(t)$ and $L_j(t)$ cannot be represented as explicit functions of the decision variables. Thus, it may not be feasible to enforce the constraints of Equations (E-4) to (E-6) directly in the hydraulic management-reconstruction problem. In order to best satisfy the constraints, we will formulate these constraints into an objective function by imposing a penalty for the violation of the constraints. By minimizing the objective function with the constraints of Equations (E-1) and (E-2), we obtain the "pattern factors" of the water-supply wells in the system with minimized violation of constraints (Equations (E-4) to (E-6)).

If the water pressure of a junction at time t, $P_i(t)$, satisfies Equation (E-4), there is no penalty, *i.e.* the "penalty" is assumed to be 0. If the water pressure at the junction is out of the constraint range, a penalty will be imposed. We may define the "penalty" at the ith junction at time t, $C_i(t)^J$, to be

$$C_i(t)^J = \begin{cases} 0 & P_{\min} \le P_i(t) \le P_{\max} \\ [P_{\min} - P_i(t)]^2 & P_i(t) < P_{\min} \\ [P_i(t) - P_{\max}]^2 & P_i(t) > P_{\max} \end{cases} \tag{E-7}$$

Therefore, the "penalty" for the ith junction for a day can be defined as

(E-8)

Similar to junctions, if the water level in the jth tank at time t, $L_j(t)$ satisfies Equation (E-5), the "penalty" is defined as zero. Otherwise, a penalty is imposed. Thus the "penalty" function for the jth tank at hour t, $C_j(t)^T$, can be defined as,

$$C_j(t)^T = \begin{cases} 0 & L_{jmin} \le L_j(t) \le L_{jmax} \\ a_T\,[L_{jmin} - L_j(t)]^2 & L_j(t) < L_{jmin} \\ a_T\,[L_j(t) - L_{jmax}]^2 & L_j(t) > L_{jmax} \end{cases} \tag{E-9}$$

where a_T is the penalty factor for a tank violating the water level requirement. Similarly the total penalty for the jth tank for a day can be defined as,

$$C_j^T = \sum_{t=1}^{24} C_j(t)^T \qquad j = 1,2,...,T \tag{E-10}$$

If the water level in the jth tank at time t = 24 hour is equal to the water level in the tank at time t = 0, Equation (E-6) is satisfied. Otherwise, a penalty is imposed and the penalty function, C_j^{TI} is defined as,

$$C_j^{TI} = a_{TI}[L_j(24) - L_j(0)]^2 \qquad j = 1,2,...,T \tag{E-11}$$

where a_{TI} is the penalty factor for violating the constraint of Equation (E-6).

The objective function of the optimization problem for hydraulic management reconstruction is defined in terms of the total penalty function for the system, which can be given as,

$$C = \sum_{i=1}^{M} C_i^J + \sum_{j=1}^{T} (C_j^T + C_j^{TI}) \tag{E-12}$$

2.3 EPANET2 Water-Distribution System Model

EPANET2 is a computer program that performs extended period simulation of hydraulic and water quality behavior within pressurized pipe networks [Rossman, 2000]. The EPANET2 has been used to simulate water-distribution systems in numerous field applications in the literature including [Aral 1996, 2001; and Maslia, *et. al*, 2000a, 2000b]. In our reconstruction of the management strategy, the EPANET2 code is being used to model the water-distribution system serving the residents of the Dover Township area. The EPANET2 toolkit will be used to obtain the hydraulic simulation parameters of the water-distribution system. Mathematically, the EPANET2 toolkit works as a function that associates the decision variables (the "pattern factors"), X, with junction pressures, $P_i(t)$ (i = 1,2,...,M; t = 1, 2,...,24) and water levels in tanks $L_j(t)$ (j = 1,2,...,T; t = 1, 2,...,24). For the given values of the decision variables X, the $P_i(t)$ and $L_j(t)$ can be obtained by the EPANET2 toolkit. Thus, we have mathematically

$$\begin{aligned} P_i(t) &= F_{it}^J(\mathrm{X}) \qquad \mathrm{i} = 1,2,...,\mathrm{M},\ \mathrm{t} = 1,2,...,24 \\ L_j(t) &= F_{jt}^T(\mathrm{X}) \qquad \mathrm{j} = 1,2,...,\mathrm{T},\ \mathrm{t} = 1,2,...,24 \end{aligned} \tag{E-13}$$

2.4 Optimization Model

Based on the above discussion, the objective function C of Equation (E-12) is a function of the decision variables, X. Thus, we may write the objective function as

$$C = f(\mathrm{X}) \tag{E-14}$$

The reconstruction of the optimal hydraulic management strategy can now be formulated as

$$\begin{aligned} &Minimize \quad \{ f(X) \} \\ &\sum_{t=1}^{24} x_i(t) = b_i \qquad\qquad i = 1,2,...,N \\ &x_i(t) = 0 \quad or \quad x_{i\min} \le x_i(t) \le x_{imax} \qquad i = 1,2,...,N; \quad t = 1,2,...,24 \end{aligned} \tag{E-15}$$

3. Non-Uniqueness of Optimal Solutions

The analysis presented above will be used to generate the optimal operational strategy for the water-distribution system. During a subsequent study, this operational strategy will be used to evaluate the contaminant transport characteristics of the water-distribution system. The purpose in that study is to evaluate the effect of the operation of the water-distribution system on the contaminant transport conditions that will be generated in the system. So far we have described the operation of the water-distribution system in terms of two patterns. These patterns are generated using the manual trial and error approach and the optimization approach. However, the management strategy obtained from the above described mathematical model may not be unique. Thus, it may be argued that there are other hydraulic management strategies that may also satisfy the recorded constraints, which may not be optimal. In turn, this management strategy may yield different results, when proportiante contribution of water analysis for the system is evaluated. Therefore, based on the model described above, another mathematical model is used to identify another solution which yields a pattern distribution as different as possible from the first solution, while still satisfying the constraints of the problem. Eventually, the purpose is to find out if this new solution would yield a significantly different proportinate contribution of water distribution pattern within the system and, if it does, what would be the difference.

To start this formulation, we begin with the optimal solution obtained from the first model, defined as

$$\mathrm{X}^0 = [\, x_1^0(1),\ x_1^0(2),...,x_1^0(24),...,x_i^0(1),\ x_i^0(2),...,x_i^0(24),\ ...x_N^0(1),...,x_N^0(24)]^{\mathrm{T}} \tag{E-16}$$

and the corresponding optimal objective function value as $f(X^0)$ or f^0. The new solution is still defined as given in Equation (E-3) and the objective function is expressed using Equation (E-14) as $f(X)$ or f. As expected, the new solution has an objective value that is equal to or less than $f(X^0)$. However, we would like to have the new solution pattern for all water-supply wells to be different from X^0 as much as possible. Therefore, this requirement can be quantitatively stated as a new objective function,

$$Maximize \quad \{ F(X) \} = Maximize\ \{\beta \sum_{i=1}^{N} \sum_{t=1}^{24} (x_i(t) - x_i^0(t))^2 - G(X)\} \tag{E-17}$$

where $G(X)$ is the term related to the previous objective value and defined as

$$G(X) = \begin{cases} (f(X) - f(X^0))^2 & f(X) - f(X^0) > \delta \\ 0 & otherwise \end{cases} \tag{E-18}$$

β is a trade-off coefficient, δ is an allowable error. Equation (E-18) reflects the tolerance for a new solution. In order to analyze and compare the solutions obtained from both models, the constraints of the new model must be the same as the ones used in the previous model. Thus, the optimization model for selecting a new solution can be mathematically stated as

$$\begin{aligned} &Maximize \quad \{F(X)\} \\ &\sum_{t=1}^{24} x_i(t) = b_i \qquad i = 1,2,...,N \\ &x_i(t) = 0 \quad or \quad x_{i\min} \le x_i(t) \le x_{imax} \qquad i = 1,2,...,N \quad t = 1,2,...,24 \end{aligned} \tag{E-19}$$

4. Solution Algorithm

The mathematical models given in Equations (E-15) and (E-19) are nonlinear multi-stage multi-dimensional dynamic optimization problems. In general, for the solution of dynamic problems, the Dynamic Programming (DP) method [Bellman, 1957], provides a powerful tool because it has attractive features such as global optimal solution and its unique generality. However, in this problem, the dimension of the optimal problem is defined in terms of the number of the water-supply wells. The number of the water-supply wells in the water-distribution system is very large, thus the "curse of dimensionality" in DP programming methods becomes a serious limitation. Furthermore, the computational time for the evaluation of objective function mainly depends on the scale of water-distribution system and is almost independent of the number of water-supply wells in the system. For a large-scale water-distribution system, the question as to how to reduce the computational time required in the evaluation of the objective function becomes important. This is necessary to improve the optimization algorithm performance. It should also be noted that the objective function is a non-continuous and non-separate implicit function of the decision variables. Thus, the nonlinear gradient-based search algorithms cannot be applied to this problem efficiently. In recent years, a new breed of heuristic combinatorial search techniques—genetic algorithms (GAs)—have aroused the interest of scientists in searching optimal solutions to complicated optimization problems. Genetic algorithms are established through the combination of artificial survival of the fittest concept with genetic operations abstracted from nature [Holland, 1975]. The most important feature of genetic algorithms is that they use the objective function itself, instead of derivative information on the objective function and constraints, to search the optimal solution. It is well known that genetic algorithms have proved to be very efficient in solving problems with bounds. For the problems with equality and inequality constraints, additional transformations should be done [Guan and Aral, 1999a, 1999b]. Considering the complex nature of both optimization problems and the features of genetic algorithms, a new approach, that embeds genetic algorithm (GA) in progressive optimality algorithm (POA) is developed. The resulting algorithm is identified as Progressive Optimality Genetic Algorithm (POGA) and is proposed as the method to solve the problems described above. Considering that the difference between both models is only in the definition of the objective functions, and has no effect on the optimization algorithms used, the model described by Equation (E-15) is chosen as an example to illustrate the principles and processes included in POGA.

4.1 Progressive Optimality Genetic Algorithm (POGA)

Progressive optimality algorithm is based on "principle of optimality" [Bellman, 1957]. Its basic idea of searching optimal solution is straightforward. In this approach, the optimization process is divided into two steps: decomposition and iteration. In the decomposition step, POGA decomposes a multi-stage multi-dimensional dynamic problem into a series of two-stage multi-variable static problems, which can be solved by static optimization methods such as the linear and nonlinear programming and genetic algorithms. In the iteration step, POGA applies the iteration mechanics to obtain a converged solution. For simplicity and without loss of generality, an example with one water-supply well with index "*i*" is chosen to illustrate the computational procedures of the POGA.

Step 1. A feasible solution is assumed as initial solution and is denoted as $[x_i(1)^{(k)}, x_i(2)^{(k)}, \ldots, x_i(24)^{(k)}]^T$, where superscript k indicates index of iterations, where initially $k = 0$.

Step 2. Under the condition of fixed $x_i(\tau)^{(k)}$, $\forall\tau$ except $x_i(t)^{(k)}$ and $x_i(t+1)^{(k)}$, one adjusts $x_i(t)^{(k)}$ and $x_i(t+1)^{(k)}$ to minimize the objective function. The resultant new solution is $[x_i(1)^{(k)}, x_i(2)^{(k)}, \ldots, x_i(t)^{(k+1)}, x_i(t+1)^{(k+1)}, \ldots, x_i(24)^{(k)}]^T$.

Step 3. For t = 1 to 23, one repeats step 2 and obtains a new solution denoted as $[x_i(1)^{(k+1)}, x_i(2)^{(k+1)}, \ldots, x_i(24)^{(k+1)}]^T$.

Step 4. Compare two consecutive solutions $[x_i(1)^{(k)}, xi(2)^{(k)}, \ldots, x_i(24)^{(k)}]^T$, and $[x_i(1)^{(k+1)}, x_i(2)^{(k+1)}, \ldots, x_i(24)^{(k+1)}]^T$. If the difference between these two solutions is smaller than a pre-specified accuracy limit, the computation process terminates. Otherwise, one selects $[x_i(1)^{(k+1)}, x_i(2)^{(k+1)}, \ldots, x_i(24)^{(k+1)}]^T$ as the new initial solution, *i.e.*, $k = k + 1$ and continues with steps 2 through 4 until convergence is achieved.

As demonstrated in the application of this algorithm, the objective function values in the iteration process are monotonically decreasing, and the minimum objective function value in this problem is zero if all constraints are satisfied. This indicates that the iteration process is convergent.

4.2 Optimization Algorithm in Two-Stage Problems

In two-stage optimization problems, genetic algorithm is applied to search for the optimal solution. Assuming that the two stages are t and t+1, $X(t)$ and $X(t+1)$ are two vectors denoted as $X(t) = [x_1(t), x_2(t), \ldots, x_N(t)]^T$, and $X(t+1) = [x_1(t+1), x_2(t+1), \ldots, x_N(t+1)]^T$, then the original optimization problem can be restated as

$$\begin{gathered}
Minimize\ \{C = f(X(t),\ X(t+1); X(\tau), \tau \neq t, t+1)\} \\
x_i(t) = b_i - x_i(t+1) - \sum_{\substack{\tau=1 \\ \tau \neq t,\, t+1}}^{24} x_i(\tau) \\
x_{i\,\min}(t) \leq x_i(t) \leq x_{i\,\max}(t) \\
x_{i\,\min}(t+1) \leq x_i(t+1) \leq x_{i\,\max}(t+1) \\
i = 1,\ 2,\ \ldots,\ N
\end{gathered} \tag{E-20}$$

where $x_i(\tau)$, τ = 1, 2, …, 24, but $\tau \neq t$ and t+1, are constants evaluated by previous iteration or initial solution.The model can be further simplified as

$$\begin{gathered}
Minimize\ \{C = f(X(t),\ X(t+1))\} \\
x_i(t) = d_i - x_i(t+1) \\
x_{i\,\min}(t) \leq x_i(t) \leq x_{i\,\max}(t) \\
x_{i\,\min}(t+1) \leq x_i(t+1) \leq x_{i\,\max}(t+1) \\
i = 1,\ 2,\ \ldots,\ N
\end{gathered} \tag{E-21}$$

where

$$d_i = b_i - \sum_{\substack{\tau=1 \\ \tau \neq t, t+1}}^{24} x_i(\tau) \tag{E-22}$$

Through this approach, the original problem becomes a static optimization problem with $2 \times N$ variables. Because of the equality constraints, the number of independent variables is N. Without loss of generality, $x_i(t+1)$ $\forall$i are taken as the independent variables, and $x_i(t)$ $\forall$i as the dependent variables, which can be directly calculated using the equality constraints. In the application of GA, the random selection of $x_i(t+1)$ must yield $x_i(t)$ variables that satisfy the bounds of this variable. To achieve this condition, the constraint for $x_i(t+1)$ can be given as,

$$d_i - x_{i\max}(t) \leq x_i(t+1) \leq d_i - x_{i\min}(t) \tag{E-23}$$

At the same time, $x_i(t+1)$ must also satisfy $x_{i\ min}(t+1) \leq x_i(t+1) \leq x_{i\ max}(t+1)$. Synthetically considering these two constraints, a new constraint can be obtained as,

$$x_{i\,low}(t+1) \leq x_i(t+1) \leq x_{i\,up}(t+1) \tag{E-24}$$

where

$$\begin{aligned} x_{i\,low}(t+1) &= \max\{d_i - x_{i\max}(t),\ x_{i\min}(t+1)\} \\ x_{i\,up}(t+1) &= \min\{d_i - x_{i\min}(t),\ x_{i\max}(t+1)\} \end{aligned} \tag{E-25}$$

Therefore, the two-stage problem can be simplified as,

$$\begin{gathered} Minimize\ \ \{C = f(X(t),\ X(t+1))\} \\ x_{i\,low}(t+1) \leq x_i(t+1) \leq x_{i\,up}(t+1) \\ x_i(t) = d_i - x_i(t+1) \\ i = 1,\ 2,\ ...,\ N \end{gathered} \tag{E-26}$$

This is a bounded optimization problem, which can be solved by genetic algorithms efficiently [Guan and Aral, 1999a, 1999b]. The application of GA is straightforward for the optimal solution of this problem. GA starts with an initial population of members generated randomly. Three operators, identified as “selection,” “crossover,” and “mutation,” abstracted from biologically evolutionary process, are applied to this population in improving the objective function value to form the new generation, in which the members have a higher “quality.” Each member in the population corresponds to a solution in the solution space. Member’s quality is represented by its fitness associated with the objective function value. The principle of “survival of the fittest” is taken as a rule in the search process. Members of the population are improved from generation to generation until an optimum condition is satisfied [Goldberg, 1989]. These procedures of the genetic algorithm used in the solution of this problem are described below for completeness.

Division of Variables: variables $x_i(t)$ and $x_i(t+1)$ $\forall i$ are divided into two parts, *i.e.*, the independent and dependent variables. In this formulation $x_i(t+1)$ $\forall$i are defined as the independent variables, x_i (t) $\forall$i are defined as the dependent variables.

Coding the problem: in GAs, the independent variables are encoded as binary strings. The bits of the encoded variables are combined to simulate the biological chromosomes of a natural environment. If a *k*-bit binary variable is used to represent one variable $x_i(t+1)$, the integers of the binary variable would ranges from 0 to (2^k-1). This range can be mapped linearly into the solution space $[x_{i\ low}(t+1), x_{i\ up}(t+1)]$ and the variable range will be discretized into 2^k points. The discrete interval can now be given as

$$\Delta x_i(t+1) = \frac{x_{i\ up}(t+1) - x_{i\ low}(t+1)}{2^k - 1} \tag{E-27}$$

If the integer of binary variable is "m," then the corresponding variable $x_i(t+1)$ value can be given by

$$x_i(t+1) = x_{i\ low}(t+1) + m\Delta x_i(t+1) \tag{E-28}$$

If $x_i(t+1)$ is less than the minimum load constraint of water-supply wells, then let $x_i(t+1) = 0$.

Forming the initial population: to start the solution, an initial population with *m* members is created. For the independent variables $x_i(t+1)$ $\forall i$, integer values are generated randomly in the interval $[0, 2^k-1]$ with uniform distribution. These integer values are then mapped into real area of $x_i(t+1)$ using Equation (E-27) given above. The dependent variables $x_i(t)$ are calculated using the equality constraint, together with $x_i(t+1)$, forming the initial population. In order to guarantee the objective function to be monotonic, the initial population should include the last solution.

Evaluation of members in the population and choosing parents: the "quality" of the members of a population is measured by their fitness values. The fitness of a member is a nonnegative function, which is determined by the objective function value. In this problem, objective function is minimized. The fitness of each member can be defined by

$$F_j = f_{\max}(X(t),\ X(t+1)) - f_j(X(t),\ X(t+1)) \tag{E-29}$$

where *j* indicates the index of the members in the population. Relative fitness or probability of selection (ps_j) is defined by

$$ps_j = \frac{F_j}{\sum_{l=1}^{m} F_l} \tag{E-30}$$

The probability of selection value may then be used to select strings from the current population to form a mating pool. The larger the fitness, the larger the probability that the corresponding member is selected as parents. Thus, members with higher relative fitness values are more likely to be selected for mating. The roulette wheel selection may be taken as a method for choosing members of the mating pool.

Forming a new population: The next population is formed by using the three standard operations of GAs. These include direct selection, crossover and adaptive mutation processes.

Direct Selection Operation: Members with the highest fitness enter directly to the next population at some proportion. These members may also be selected as parents for the mating pool. Thus, using this selection, the best members are protected, and at the same time this selection assures the monotonic increase of the objective function values of the best member during each generation.

Crossover Operation: Crossover is a principle genetic operation. It is the splicing of two parent members from mating pool, at a randomly chosen point, to create two children strings each made up of "genetic material" from both parents.The crossover operation can be easily realized by computer bit operations.

Adaptive Mutation Operation: Mutation operation randomly changes bits within newly created strings. In this operation zero/one bits are changed to one/zero bits respectively in a random manner based on a mutation probability value. Mutation maintains variability in the population, and reduces the chance that the population will prematurely converge on one possible sub-optimal solution. For standard GAs, the probability of any member in the population to be selected to undergo mutation is the same, that is,

$$p_i = \frac{1}{m} \; ; \quad i = 1, 2, ..., m \tag{E-31}$$

This process may also be improved if a member with smaller fitness value has a larger probability of mutation than one with a larger fitness value. Therefore, the following steps are used to determine the probability of mutation in GA; (i) sort the members of the population according to their fitness value from the smallest to the largest; and (ii) assign the largest probability value to first member by,

$$p_i = \frac{c}{m} \; ; \quad c > 1 \tag{E-32}$$

and the smallest probability value to final member in the list by,

$$p_m = p_{\min} = \frac{2-c}{m} \tag{E-33}$$

The probability values for other members of the population are linearly interpolated as,

$$p_j = p_1 + \frac{p_m - p_1}{m-1}(j-1) = \frac{c}{m} + \frac{2(1-c)}{m(m-1)}(j-1) \tag{E-34}$$

In these equations the condition given below will be observed,

$$\sum_{j=1}^{m} p_j = 1; \quad p_j \geq 0 \tag{E-35}$$

Because the interval for c is $1 \leq c \leq 2$, then selecting $c = 1$ implies $p_j = 1/m$, which is the standard genetic algorithm rule. Selecting $c = 2$ yields

$$p_1 = \frac{2}{m}; \quad p_m = 0; \quad p_j = \frac{2(m-j)}{m(m-1)} \tag{E-36}$$

If this equation is used to assign the probabilities for the selection of members that will undergo mutation, then it is assured that the member with the lowest fitness has the highest probability of mutation, and the member with the highest fitness has a zero probability of mutation. This implies that the worst members are more likely to be selected for mutation and the best members do not undergo mutation. This adaptive mutation process helps to protect best members from mutation and improves worst members through mutation.

The three operations are applied to the current population to form next population of $x_i(t+1)$. For each member in next population, $x_i(t)$ can be computed by the equality constraint, forming a new generation with higher quality, together with $x_i(t+1)$. $x_i(t)$ and $x_i(t+1)$, together with $x_i(\tau), \tau = 1, 2, \ldots, 24$, but $\tau \neq t$ and $t+1$ determine the fitness of each member in next generation.

The steps described above are repeated from generation to generation for a specified number of generations or until some stopping criterion, such as convergence of the population to a single solution is achieved.These procedures yield a very effective solution strategy for optimization problems, where the solution domain is bounded. The flowchart of the procedure for progressive optimality genetic algorithm is shown in Figure E-3.

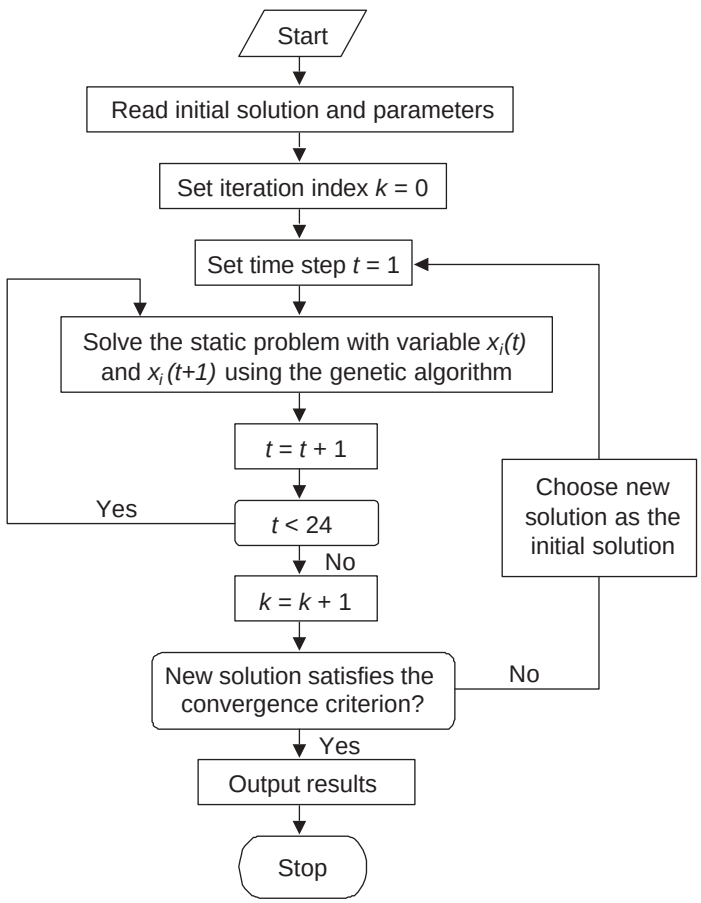


Figure E-3. Flowchart of progressive optimality genetic algorithm.

5. Integrated System of POGA and EPANET2

The POGA has been employed as an effective optimization algorithm to reconstruct hydraulic management strategy in a water-distribution system and to select new patterns based on the optimized solution for analyzing the effect of non-uniqueness of solutions. In POGA, the pressure distribution on the node network and the operation processes of tanks are calculated using the functions in EPANET2 dynamic link library. EPANET2 software is a powerful tool for performing extended period simulation of hydraulic and water quality behavior within pressurized pipe networks. EPANET2 is taken as a simulator, which can be either operated independently or embedded in POGA software for analyzing the effect of optimized results on hydraulic and water quality behavior. The manually constructed historical datasets are the starting point of the optimization process. The optimized datasets provide a consistent management strategy for reconstruction of the hydraulic management of the water-distribution system. The optimized results are used as the input to reconstruct the historical contaminant distribution pattern in the water-distribution system. The components of POGA are integrated to form an integral decision support system. The system architecture is shown in Figure E-4.

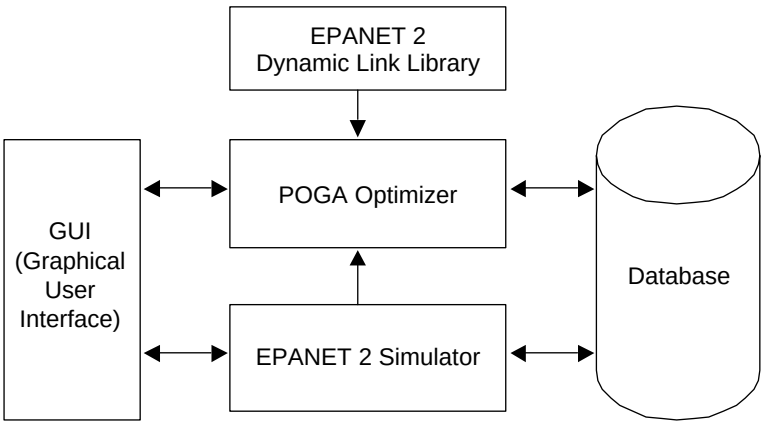


Figure E-4. The integrated system architecture for the Progressive Optimality Genetic Algorithm (POGA).

6. Numerical Results

To demonstrate the models and algorithms described above, the integrated system of POGA and EPANET2 is applied to the water-distribution system serving the Dover Township area to reconstruct its hydraulic management strategy. The study period spans from 1962 through 1996. The components of the water-distribution system have been significantly changed during this period. For example, the water-distribution system contained only one water storage tank and three water-supply wells in 1962, as shown in Figure E-1, and became a very complex system with 9 water storage tanks and 20 water-supply wells in 1996, as shown in Figure E-2. Through extensive field investigation, an initial EPANET2 input file has been generated for each month of every year by ATSDR. A corresponding text file is also generated for each month to include the specific constraint information for the water-supply wells and tanks in the water-distribution system for the particular period. After the POGA and EPANET2 are applied to the monthly data, both an optimized EPANET2 input data file and a text file including input parameters and information on iteration process are generated for the purpose of further analysis. The optimized EPANET2 input data files represent the optimized hydraulic management strategy for each month. The optimized hydraulic management strategy generally results in much smaller water pressure violation at the network junctions in Equation (E-7) as well as water level violation in tanks in Equations (E-9) and (E-11) than the initial management strategy presented in the initial EPANET2 input data files. Both the calculation of optimal pattern and the selection of new patterns are addressed in this section.

Parameter Setting: The integrated system requires two categories of parameters—water-distribution system parameters and POGA parameters. According to the pressure requirements for the Dover Township water-distribution system, the minimum pressure limit, P_{min}, is selected as 15 pounds per square inch (psi), and the maximum pressure limitation, $P_{max,}$ is selected as 110 psi. The penalty coefficient for water-level violation in a tank in Equation (E-9), a_T, is selected to be 1.0 and the penalty coefficient for the initial water level violation in a tank in Equation (E-11), a_{TI}, is selected to be 5000. The selection of these penalty coefficients may affect the optimization results because the objective function is dependent on these coefficients. The larger the penalty coefficients a_T and a_{TI} are, the more the water-level violation in the tanks weighs in the objective function. Other GA parameters used in POGA are listed in Table E-1.

Table E-1. Parameters used in Progressive Optimality Genetic Algorithm (POGA)

Parameter	Value
Population size	5
String length for each variable	10
Maximum generation	2
Crossover ratio	0.9
Direct selection ratio	0.1
Mutation ratio	0.1
Beta (β)	100
Delta (δ)	0

Calculation of Optimal Patterns: The optimal patterns are calculated using two data sets. The first data set represents the water-distribution system serving the Dover Township in May 1962, which contained 2,272 junctions, 2,403 pipe links, one water storage tank and 3 water-supply wells as shown in Figure E-1. Optimization calculation takes four iterations. The initial and optimal operation patterns of water-supply wells are shown in Figure E-5. The optimal patterns are obtained through slight adjustment based on the initial patterns using POGA. However, junction pressure violation cost is largely reduced. The relationship between objective function, time step and iterations are shown in Figure E-6. In this case, tank violation cost is very small, junction violation cost is 3436.8 initially. The first iteration reduces junction violation cost from 3436.8 to 470.25. Consecutively these values are reduced to 61.19, 8.91, and finally to 0.21. The objective function is convergent and also monotonically reduces throughout the computation. The results imply that the water pressure of each junction in the system would stay in the allowed water pressure range (15 psi to 110 psi) if the optimized hydraulic management strategy were employed in the system operation. The water pressure as function of time in a one-day period for the junction #3399 and junction #4627 clearly shows that the optimized data set is much better than the initial data set in terms of water pressure violation as shown in Figures E-7 and E-8. Using the initial patterns, the water pressure at junction # 3399 is lower than the lower pressure limit (15 psi) from 8:00 AM to 12:00 PM and from 10:00 PM to 12:00 AM. However, using the optimal patterns, the water pressure at that junction is always higher than the lower pressure limit (15 psi). Similarly, the water pressure at junction # 4627 is lower than 15 psi from 6:00 AM to 14 PM using the initial patterns, while the water pressure is higher than 15 psi all the time using the optimal patterns. For both the initial and the optimal patterns, the water level in tank 33934-HORTA stays within its lower level and upper level limits at all times, and the water level in the tank at the beginning of the day equals to that at the end of the day for this case as shown in Figure E-9. However, the tank operates on a higher water head using the optimal patterns than using the initial patterns, increasing the efficiency of the tank.

The second data set represents the water-distribution system serving the Dover Township area in October 1996. This network shows significant development and now contains 14,965 junctions, 16,048 pipe links, 8 water-storage tanks and 20 water-supply wells (Figure E-2). Optimization calculation also takes four iterations. The initial and optimal operation patterns of three of the water-supply wells are shown in Figure E-10. Because there is a large decision space in this case, the optimal patterns have significantly changed when compared with the initial patterns. In this case, junction violation, tank violation costs and objective value are initially 42,728.6, 1585.72 and 44314.3,

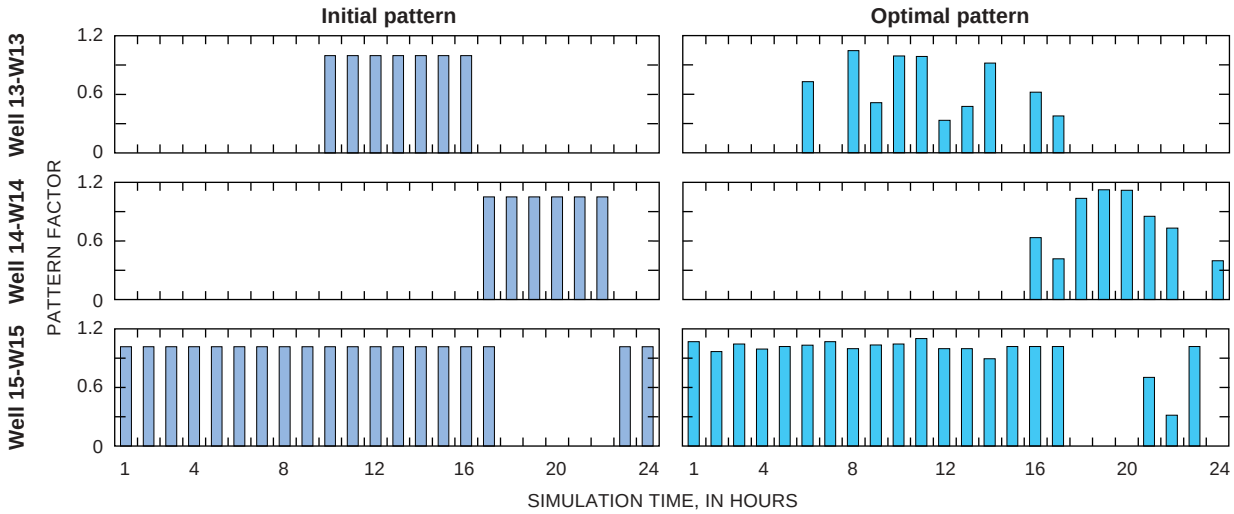


Figure E-5. Initial and optimal operation patterns of water-supply wells, May 1962. (See Figure E-1 for well llocations.)

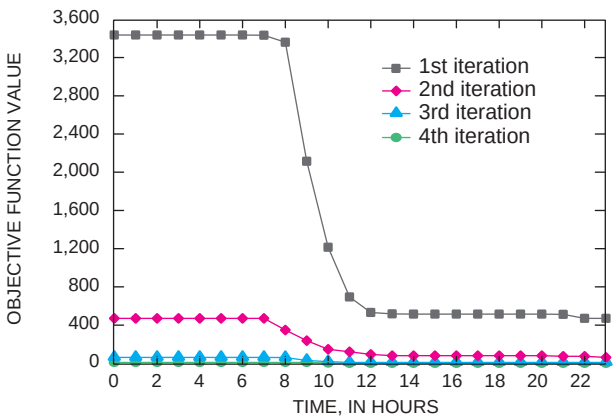


Figure E-6. Convergence of objective function as function of iteration number and time step, May 1962.

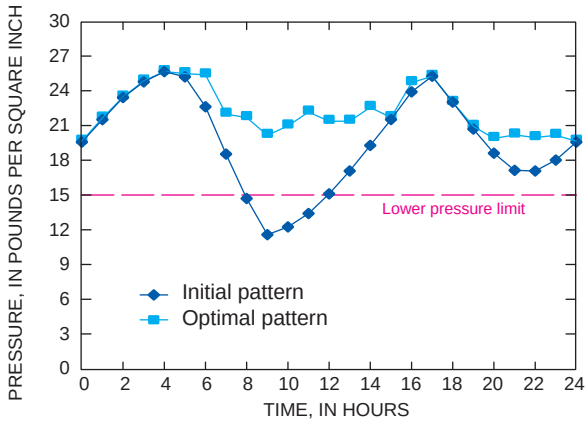


Figure E-7. Water pressure at Junction #3399 using two different patterns, May 1962. (See figure E-1 for location.)

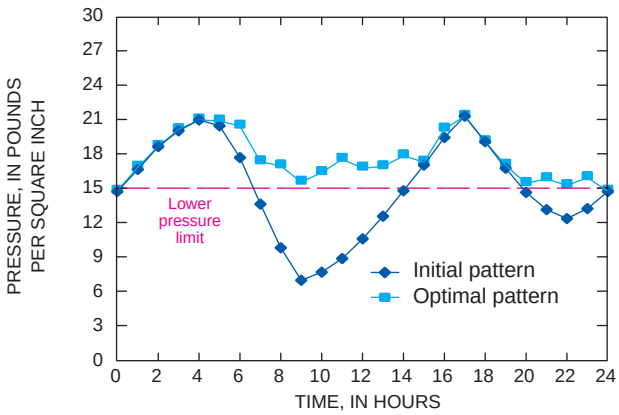


Figure E-8. Water pressure at Junction #4627 using two different patterns, May 1962. (See figure E-1 for location.)

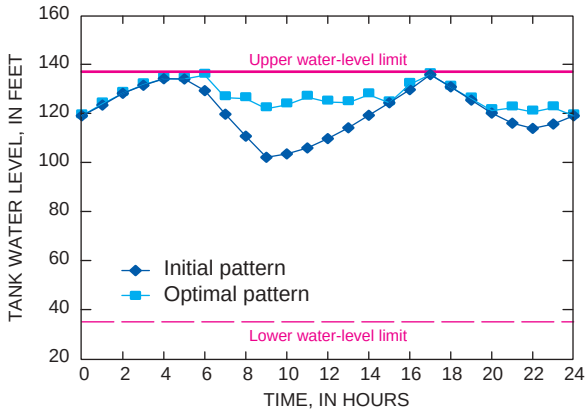


Figure E-9. Water level at Horton Street tank and standpipe using two different patterns, May 1962. (See figure E-1 for location.)

respectively. Through optimization calculation of four iterations, they are reduced to 2910.2, 0.98 and 2911.2 respectively. Figures E-11(a), E-11(b) and E-11(c) show the convergence of the objective function, junction violation cost and tank violation cost as a function of time step and iterations. Although the tank-violation cost has some fluctuation during the iteration, the objective function is monotonically reduced. In this case the water pressure violations in many junctions are very large when the initial patterns are used. The water-pressure violations are significantly improved although the violation still exists in some junctions using the optimal patterns, as shown in Figures E-12, and E-13. These violation junctions are at the suction sides of the pumps and not at demand nodes, and are expected to occur. The water pressure at junction #55024 is much higher than the upper pressure limit (110 psi) from 0800 to 1000 hours and at a maximum reaches 240 psi using the initial patterns. This situation should be prohibited in real operation of the water system distribution. In contrast, the water pressure at the junction stays within the lower pressure limit and upper pressure limits at all times using the optimal patterns (Figure E-12). Similar observation can be seen from Figure E-13 for the junction #55022. The water level in the tank is within its lower level and upper level limits at all times for both the initial and the optimal patterns, which is enforced by the EPANET2 water-distribution system model as shown in Figures E-14 and E-15. However, the initial water level in a tank at the beginning of the day may not be equal to the water level at the end of the day. The water levels in tank 33564-IHTA at the beginning and the end of the day are 196 ft and 195.92 ft, respectively, resulting in a difference of 0.08 ft using the initial patterns, and the difference reduces to 0.01 ft using the optimal pattern (Figure E-15). For tank 33566-NDTA, the difference reduces from 0.48 ft (203–202.52) in the initial patterns to 0.01 ft (203–202.99) in the optimal patterns (Figure E-14). In the reconstruction simulation, the optimal patterns selected will be continuously operated for 1200 hrs. Even though the difference in water levels in a tank between the beginning and end of the day is small, the long term simulations may result in a large difference in the water level in the tank between the beginning and the end of the simulation period. This may affect the flexibility of the patterns, and create negative pressures at junctions and cause water delivery problems. This is the reason why the penalty coefficient for this term is selected to be large compared with other terms in the objective function.

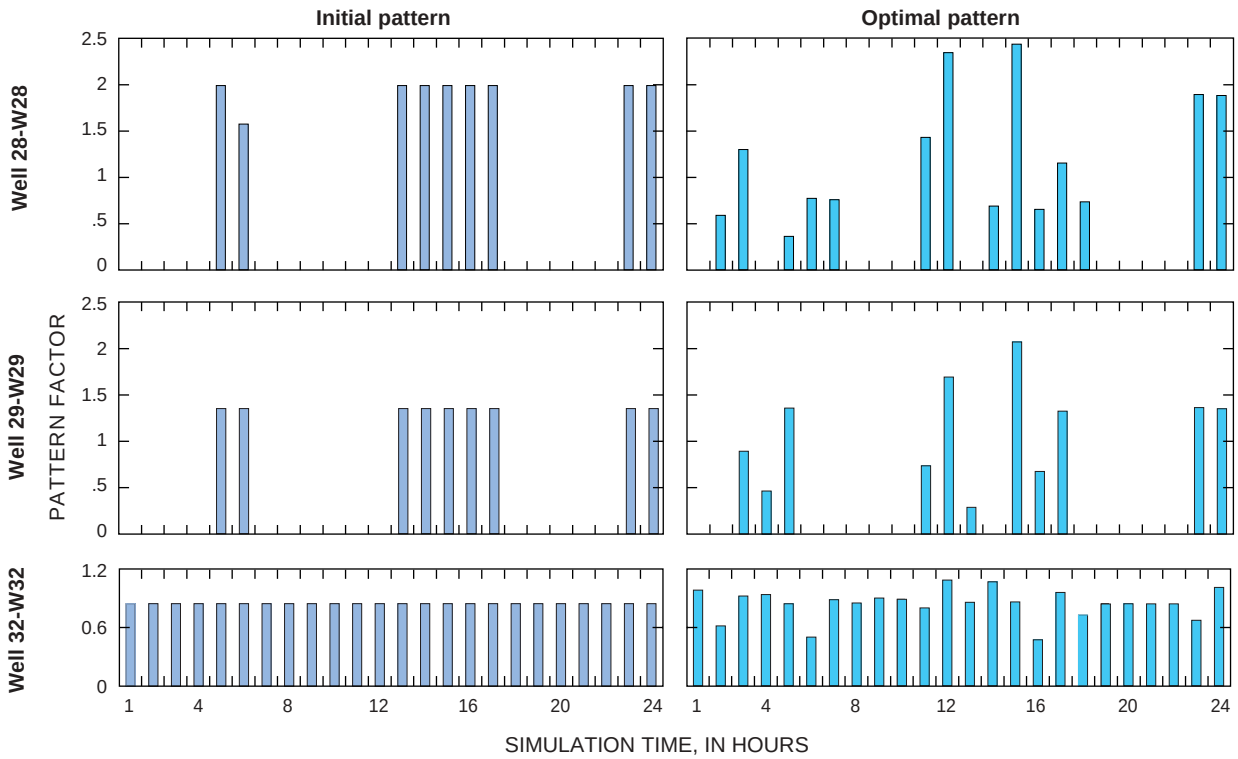


Figure E-10. Initial and optimal operation patterns of water-supply wells, October 1996. (See Figure E-2 for well locations.)

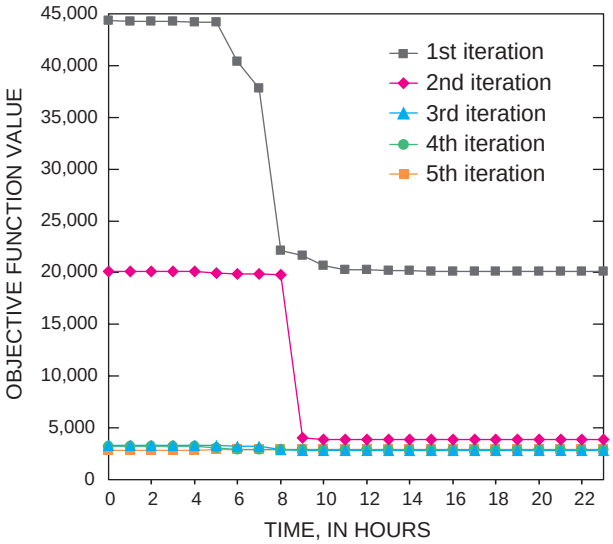


Figure E-11a. Convergence of objective function as function of iteration number and time step, October 1996.

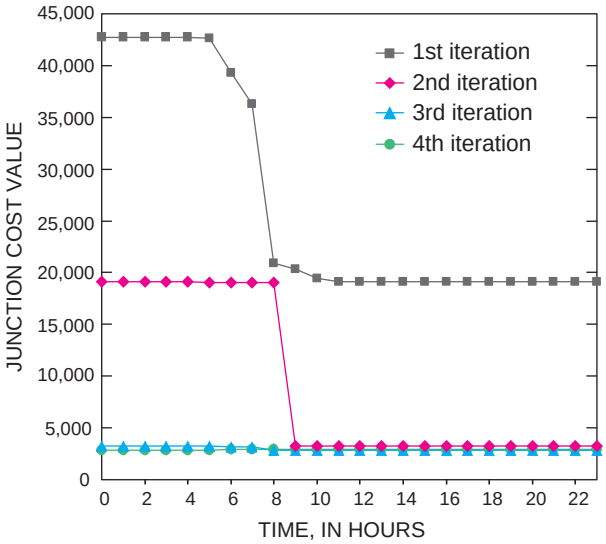


Figure E-11b. Convergence of junction cost as function of iteration number and time step, October 1996.

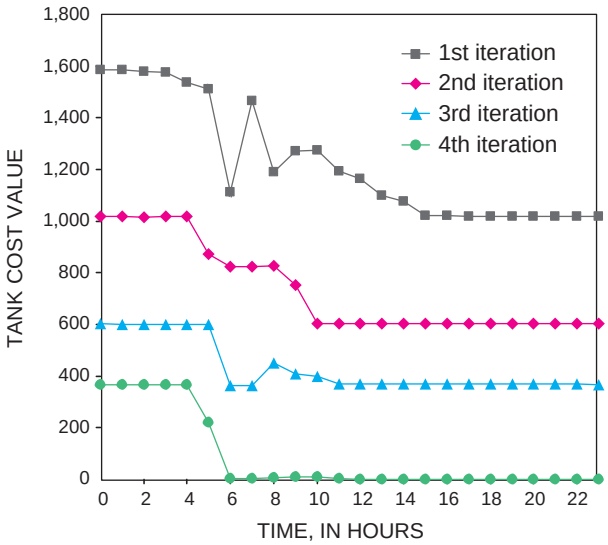


Figure E-11c. Convergence of tank cost as function of iteration number and time step, October 1996.

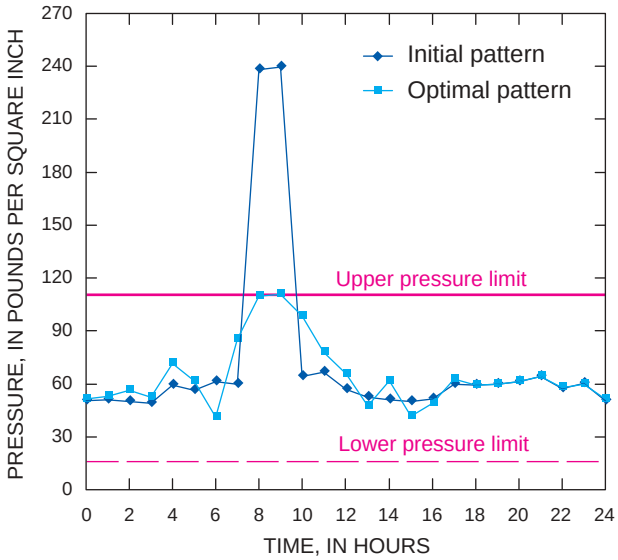


Figure E-12. Water pressure at Junction #55024 (Parkway Well 24) using two different patterns, October 1996. (See figure E-2 for location.)

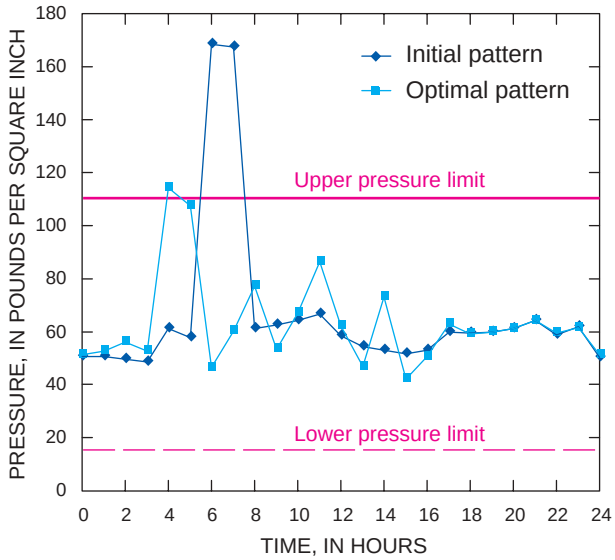


Figure E-13. Water pressure at Junction #55022 (Parkway Well 22) using two different patterns, October 1996. (See figure E-2 for location.)

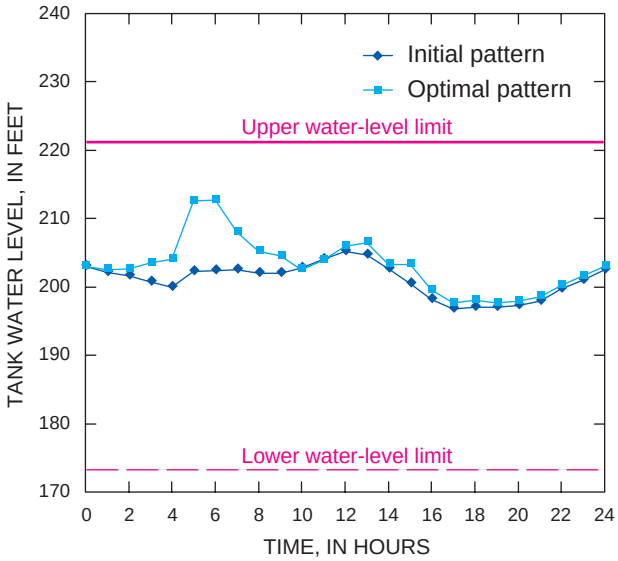


Figure E-14. Water pressure at North Dover elevated storage tank using two different patterns, October 1996. (See figure E-2 for location.)

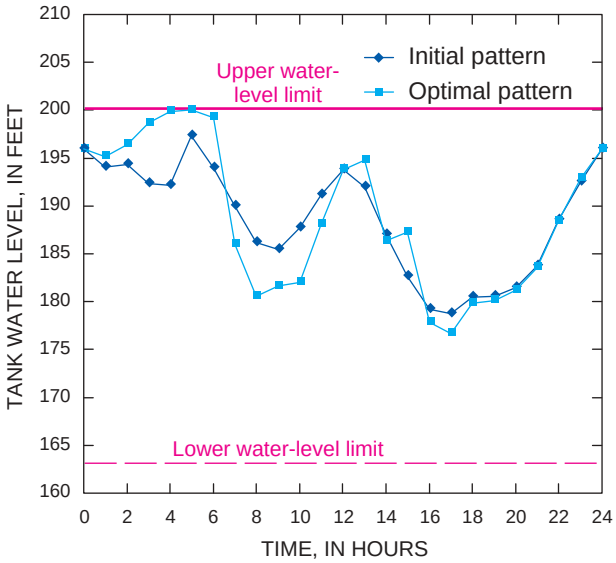


Figure E-15. Water pressure at Indian Hill elevated storage tank using two different patterns, October 1996. (See figure E-2 for location.)

Selection of New Patterns: As described in Section 3, the solution of the optimization model in Equation (E-15) may not be unique. The data set in October 1996 is chosen as an example to address the effect of non-uniqueness of optimal solutions on the operation of the water-distribution system. The model in Equation (E-19) and POGA algorithm is employed with the optimal patterns obtained from Equation (E-15) as its initial solution to select new patterns. The new patterns should have an original objective value calculated from Equation (E-14) close to the optimal patterns and they also must have a different pattern schedule when compared to the original optimal pattern. In this optimization, maximum iteration is selected as 8 considering the characteristics of the model in Equation (E-19). The resulting patterns are shown in Figure E-16 for three water-supply wells in this case. It might be noted that new patterns have a large difference when compared with the original optimal patterns. The original objective value of the new patterns reduces to 2900.45 from the value of 2911.09 for the original optimal pattern, resulting in a small difference 10.6 (0.37%). The convergence process of the new objective function in Equation (E-17) as a function of iterations and time steps is shown in Figure E-17(a). The new objective values are monotonically increasing as iterations and time steps. In the iterations, the original objective function is fluctuating within ± 1% range as shown in Figure E-17(b). The water pressure in the representative junctions using the new patterns has similar values when compared to the original optimal patterns although there is a significant difference between the two patterns. Figures E-18 and E-19 show the water pressure at junction #55024 and #55022 using the two different patterns. It should also be noticed that the operation of tanks is also similar for original optimal solution and the new patterns as seen in Figures E-20 and E-21. Therefore, we may conclude that the effect of using different patterns on contaminant transport solution would be negligible.

Computational Cost: In POGA, the computational cost in the terms of computational time consists of two parts. First is the computational cost of calculation of the objective function and second is the calculation of GA operations, such as crossover, mutation and comparison of fitness values. The calculation of objective function accounts for more than 95% of total computational cost so that the effect of the second calculation cost can be neglected. The computational cost for calculation of the objective function depends on the scale of the water-distribution system. For example, the computational cost for each calculation of objective function needs about 2 seconds for the system in 1962, and about 10 seconds for the system in 1996 on an IBM/PC Pentium system. If we define t as the computation time of one calculation of the objective function, G as the maximum number of generations, P as the population size, N as maximum number of iterations, M as the number of time steps and T as the total time, then total time using POGA can be approximately estimated by

$$T = G \times P \times N \times M \times \mathrm{t} \tag{E-37}$$

In searching optimal patterns, $G = 2$, $P = 5$, $M = 23$, $N = 4$, $T = 920\ t$. In the case of 1962 simulation, $t = 2$ s, then total computational time $T = 1840$ s = 30.7 m = 0.5 hr. In the case of 1996 simulation, $t = 10$ s, then total computational time $T = 9200$s = 153.3m = 2.6 hrs.

From Equation (E-36), the total computational time seems to be independent of the number of decision variables. In fact, the effect of the number of decision variables on the total computational cost is implicitly reflected in population size and generations. In general, the more the decision variables there are, the larger the number of population size and generations should be set. For example, in the case of year 1996 simulation, there are 20 water-supply wells in the system. The resulting number of decision variables is ($20 \times 24 = 480$). If the GA is directly used to solve this problem, the population size should be set at least as 50 and the number of generations should be set to at least 20. The total computational time T would be at the least ($50 \times 20 \times \mathrm{t} =$ 10,000 sec = 2.8 hrs). In POGA, the optimization problem is divided into 23 sub-problems in each iteration. The number of variables in the sub-problem reduces to the number of water-supply wells. In the case of year 1996 simulation, it is 20. Therefore, we can choose a small population size and generations to reduce the computational cost. Furthermore, the equality constraints are not so easily handled as they are treated in POGA if GA is directly applied to this problem.

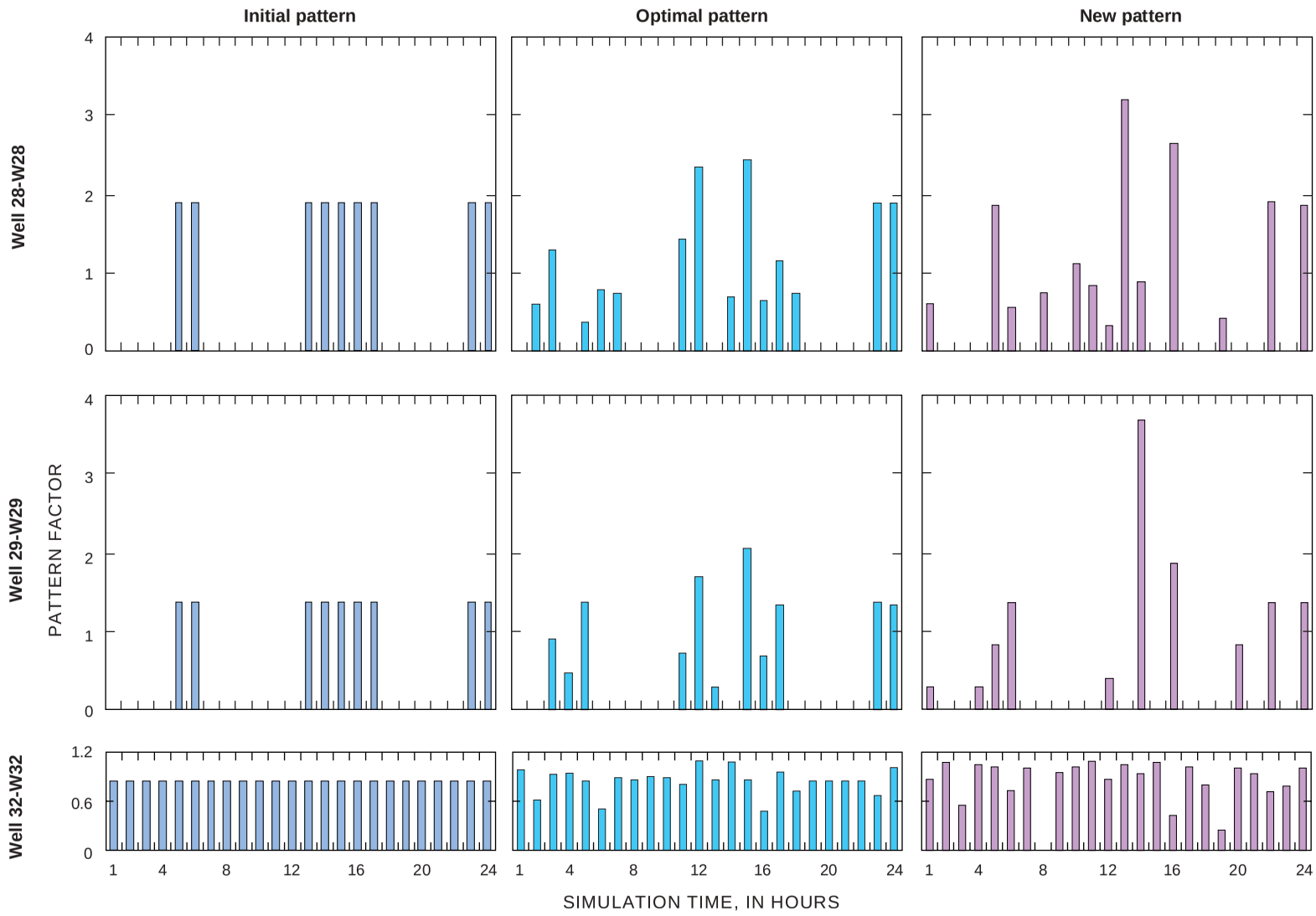


Figure E-16. Initial, optimal, and new operation patterns of water-supply wells, October 1996. (See Figure E-2 for well locations.)

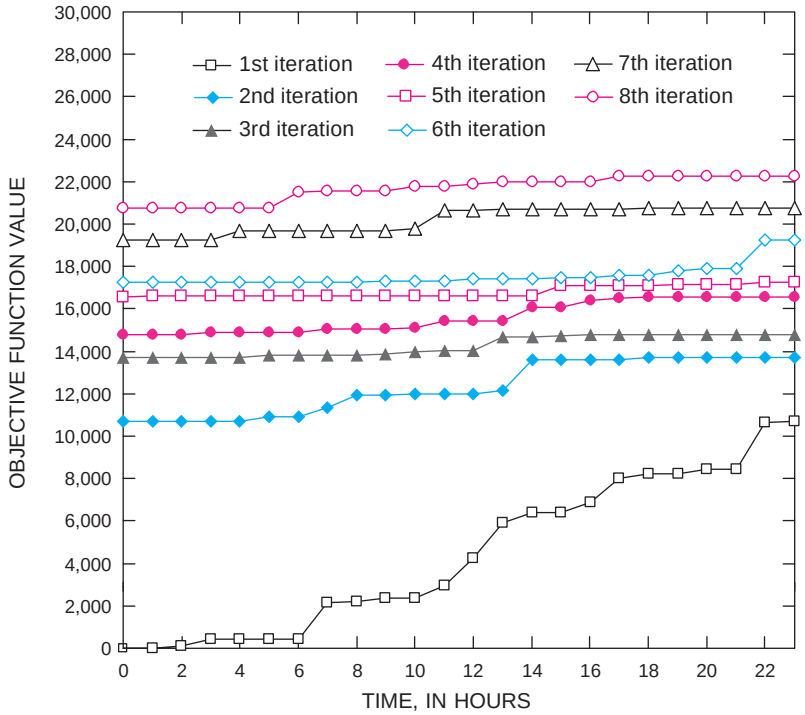


Figure E-17a. Convergence of new objective function as function of iteration number and time step, October 1996.

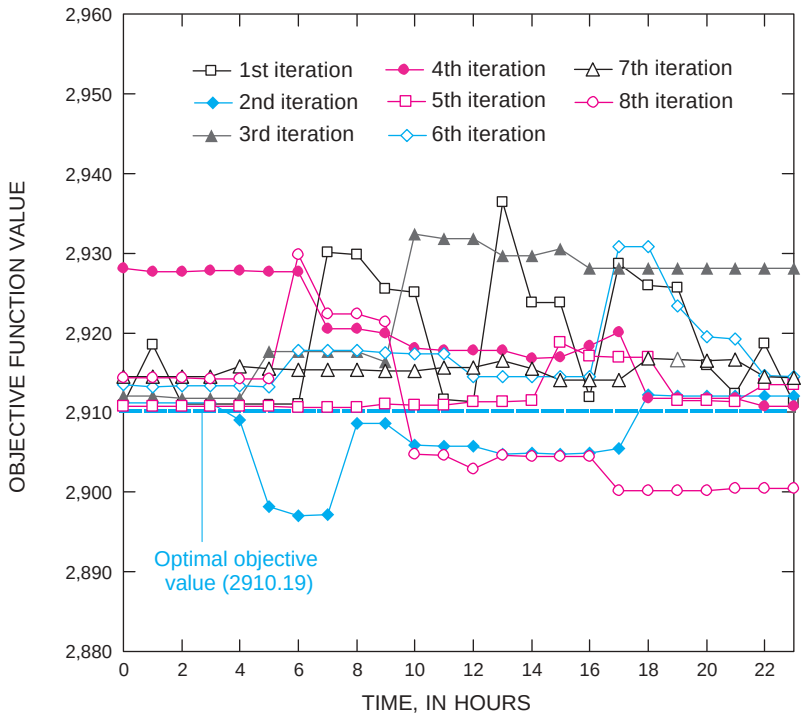


Figure E-17b. Variation of original objective function value in iteration process, October 1996.

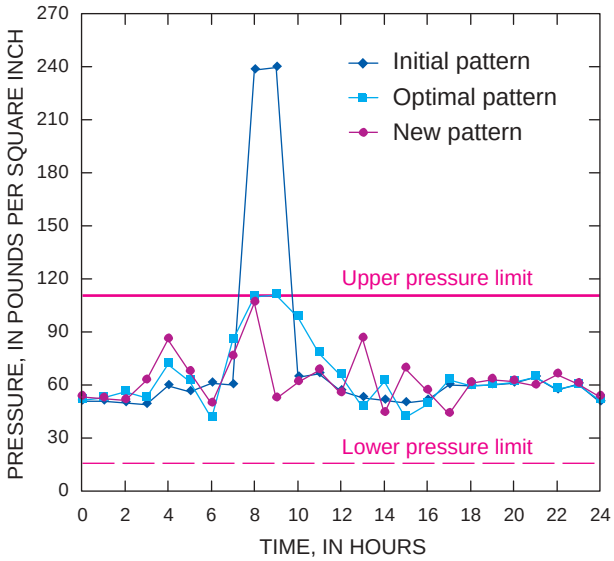


Figure E-18. Water pressure at Junction #55024 (Parkway Well 24) using three different patterns, October 1996. (See figure E-2 for location.)

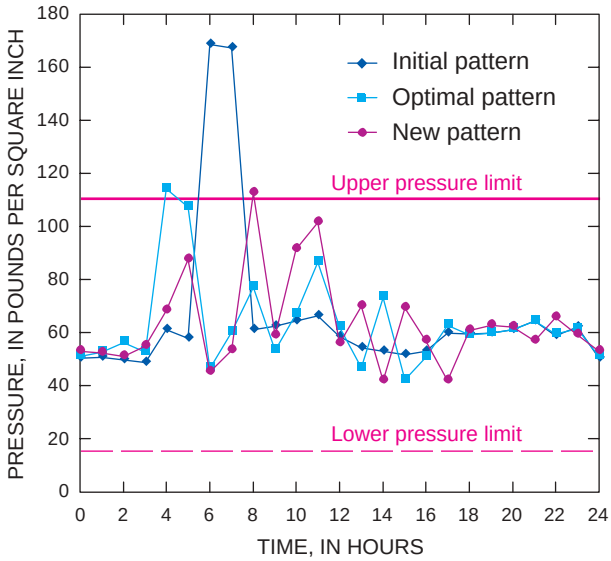


Figure E-19. Water pressure at Junction #55022 (Parkway Well 22) using three different patterns, October 1996. (See figure E-2 for location.)

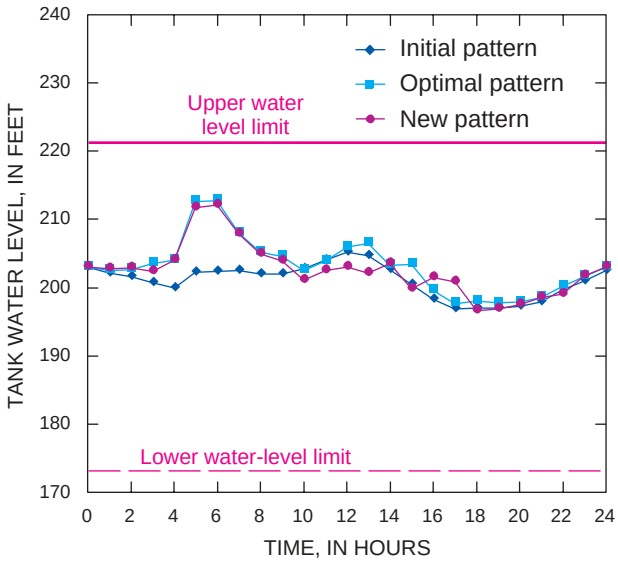


Figure E-20. Water pressure at North Dover elevated storage tank using three different patterns, October 1996. (See figure E-2 for location.)

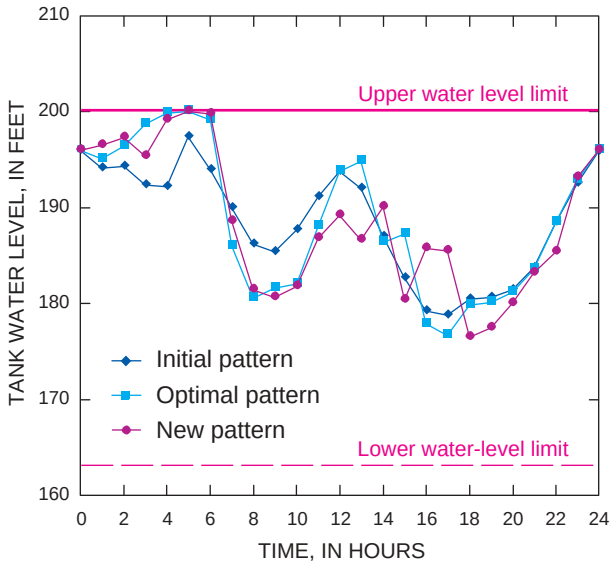


Figure E-21. Water pressure at Indian Hill elevated storage tank using three different patterns, October 1996. (See figure E-2 for location.)

7. Sensitivity Analysis

The control parameters in the model have a large effect on the optimal solution. Among these parameters, the minimum pressure limitation at the junctions in the water-distribution system and the difference in water levels in the tanks between the beginning and the end of the day play an important role in the objective function value. Therefore, a sensitivity analysis for these two parameters is necessary. The effect of minimum pressure on the operation pattern of water-supply wells can be analyzed by setting different values. In this study, three minimum pressure values, 15, 20, 30 psi, are used to calculate the optimal patterns. The effect of difference between storage starting and ending water levels in a 24-hour period on the optimal patterns can be reflected by adjusting Equation (E-6). Equation (E-6) is a tightening constraint and can be relaxed by

$$| L_j(24) - L_j(0) | \leq \Delta L \qquad j = 1, 2, ..., N \tag{E-38}$$

where ΔL is an allowable error, and can be set to zero or 3 ft as is done in the sensitivity analysis phase. The dataset for October 1996 is used to present the sensitivity analysis results here, although numerous cases were analyzed. The optimal patterns of the water-supply wells are shown in Figures E-22(a) and E-22(b) by setting different minimum pressure values and the different water-level limits in tanks. It may be noted that these two parameters have a significant effect on the schedule of optimal patterns obtained. The convergence of the objective function in the first iteration using different patterns with different parameters is shown in Figure E-23, where P_{min} indicates minimum water pressure, ΔL indicates allowable water-level difference in the storage tanks. From this Figure E-23, we can observe the following: when the minimum water-pressure limit increases, more junctions violate the minimum water-pressure constraints; thus, the objective values increase. The objective values decrease when the constraint of water-level difference in tanks is relaxed, and this effect is more obvious for higher minimum water-pressure requirement. The different patterns result in the fluctuation of the water pressure for some junctions. The water-pressure variation as function of time is the same for junction #55024, however, it is has changed for the junction #55022 as shown in Figures E-24 and E-25. The change in minimum water-pressure limit has no obvious effect on the operation of tanks, although the optimal patterns obtained are different as shown in Figures E-26 and E-27. Comparing with the initial patterns, all optimal patterns tend to keep the tanks operating at a higher water level to maintain the higher "low pressure" limits. Under the same minimum water-pressure limit, different allowable water-level differences between the starting and the ending of a 24-hour period (day) in storage tanks leads to the ending water level not returning to that of the starting of the day as shown in Figures E-28 and E-29. The starting and ending water levels in storage tanks are given in Table E-2.

Table E-2. Difference between storage tank starting and ending water levels in a 24-hour period

Storage tank	Minimum water pressure (pounds per square inch)	Allowable water-level difference (feet)	Water level		Difference (feet)
			Starting	Ending	
33566-NDTA	20	0	203.00	202.97	0.03
		3	203.00	201.44	1.56
	30	0	203.00	202.96	0.04
		3	203.00	200.82	2.12
33564-IHTA	20	0	196.00	195.98	0.02
		3	196.00	196.93	-0.93
	30	0	196.00	195.98	0.02
		3	196.00	198.79	-2.79

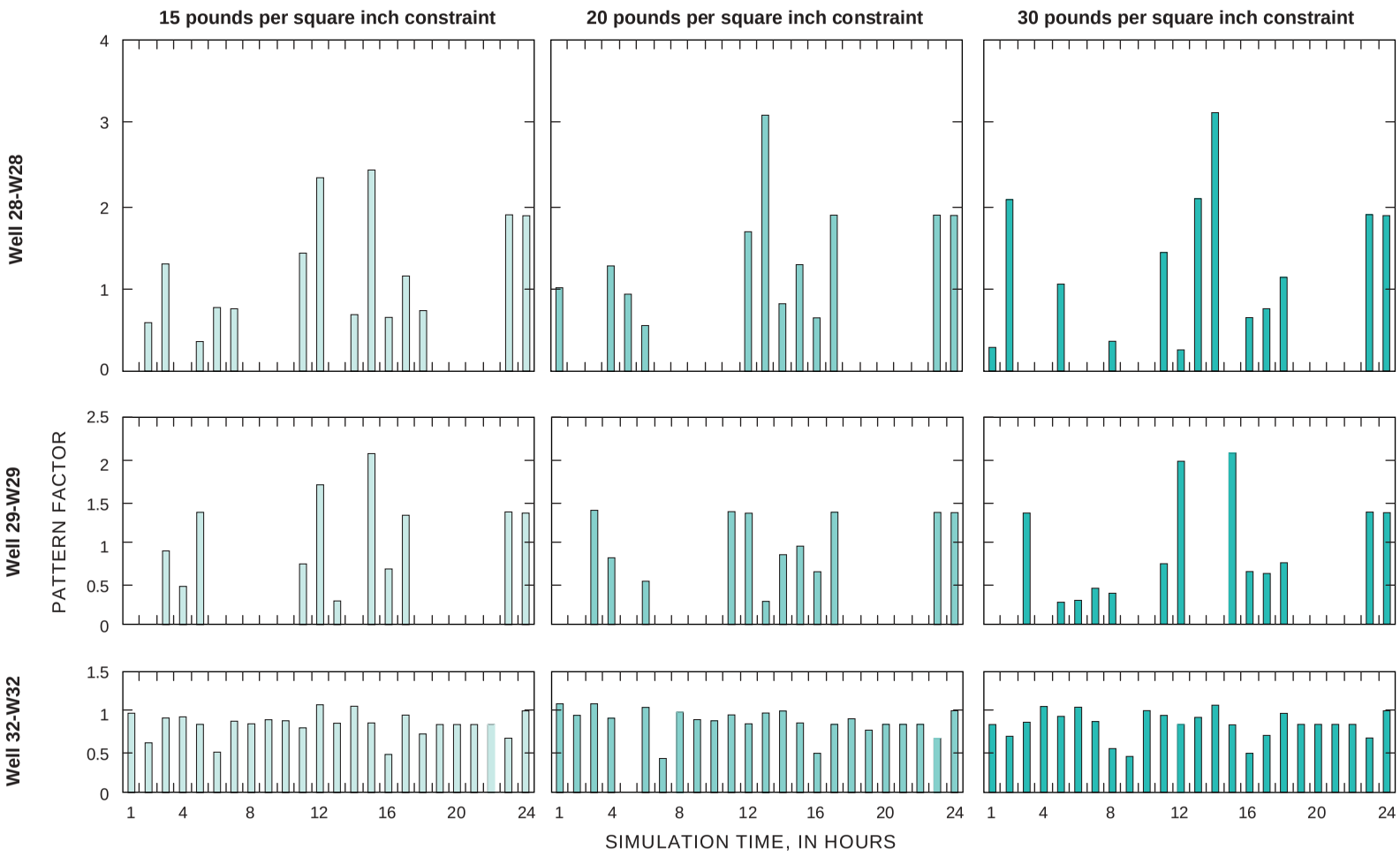


Figure E-22a. Optimal patterns of water-supply wells under different minimum pressure constraints, October 1996. (See Figure E-2 for well locations.)

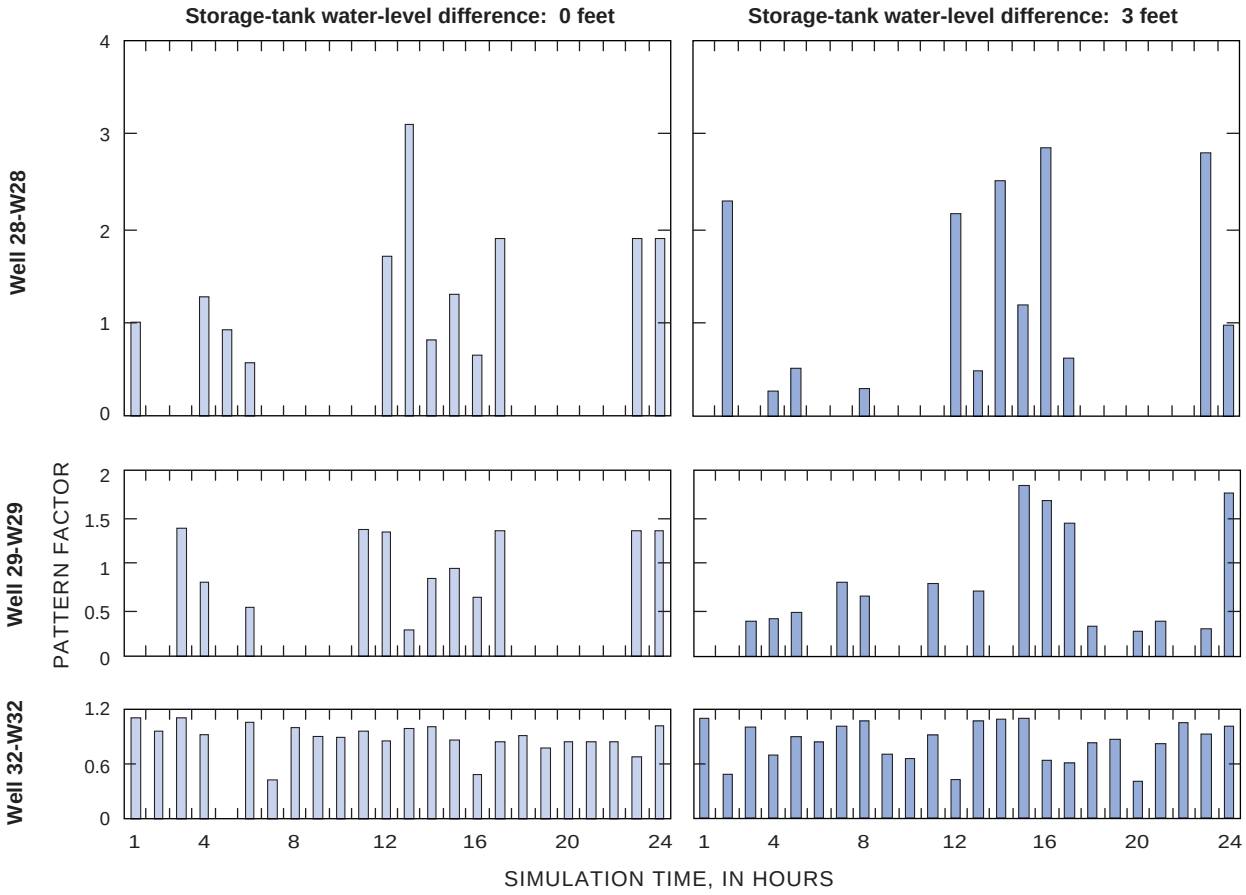


Figure E-22b. Optimal patterns of water-supply wells under minimum pressure of 20 pounds per square inch and two different tank-level constraints, October 1996. (See Figure E-2 for well locations.)

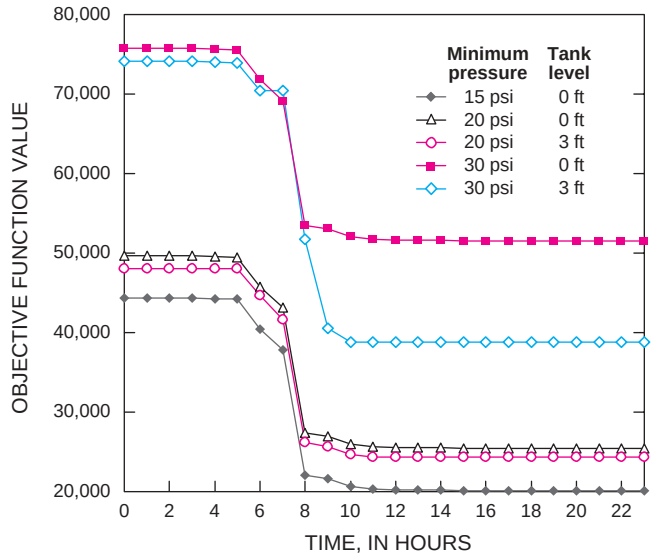


Figure E-23. Convergence of objective function in first iteration using different patterns with different minimum pressure and tank-level contraints, October 1996.

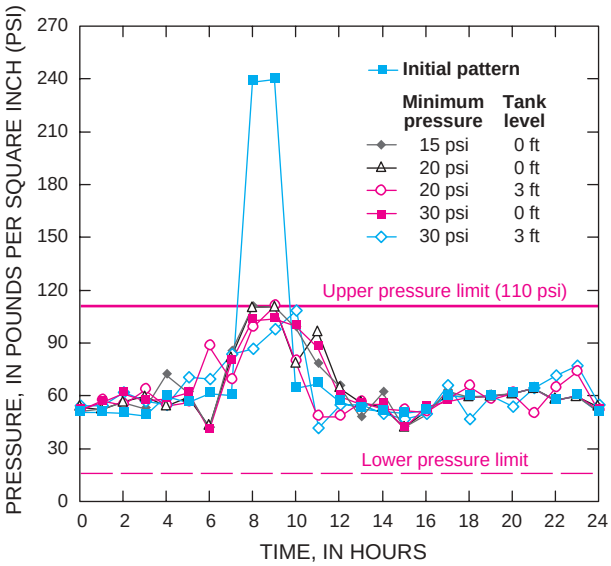


Figure E-24. Water pressure at Junction #55024 (Parkway Well 24) using different patterns with minimum pressure and tank-level constraints, October 1996. (See figure E-2 for location.)

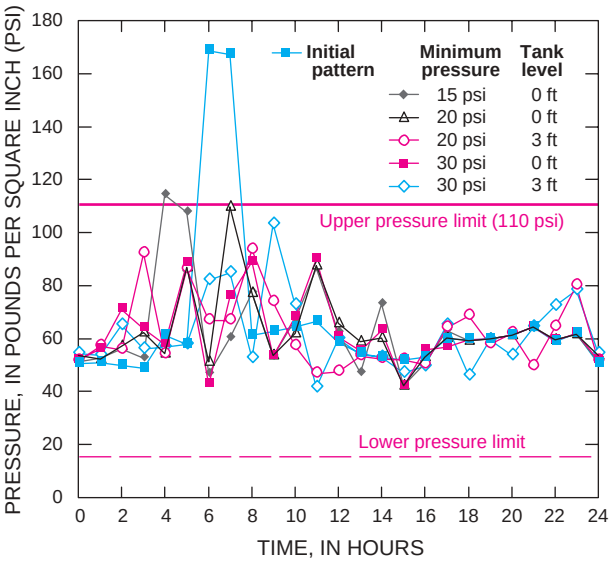


Figure E-25. Water pressure at Junction #55022 (Parkway Well 22) using different patterns with minimum pressure and tank-level constraints, October 1996. (See figure E-2 for location.)

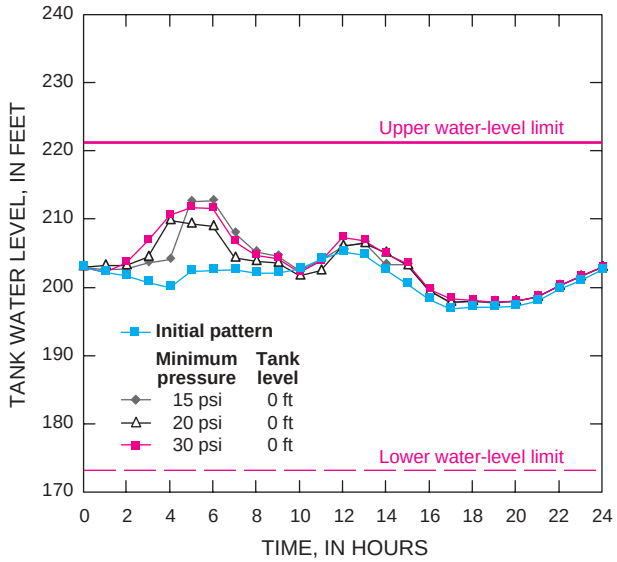


Figure E-26. Water level at North Dover elevated storage tank using different patterns with different minimum pressure constraints, October 1996. (See figure E-2 for location.)

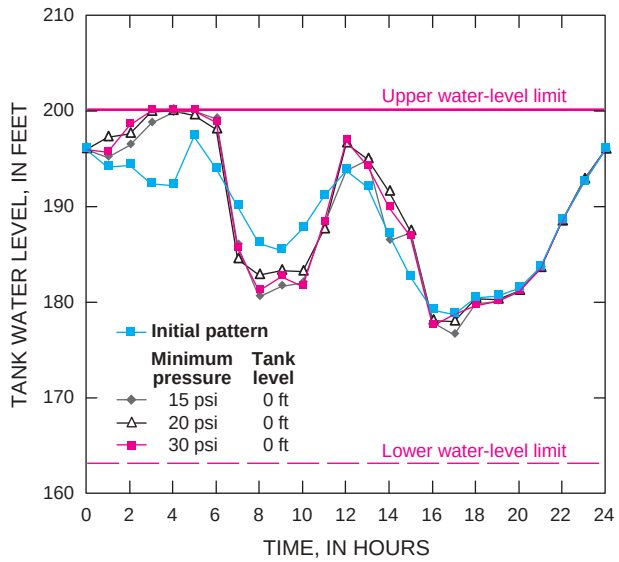


Figure E-27. Water level at Indian Hill elevated storage tank using different patterns with different minimum pressure constraints, October 1996. (See figure E-2 for location.)

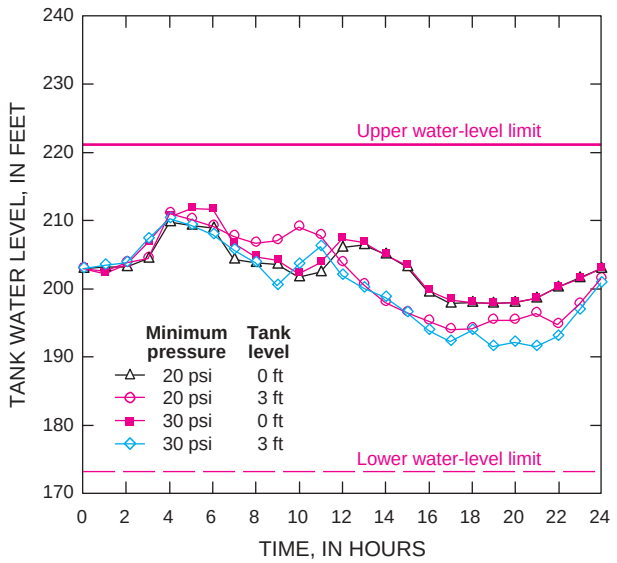


Figure E-28. Water level at North Dover elevated storage tank using different patterns with different minimum pressure and tank-level constraints, October 1996. (See figure E-2 for location.)

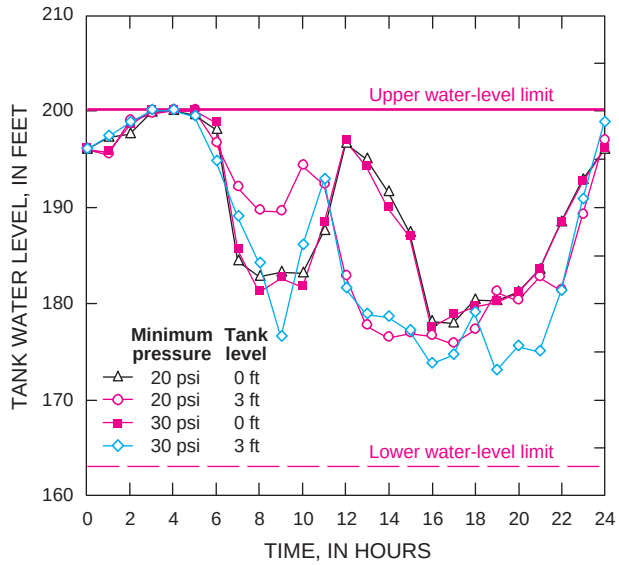


Figure E-29. Water pressure at Indian Hill elevated storage tank using different patterns with different minimum pressure and tank-level constraints, October 1996. (See figure E-2 for location.)

when the allowable water level difference in tanks is set as 3 feet, the difference in actual operation is 1.56 feet for P_{min} = 20 psi and 2.12 feet for P_{min} = 30 psi for tank 33566-NDTA; is –0.93 feet for P_{min} = 20 psi and –2.79 feet for P_{min} = 30 psi for tank 33564-IHTA. Although increasing allowable water-level difference in tanks may improve water pressure distribution at junctions and provide flexibility to the selection of patterns, the long-term continuous operation using the same patterns during a 1200 hr simulation period results in a large difference at the starting and end of the simulation period in storage tanks which would violate the tank-level constraints.

8. Conclusions

In this study, the reconstruction of hydraulic management strategies in the water-distribution system is formulated as an optimization problem. In the model, the pumping rates of water-supply wells are selected as decision variables, and the penalty functions are assigned to the violation of the management objectives, which are incorporated into the objective function. The equality and bounded limits of decision variables for each water-supply well reflect the historical operation of the system. Considering the non-uniqueness of the optimal solution of this model, a new optimal model is developed based on the optimal solution of the first model. The objective function in the new model reflects the expectation that the new patterns obtained from the second model have an objective value close to the optimal solution obtained from the first model, and also there should be a large difference between the optimal patterns. Both models have the same constraints so that the results obtained from them can be used to analyze the effect of different optimal patterns on hydraulic and contaminant transport characteristics of the system. Both models are multiple-stage nonlinear dynamic problems with equality constraints. For the solution of both models, a new algorithm, identified as Progressive Optimality Genetic Algorithm (POGA), is developed and coded. This algorithm incorporates progressive optimality algorithm and genetic algorithm. POGA is integrated with EPANET2 to construct a high integrity system, which provides a visual tool for reconstructing the hydraulic management strategies in a water-distribution system.

The integrated system has been applied to the monthly data sets of the water-distribution system serving the Dover Township area, N.J. for the study period between the years 1962 and 1996. The effect of several parameters on hydraulic management strategies in the water-distribution system has also been analyzed. The computational results show that the objective function value has been significantly improved for all of the data sets, which implies that the optimized hydraulic management strategies are better in satisfying the hydraulic management objectives than the initial hydraulic management strategy. Based on the results and analysis, we make the following conclusions:

- The models described in Equations (E-15) and (E-19) reflect the historical situation associated with the water-distribution system and can be used to reconstruct the hydraulic management strategies. The POGA is an effective and efficient algorithm for solution of both models. The idea of POGA may be applied to other multiple-stage dynamic problems.
- Optimized management of the water-distribution system may improve the hydraulic condition of the system operation, reduce the violation of water-pressure requirement, and heighten the efficiency of the system.
- The reconstruction problem may not have a unique solution. However, the different patterns satisfying optimal conditions seem to have little effect on water-pressure distribution at junctions, the operation of tanks in the water-distribution system and consequently have little effect on final contaminant distribution pattern in the system.
- The constraints on minimum water pressure at junctions and water level of the tanks at the starting and ending of the simulation period directly affect the optimal patterns. The relaxed allowable water-level difference in tanks may reduce the violation of water pressure at junctions, but may result in a large accumulated water-level difference between the starting and ending of the simulation period.

The results of analysis presented in this report provide the data that can feed into the epidemiologic study of childhood leukemia and central nervous system cancers that occurred in the period 1979 through 1996 in Dover Township area, N.J. It is expected that these results will be used in identifying the contaminant transport characteristics of the water-distribution system so that the epidemiologic studies can be completed.

9 References

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APPENDIX F
TABLES, WELLS AND WELL FIELDS (POINTS OF ENTRY), AND EPANET 2 SOURCE-NODE IDENTIFICATIONS USE TO CONDUCT MONTHLY SOURCE-TRACE ANALYSES, DOVER TOWNSHIP AREA, NEW JERSEY, 1962–96

Table F-1. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1962

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1962	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	—	—	—	—	—	—	—	—
February	X	X	—	—	—	—	—	—	—	—
March	X	X	—	—	—	—	—	—	—	—
April	X	X	—	—	—	—	—	—	—	—
May	X	X	—	—	—	—	—	—	—	—
June	X	X	—	—	—	—	—	—	—	—
July	X	X	—	—	—	—	—	—	—	—
August	X	X	—	—	—	—	—	—	—	—
September	X	X	—	—	—	—	—	—	—	—
October	X	X	—	—	—	—	—	—	—	—
November	X	X	—	—	—	—	—	—	—	—
December	X	X	—	—	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:
2626, Holly (13 and 14); and
16711, Brookside (15).

Table F-2. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1963

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1963	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	—	—	—	—	—	—	—	—
February	X	X	—	—	—	—	—	—	—	—
March	X	X	—	—	—	—	—	—	—	—
April	X	X	—	—	—	—	—	—	—	—
May	X	X	—	—	—	—	—	—	—	—
June	X	X	—	—	—	—	—	—	—	—
July	X	X	—	—	—	—	—	—	—	—
August	X	X	—	—	—	—	—	—	—	—
September	X	X	—	—	—	—	—	—	—	—
October	X	X	—	—	—	—	—	—	—	—
November	X	X	—	—	—	—	—	—	—	—
December	X	X	—	—	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:
2626, Holly (13 and 14); and
16711, Brookside (15).

Table F-3. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1964

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1964	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	—	—	—	—	—	—	—	—
February	X	X	—	—	—	—	—	—	—	—
March	X	X	—	—	—	—	—	—	—	—
April	X	X	—	—	—	—	—	—	—	—
May	X	X	—	—	—	—	—	—	—	—
June	X	X	—	—	—	—	—	—	—	—
July	X	X	—	—	—	—	—	—	—	—
August	X	X	—	—	—	—	—	—	—	—
September	X	X	—	—	—	—	—	—	—	—
October	X	X	—	—	—	—	—	—	—	—
November	X	X	—	—	—	—	—	—	—	—
December	X	X	—	—	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:
2626, Holly (13 and 14); and
16711, Brookside (15).

Table F-4. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1965

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1965	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	—	—	—	—	—	—	—	—
February	X	X	—	—	—	—	—	—	—	—
March	X	X	—	—	—	—	—	—	—	—
April	X	X	—	—	—	—	—	—	—	—
May	X	X	—	—	—	—	—	—	—	—
June	X	X	—	—	—	—	—	—	—	—
July	X	X	—	—	—	—	—	—	—	—
August	X	X	—	—	—	—	—	—	—	—
September	X	X	—	—	—	—	—	—	—	—
October	X	X	—	—	—	—	—	—	—	—
November	X	X	—	—	—	—	—	—	—	—
December	X	X	—	—	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:
2626, Holly (14, 16, and 18); and
16711, Brookside (15).

Table F-5. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1966

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1966	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	—	—	—	—	—	—	—	—
February	X	X	—	—	—	—	—	—	—	—
March	X	X	X	—	—	—	—	—	—	—
April	X	X	X	—	—	—	—	—	—	—
May	X	X	X	—	—	—	—	—	—	—
June	X	X	X	—	—	—	—	—	—	—
July	X	X	X	—	—	—	—	—	X	X
August	X	X	X	—	—	—	—	—	X	—
September	X	X	X	—	—	—	—	—	—	—
October	X	X	X	—	—	—	—	—	—	—
November	X	X	—	—	—	—	—	—	—	—
December	X	X	—	—	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:
2626, Holly (14, 16, and 18); and
16711, Brookside (15).

Table F-6. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses Dover Township area, New Jersey, 1967

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1967	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	—	—	—	—	—	—	—
February	X	X	X	—	—	—	—	—	—	—
March	X	X	X	—	—	—	—	—	—	—
April	X	X	X	—	—	—	—	—	—	—
May	X	X	X	X	—	—	—	—	—	—
June	X	X	X	X	—	—	—	—	X	X
July	X	X	X	X	—	—	—	—	X	—
August	X	X	X	X	—	—	—	—	—	—
September	X	X	X	X	—	—	—	—	—	—
October	X	X	X	X	—	—	—	—	—	—
November	X	X	X	X	—	—	—	—	—	—
December	X	X	X	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, and 19);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-7. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1968

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1968	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	—	—
March	X	X	X	X	—	—	—	—	—	—
April	X	X	X	X	—	—	—	—	—	—
May	X	X	X	X	—	—	—	—	—	—
June	X	X	X	X	—	—	—	—	X	X
July	X	X	X	X	—	—	—	—	—	—
August	X	X	X	X	—	—	—	—	—	—
September	X	X	X	X	—	—	—	—	—	—
October	X	X	X	X	—	—	—	—	—	—
November	X	X	X	X	—	—	—	—	—	—
December	X	X	X	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, and 19);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-8. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1969

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1969	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	—	—
March	X	X	X	X	—	—	—	—	—	—
April	X	X	X	X	—	—	—	—	—	—
May	X	X	X	X	—	—	—	—	X	X
June	X	X	X	X	—	—	—	—	X	X
July	X	X	X	X	—	—	—	—	X	X
August	X	X	X	X	—	—	—	—	X	X
September	X	X	X	X	—	—	—	—	X	X
October	X	X	X	X	—	—	—	—	—	—
November	X	X	X	X	—	—	—	—	—	—
December	X	X	X	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-9. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1970

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1970	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	—	—
March	X	X	X	X	—	—	—	—	—	—
April	X	X	X	X	—	—	—	—	X	—
May	X	X	X	X	—	—	—	—	X	X
June	X	X	X	X	—	—	—	—	X	X
July	X	X	X	X	—	—	—	—	X	X
August	X	X	X	X	—	—	—	—	X	X
September	X	X	X	X	—	—	—	—	X	X
October	X	X	X	X	—	—	—	—	—	—
November	X	X	X	X	—	—	—	—	—	—
December	X	X	X	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-10. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1971

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1971	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	X	X
March	X	X	X	X	—	—	—	—	—	—
April	X	X	X	X	—	—	—	—	X	X
May	X	X	X	X	—	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	—	—	—	—	X	X
November	X	X	X	X	—	—	—	—	X	X
December	X	X	—	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 26, and 27);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-11. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1972

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1972	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	—	X
March	X	X	X	X	—	—	—	—	—	X
April	X	X	X	X	—	—	—	—	X	X
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	—	—	—	—	—	—
December	X	X	X	X	—	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, and 27);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-12. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1973

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1973	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	—	—	—	—	—	—
February	X	X	X	X	—	—	—	—	—	—
March	X	X	X	X	—	—	—	—	—	—
April	X	X	X	X	X	—	—	—	—	—
May	X	X	X	X	X	—	—	—	—	—
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	—	—	—	—	—
December	X	X	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, and 27);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-13. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1974

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1974	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	X	X	X	X	—	—	—	X	X
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	—	X	X	X	—	—	—	—	—
December	X	—	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, and 27);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-14. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1975

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1975	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	—	X	X	X	—	—	—	—	—
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	—	—
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	—	—	—	—	—
December	X	—	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
555098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-15. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1976

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1976	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	X	X	X	X	—	—	—	X	X
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	—	—	—	—	—
December	X	X	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (14, 16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-16. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1977

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1977	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	X	X	—	—	—	—	—
February	X	—	—	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	X	X	X	X	—	—	—	X	X
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	—	—	—	—	—
December	X	—	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-17. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1978

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1978	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	X	X	X	X	—	—	—	X	X
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	X	X
September	X	X	X	X	X	—	—	—	X	X
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	—	—	—	—	—
December	X	—	X	—	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-18. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1979

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1979	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	—	X	X	X	—	—	—	—	—
May	X	X	X	X	X	—	—	—	X	X
June	X	X	X	X	X	—	—	—	X	X
July	X	X	X	X	X	—	—	—	X	X
August	X	X	X	X	X	—	—	—	—	X
September	X	X	X	X	X	—	—	—	—	—
October	X	X	X	X	X	—	—	—	—	—
November	X	—	X	X	X	—	—	—	—	—
December	X	—	X	X	X	—	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 18, and 19);
16711, Brookside (15);
16198, South Toms River (17);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-19. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1980

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1980	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	—	—	—	—	—
February	X	—	X	X	X	—	—	—	—	—
March	X	—	X	X	X	—	—	—	—	—
April	X	—	X	X	X	—	—	—	—	—
May	X	—	X	X	X	X	—	—	—	—
June	X	X	X	X	X	X	—	—	X	X
July	X	X	X	X	X	X	—	—	X	X
August	X	X	X	X	X	X	—	—	X	X
September	X	X	X	X	X	X	—	—	—	—
October	X	X	X	X	X	—	—	—	—	—
November	X	X	X	X	X	X	—	—	—	—
December	—	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 18, 19, and 21);
16711, Brookside (15);
16198, South Toms River (17 and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55031, Route 70 (31);
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only; and
55099, Silver Bay (99)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-20. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1981

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1981	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	—	—	—	—
February	—	—	X	X	X	X	—	—	—	—
March	—	—	X	X	X	X	—	—	—	—
April	—	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	—	—	—	—
June	X	X	X	X	X	X	—	—	—	—
July	X	X	X	X	X	X	—	—	X	—
August	X	X	X	X	X	X	—	—	—	—
September	X	X	X	X	X	X	—	—	—	—
October	—	X	X	X	X	X	—	—	—	—
November	—	—	X	X	X	X	—	—	—	—
December	—	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 21, and 30);
16711, Brookside (15);
16198, South Toms River (17 and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55031, Route 70 (31);and
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-21. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1982

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1982	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	—	—	—	—
February	—	—	X	X	X	X	—	—	—	—
March	—	—	X	X	X	X	—	—	—	—
April	X	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	—	—	—	—
June	X	—	X	X	X	X	—	—	—	—
July	X	X	X	X	X	X	—	—	—	—
August	X	—	X	X	X	X	—	—	—	—
September	X	—	X	X	X	X	—	—	—	—
October	X	—	X	X	X	X	—	—	—	—
November	X	—	X	X	X	X	—	—	—	—
December	X	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21and 30);
16711, Brookside (15);
16198, South Toms River (17 and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);and
55031, Route 70 (31).

Table F-22. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1983

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1983	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	X	—	—	—	—
February	—	—	X	X	X	X	—	—	—	—
March	X	—	X	X	X	X	—	—	—	—
April	X	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	—	—	—	—
June	X	X	X	X	X	X	—	—	—	—
July	X	X	X	X	X	X	—	—	—	—
August	X	X	X	X	X	X	—	—	—	—
September	X	X	X	X	X	X	—	—	—	—
October	X	—	X	X	X	X	—	—	—	—
November	—	—	X	X	X	X	—	—	—	—
December	—	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 21, and 30);
16711, Brookside (15);
16198, South Toms River (17 and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, and 28);and
55031, Route 70 (31).

Table F-23. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1984

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1984	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	—	—	—	—
February	—	—	X	X	X	X	—	—	—	—
March	—	—	X	X	X	X	—	—	—	—
April	X	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	—	—	—	—
June	X	X	X	X	X	X	—	—	X	—
July	X	X	X	X	X	X	—	—	—	—
August	X	X	X	X	X	X	—	—	—	—
September	X	X	X	X	X	X	—	—	—	—
October	X	—	X	X	X	X	—	—	—	—
November	X	—	X	X	X	X	—	—	—	—
December	X	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 21, and 30);
16711, Brookside (15);
16198, South Toms River (17, and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55031, Route 70 (31);and
55098, Anchorage (98)—well number assigned by ATSDR for identification and simulation purposes only.

Table F-24. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1985

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1985	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	X	—	—	—	—
February	X	—	X	—	X	X	—	—	—	—
March	X	—	X	X	X	X	—	—	—	—
April	X	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	—	—	—	—
June	X	—	X	X	X	X	—	—	—	—
July	X	X	X	X	X	X	—	—	—	—
August	X	—	X	X	X	X	—	—	—	—
September	X	—	X	X	X	X	—	—	—	—
October	X	—	X	X	X	X	—	—	—	—
November	X	—	X	X	X	X	—	—	—	—
December	X	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21 and 30);
16711, Brookside (15);
16198, South Toms River (17 and 32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);and
55031, Route 70 (31).

Table F-25. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1986

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1986	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	—	—	—	—
February	—	—	X	X	X	X	—	—	—	—
March	X	—	X	X	X	X	—	—	—	—
April	X	—	X	X	X	X	—	—	—	—
May	X	X	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	—	—	—
July	X	X	X	X	X	X	X	—	—	—
August	X	X	X	X	X	X	X	—	—	—
September	X	—	X	X	X	X	—	—	—	—
October	X	—	X	X	X	X	—	—	—	—
November	X	—	X	X	X	X	—	—	—	—
December	X	—	X	X	X	X	—	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (16, 21, and 30);
16711, Brookside (15);
16198, South Toms River (32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55031, Route 70 (31);and
1351, Berkeley (33, 34, and 35).

Table F-26. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1987

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1987	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	X	—	X	X	X	X	X	—	—	—
April	X	—	X	X	X	X	X	—	—	—
May	X	X	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	—	—	—
July	X	X	X	X	X	X	X	—	—	—
August	X	—	X	X	X	X	X	—	—	—
September	X	—	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	X	X	X	X	X	X	X	—	—	—
December	X	X	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21 and 30);
16711, Brookside (15);
16198, South Toms River (32);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 25, 26, 27, 28, and 29);
55031, Route 70 (31);and
1351, Berkeley (33 and 34).

Table F-27. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1988

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1988	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	X	X	—	X	X	X	—	—	—
February	X	X	X	—	X	X	X	—	—	—
March	X	X	X	—	X	X	X	—	—	—
April	X	X	X	—	X	X	X	—	—	—
May	X	X	X	—	X	X	X	—	—	—
June	X	X	X	X	X	X	X	—	—	—
July	X	X	X	X	X	X	X	—	—	—
August	X	X	X	X	X	X	X	—	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	X	X	X	X	X	X	X	—	—	—
December	—	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21and 30);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 26, 28, and 29);
55031, Route 70 (31);and
1351, Berkeley (33, 34, and 35).

Table F-28. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1989

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1989	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	—	X	X	X	—	—	—
February	—	—	X	—	X	X	X	—	—	—
March	X	—	X	—	X	X	X	—	—	—
April	X	—	X	—	X	X	X	—	—	—
May	X	—	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	—	—	—
July	X	X	X	X	X	X	X	—	—	—
August	X	X	X	X	X	X	X	—	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	X	—	X	X	X	X	X	—	—	—
December	X	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 23, 24, 26, 28, and 29);
55031, Route 70 (31); and
1351, Berkeley (33, 34, and 35).

Table F-29. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1990

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1990	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	—	—	X	X	X	X	X	—	—	—
April	X	—	X	X	X	X	X	—	—	—
May	X	—	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	—	—	—
July	X	X	X	X	X	X	X	—	—	—
August	X	X	X	X	X	X	X	—	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	X	—	X	X	X	X	X	—	—	—
December	—	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 24, 26, 28, and 29);
55031, Route 70 (31);and
1351, Berkeley (33, 34, and 35).

Table F-30. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1991

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1991	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	X	—	X	X	X	X	X	—	—	—
February	X	—	X	X	X	X	X	—	—	—
March	X	—	X	X	X	X	X	—	—	—
April	X	—	X	X	X	X	X	—	—	—
May	X	X	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	X	X	X	X	X	X	X	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	—	—	X	X	X	X	X	X	—	—
December	—	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 24, 26, 28, 29, and 39);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);and
55040, Windsor (40).

Table F-31. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1992

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1992	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	X	—	—	—
February	X	—	X	X	X	X	X	—	—	—
March	X	—	X	X	X	X	X	—	—	—
April	X	X	X	X	X	X	X	—	—	—
May	X	X	X	X	X	X	X	X	—	—
June	X	X	X	X	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	X	X	X	X	X	X	—	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	X	X	X	X	X	X	—	—	—
November	X	—	X	X	X	X	X	—	—	—
December	—	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 24, 26, 28, 29, and 39);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);and
55040, Windsor (40).

Table F-32. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1993

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1993	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	—	—	X	X	X	X	X	—	—	—
April	X	—	X	X	X	X	X	—	—	—
May	X	X	X	X	X	X	X	X	—	—
June	X	X	X	X	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	X	X	X	X	X	X	X	—	—
September	X	X	X	X	X	X	X	—	—	—
October	X	—	X	X	X	X	X	—	—	—
November	—	—	X	X	X	X	X	—	—	—
December	—	—	X	X	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 24, 26, 28, 29, 39, and 41);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);and
55040, Windsor (40).

Table F-33. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1994

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1994	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	—	—	X	X	X	X	X	—	—	—
April	X	X	X	X	X	X	X	X	—	—
May	X	X	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	X	X	X	X	X	X	—	—	—
September	—	X	X	X	X	X	X	X	—	—
October	—	X	X	X	X	X	X	—	—	—
November	—	—	X	X	X	X	X	—	—	—
December	—	—	X	—	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22,24, 26, 28, 29, 39, 41, and 42);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);and
55040, Windsor (40).

Table F-34. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1994

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1994	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	—	—	X	X	X	X	X	—	—	—
April	X	X	X	X	X	X	X	X	—	—
May	X	X	X	X	X	X	X	—	—	—
June	X	X	X	X	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	X	X	X	X	X	X	—	—	—
September	—	X	X	X	X	X	X	X	—	—
October	—	X	X	X	X	X	X	—	—	—
November	—	—	X	X	X	X	X	—	—	—
December	—	—	X	—	X	X	X	—	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22,24, 26, 28, 29, 39, 41, and 42);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);and
55040, Windsor (40).

Table F-35. Wells and well fields (points of entry) and EPANET 2 source-node identifications used to conduct monthly source-trace analyses, Dover Township area, New Jersey, 1996

[—, well or well field not pumping during month or non-existing (*see* Appendix B)]

1996	Well or well field (point of entry) and EPANET 2 Source-Node Identification[1]									
	Holly[2]	Brookside[2]	South Toms River[2]	Indian Head[2]	Parkway[2]	Route 70[2]	Berkeley[2]	Windsor[2]	Anchorage[2]	Silver Bay[2]
	2626	16711	16198	55020	4665	55031	1351	55040	55098	55099
January	—	—	X	X	X	X	X	—	—	—
February	—	—	X	X	X	X	X	—	—	—
March	X	—	X	X	X	X	X	—	—	—
April	X	—	X	X	X	X	X	—	—	—
May	X	X	X	X	X	X	X	X	—	—
June	X	X	X	—	X	X	X	X	—	—
July	X	X	X	X	X	X	X	X	—	—
August	X	—	X	—	X	X	X	X	—	—
September	X	—	X	—	X	X	X	X	—	—
October	X	—	X	—	X	X	X	—	—	—
November	X	—	X	—	X	X	X	X	—	—
December	X	—	—	—	—	X	X	X	—	—

[1]EPANET 2 (Rossman 2000).

[2]Source-node identifications for operating wells or well fields:

2626, Holly (21, 30, and 37);
16711, Brookside (15);
16198, South Toms River (32 and 38);
55020, Indian Head (20);
4665, Parkway (22, 24, 26, 28, 29, 39, and 41);
55031, Route 70 (31);
1351, Berkeley (33, 34, and 35);
55040, Windsor (40).

APPENDIX G

TABLES OF SIMULATED PROPORTIONATE CONTRIBUTION OF WATER DERIVED USING THE MANUAL ADJUSTMENT PROCESS, DOVER TOWNSHIP AREA, NEW JERSEY 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

Table G-1. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1962

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 52 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	9	91	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	[2]0
	C	25	75	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
February	A	0	100	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	8	92	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
March	A	10	90	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	21	79	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
April	A	28	72	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	47	53	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
May	A	23	77	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	72	28	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
June	A	27	73	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	80	20	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
July	A	24	76	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	78	22	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
August	A	31	69	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	62	38	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0

Table G-1. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1962—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 52 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	33	67	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	84	16	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
October	A	41	59	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	72	28	—	—	—	—	—	—	—	—	100
	D	1	99	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
November	A	26	74	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	44	56	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
December	A	26	74	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	47	53	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0

[1]SUM: sum of percentages across row for each location.

[2]A sum of 0% indicates node was not part of water distribution-system for this month and year.

Table G-2. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1965

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 58 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	54	46	—	—	—	—	—	—	—	—	100
	B	91	9	—	—	—	—	—	—	—	—	100
	C	47	53	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
February[3]	A	56	44	—	—	—	—	—	—	—	—	100
	B	83	17	—	—	—	—	—	—	—	—	100
	C	39	61	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
March	A	56	44	—	—	—	—	—	—	—	—	100
	B	86	14	—	—	—	—	—	—	—	—	100
	C	43	57	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
April	A	89	11	—	—	—	—	—	—	—	—	100
	B	99	1	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	6	94	—	—	—	—	—	—	—	—	100
	E	3	97	—	—	—	—	—	—	—	—	100
May	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	78	22	—	—	—	—	—	—	—	—	100
	D	20	80	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
June	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	80	20	—	—	—	—	—	—	—	—	100
	D	20	80	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
July	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	78	22	—	—	—	—	—	—	—	—	100
	D	21	79	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
August	A	99	1	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	82	18	—	—	—	—	—	—	—	—	100
	D	22	78	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100

Table G-2. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1965—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 58 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	97	3	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	21	79	—	—	—	—	—	—	—	—	100
	E	1	99	—	—	—	—	—	—	—	—	100
October	A	87	13	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	6	94	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
November	A	73	27	—	—	—	—	—	—	—	—	100
	B	92	8	—	—	—	—	—	—	—	—	100
	C	37	63	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
December	A	59	41	—	—	—	—	—	—	—	—	100
	B	89	11	—	—	—	—	—	—	—	—	100
	C	38	62	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100

[1]SUM: sum of percentages across row for each location.

Table G-3. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1971

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 64 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	93	0	7	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	26	73	1	0	0	—	—	—	0	0	100
	E	32	62	0	6	0	—	—	—	0	0	100
February	A	85	0	15	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	46	44	2	8	0	—	—	—	0	0	100
	E	24	34	0	42	0	—	—	—	0	0	100
March	A	83	0	17	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	37	60	2	1	0	—	—	—	0	0	100
	E	36	54	1	9	0	—	—	—	0	0	100
April	A	84	0	16	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	41	54	1	3	0	—	—	—	0	0	99
	E	29	49	0	20	0	—	—	—	1	2	101
May	A	89	0	11	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	43	54	2	1	0	—	—	—	0	0	100
	E	22	24	0	18	0	—	—	—	1	35	100
June	A	88	0	12	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	44	52	3	1	1	—	—	—	0	0	101
	E	24	9	0	16	7	—	—	—	12	33	101
July	A	97	0	3	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	96	4	—	—	—	0	0	100
	D	30	54	0	3	14	—	—	—	0	0	101
	E	3	4	0	5	24	—	—	—	24	40	100
August	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	96	4	—	—	—	0	0	100
	D	39	61	0	0	1	—	—	—	0	0	101
	E	2	2	0	2	14	—	—	—	27	53	100

Table G-3. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1971—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 64 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	99	0	1	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	96	4	—	—	—	0	0	100
	D	18	75	0	2	6	—	—	—	0	0	101
	E	1	8	0	1	3	—	—	—	19	69	101
October	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	19	80	0	1	0	—	—	—	0	0	100
	E	0	2	0	0	0	—	—	—	21	77	100
November	A	99	0	1	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	2	0	0	98	0	—	—	—	0	0	100
	D	14	83	0	3	0	—	—	—	0	0	100
	E	4	50	0	15	0	—	—	—	9	22	100
December	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	27	72	0	1	0	—	—	—	0	0	100
	E	15	49	0	36	0	—	—	—	0	0	100

[1]SUM: sum of percentages across row for each location.

Table G-4. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1978

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 83 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	88	0	12	0	0	—	—	—	0	0	100
	B	20	0	0	50	30	—	—	—	0	0	100
	C	0	0	0	34	66	—	—	—	0	0	100
	D	70	0	3	3	23	—	—	—	0	0	99
	E	11	0	1	10	79	—	—	—	0	0	101
February	A	84	0	15	0	0	—	—	—	0	0	99
	B	10	0	0	53	36	—	—	—	0	0	99
	C	0	0	0	30	70	—	—	—	0	0	100
	D	55	0	3	4	39	—	—	—	0	0	101
	E	6	0	0	9	85	—	—	—	0	0	100
March	A	74	0	20	1	5	—	—	—	0	0	100
	B	8	0	0	53	39	—	—	—	0	0	100
	C	0	0	0	27	73	—	—	—	0	0	100
	D	50	0	4	4	43	—	—	—	0	0	101
	E	5	0	0	8	86	—	—	—	0	0	99
April	A	76	0	24	0	0	—	—	—	0	0	100
	B	18	0	0	38	44	—	—	—	0	0	100
	C	0	0	0	16	84	—	—	—	0	0	100
	D	44	22	7	2	26	—	—	—	0	0	101
	E	2	8	0	2	31	—	—	—	39	17	99
May	A	75	0	25	0	0	—	—	—	0	0	100
	B	14	0	0	54	32	—	—	—	0	0	100
	C	0	0	0	10	90	—	—	—	0	0	100
	D	34	30	6	1	28	—	—	—	0	0	99
	E	2	15	0	2	35	—	—	—	28	17	99
June	A	81	0	19	0	0	—	—	—	0	0	100
	B	14	0	0	43	44	—	—	—	0	0	101
	C	0	0	0	2	98	—	—	—	0	0	100
	D	25	42	4	0	30	—	—	—	0	0	101
	E	0	4	0	0	25	—	—	—	29	41	99
July	A	82	0	18	0	0	—	—	—	0	0	100
	B	15	0	0	40	45	—	—	—	0	0	100
	C	0	0	0	0	100	—	—	—	0	0	100
	D	23	46	3	0	28	—	—	—	0	0	100
	E	1	7	0	0	27	—	—	—	31	34	100
August	A	84	0	14	0	2	—	—	—	0	0	100
	B	16	0	0	46	38	—	—	—	0	0	100
	C	0	0	0	13	87	—	—	—	0	0	100
	D	18	59	4	0	19	—	—	—	0	0	100
	E	0	4	0	0	19	—	—	—	29	47	99

Table G-4. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1978—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 83 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	84	0	16	0	0	—	—	—	0	0	100
	B	18	0	0	48	34	—	—	—	0	0	100
	C	0	0	0	23	77	—	—	—	0	0	100
	D	25	48	4	0	23	—	—	—	0	0	100
	E	1	11	0	0	28	—	—	—	30	31	101
October	A	85	0	15	0	0	—	—	—	0	0	100
	B	25	0	0	48	27	—	—	—	0	0	100
	C	0	0	0	18	82	—	—	—	0	0	100
	D	40	48	2	1	9	—	—	—	0	0	100
	E	8	25	0	4	63	—	—	—	0	0	100
November	A	98	0	2	0	0	—	—	—	0	0	100
	B	17	0	0	47	36	—	—	—	0	0	100
	C	0	0	0	29	71	—	—	—	0	0	100
	D	56	10	0	2	31	—	—	—	0	0	99
	E	8	7	0	6	79	—	—	—	0	0	100
December	A	84	0	12	0	4	—	—	—	0	0	100
	B	19	0	0	0	81	—	—	—	0	0	100
	C	0	0	0	0	100	—	—	—	0	0	100
	D	56	0	3	0	41	—	—	—	0	0	100
	E	7	0	0	0	92	—	—	—	0	0	99

[1]SUM: sum of percentages across row for each location.

Table G-5. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1988

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 99 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	79	0	20	0	0	0	1	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	11	0	0	0	53	12	24	—	—	—	100
	D	40	54	1	0	4	0	1	—	—	—	100
	E	5	8	0	0	36	47	4	—	—	—	100
February	A	69	0	29	0	0	0	2	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	3	0	0	0	27	3	66	—	—	—	99
	D	74	6	4	0	11	0	5	—	—	—	100
	E	7	1	0	0	24	50	17	—	—	—	99
March	A	58	0	31	0	0	0	11	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	0	29	2	69	—	—	—	100
	D	44	35	2	0	6	1	12	—	—	—	100
	E	2	4	0	0	31	49	14	—	—	—	100
April	A	79	0	16	0	0	0	5	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	0	43	1	57	—	—	—	101
	D	41	47	1	0	8	0	3	—	—	—	100
	E	2	6	0	0	37	45	10	—	—	—	100
May	A	84	0	13	0	0	0	3	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	1	0	0	0	54	1	44	—	—	—	100
	D	56	36	1	0	6	0	1	—	—	—	100
	E	3	6	0	0	42	41	8	—	—	—	100
June	A	50	0	48	0	0	0	3	—	—	—	101
	B	15	0	0	1	1	0	83	—	—	—	100
	C	9	0	0	4	80	0	7	—	—	—	100
	D	46	30	7	0	15	0	1	—	—	—	99
	E	5	5	0	5	64	21	1	—	—	—	101
July	A	40	0	60	0	0	0	0	—	—	—	100
	B	8	0	0	0	0	0	91	—	—	—	99
	C	25	0	0	4	53	0	18	—	—	—	100
	D	49	26	11	0	14	0	1	—	—	—	101
	E	6	3	0	15	57	16	2	—	—	—	99
August	A	52	0	47	0	0	0	1	—	—	—	100
	B	49	0	0	1	4	0	47	—	—	—	101
	C	6	0	0	14	80	0	0	—	—	—	100
	D	45	32	9	1	13	0	0	—	—	—	100
	E	4	4	0	15	58	19	0	—	—	—	100

Table G-5. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1988—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 99 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	74	0	19	0	0	0	7	—	—	—	100
	B	1	0	0	0	0	0	99	—	—	—	100
	C	0	0	0	31	69	0	0	—	—	—	100
	D	24	25	0	5	43	0	3	—	—	—	100
	E	0	1	0	25	44	30	0	—	—	—	100
October	A	77	0	15	1	1	0	6	—	—	—	100
	B	0	0	0	22	31	0	46	—	—	—	99
	C	0	0	0	21	79	0	0	—	—	—	100
	D	22	0	0	8	69	0	1	—	—	—	100
	E	0	0	0	18	43	39	0	—	—	—	100
November	A	58	0	28	0	0	0	14	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	54	27	2	17	—	—	—	100
	D	30	32	1	10	17	1	9	—	—	—	100
	E	1	2	0	25	22	47	3	—	—	—	100
December	A	0	0	17	2	13	0	68	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	15	71	13	0	—	—	—	99
	D	0	0	0	4	90	1	5	—	—	—	100
	E	0	0	0	4	47	48	0	—	—	—	99

[1]SUM: sum of percentages across row for each location.

Table G-6. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1995

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 118 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	0	0	90	0	0	0	10	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	8	82	0	10	0	—	—	100
	D	0	0	3	3	74	0	20	0	—	—	100
	E	0	0	0	27	44	23	6	0	—	—	100
February	A	0	0	55	0	0	0	45	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	12	88	0	0	0	—	—	100
	D	0	0	1	4	83	0	11	0	—	—	99
	E	0	0	0	29	43	27	0	0	—	—	99
March	A	0	0	5	2	24	0	69	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	11	87	0	1	0	—	—	99
	D	0	0	0	7	90	0	3	0	—	—	100
	E	0	0	0	28	43	29	1	0	—	—	101
April	A	7	0	75	0	0	0	18	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	3	86	0	11	0	—	—	100
	D	9	0	3	2	67	0	18	0	—	—	99
	E	0	0	0	22	55	21	2	0	—	—	100
May	A	32	0	63	0	0	0	4	0	—	—	99
	B	0	0	0	1	1	0	98	0	—	—	100
	C	0	0	0	0	86	0	14	0	—	—	100
	D	42	0	5	0	44	0	8	0	—	—	99
	E	0	0	0	18	58	20	3	0	—	—	99
June	A	54	0	42	0	0	0	4	0	—	—	100
	B	22	0	0	0	1	0	77	0	—	—	100
	C	2	0	0	0	94	0	4	0	—	—	100
	D	73	2	4	0	18	0	4	0	—	—	101
	E	2	0	0	14	73	9	1	0	—	—	99
July	A	27	0	71	0	0	0	2	0	—	—	100
	B	41	0	0	0	6	0	53	0	—	—	100
	C	18	0	0	0	79	0	2	0	—	—	99
	D	73	6	9	0	10	0	1	0	—	—	99
	E	7	1	0	13	71	9	1	0	—	—	102
August	A	24	0	76	0	0	0	0	0	—	—	100
	B	59	0	0	1	17	0	24	0	—	—	101
	C	12	0	0	1	87	0	0	0	—	—	100
	D	55	12	23	0	2	0	0	7	—	—	99
	E	11	7	1	5	69	6	0	1	—	—	100

Table G-6. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1995—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 118 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	54	0	40	0	0	0	6	0	—	—	100
	B	27	0	0	1	0	0	72	0	—	—	100
	C	14	0	0	3	77	0	6	0	—	—	100
	D	66	18	4	0	9	0	4	0	—	—	101
	E	4	1	0	14	70	9	1	0	—	—	99
October	A	66	0	0	0	0	0	34	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	4	79	0	17	0	—	—	100
	D	29	0	0	2	50	0	19	0	—	—	100
	E	0	0	0	22	54	20	5	0	—	—	101
November	A	0	0	0	1	16	0	83	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	5	81	0	14	0	—	—	100
	D	0	0	0	5	81	0	14	0	—	—	100
	E	0	0	0	32	38	24	7	0	—	—	101
December	A	0	0	0	1	12	0	87	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	6	77	0	17	0	—	—	100
	D	0	0	0	6	82	0	12	0	—	—	100
	E	0	0	0	28	36	26	10	0	—	—	100

[1]SUM: sum of percentages across row for each location.

Table G-7. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1996

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 137 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	0	0	12	0	8	0	79	0	—	—	99
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	7	79	0	14	0	—	—	100
	D	0	0	0	4	74	0	21	0	—	—	99
	E	0	0	0	22	46	27	5	0	—	—	100
February	A	0	0	16	4	48	0	31	0	—	—	99
	B	0	0	0	2	19	0	79	0	—	—	100
	C	0	0	0	8	92	0	0	0	—	—	100
	D	0	0	2	6	89	0	3	0	—	—	100
	E	0	0	0	28	48	24	0	0	—	—	100
March	A	26	0	26	0	25	0	22	0	—	—	99
	B	0	0	0	1	20	0	80	0	—	—	101
	C	0	0	0	11	88	0	0	0	—	—	99
	D	10	0	2	4	79	0	5	0	—	—	100
	E	0	0	0	24	51	24	0	0	—	—	99
April	A	48	0	52	0	0	0	0	0	—	—	100
	B	38	0	0	0	0	0	61	0	—	—	99
	C	13	0	0	0	85	0	1	0	—	—	99
	D	85	0	6	0	8	0	1	0	—	—	100
	E	4	0	0	4	91	0	0	0	—	—	99
May	A	64	0	35	0	0	0	0	0	—	—	99
	B	56	0	0	0	8	0	36	0	—	—	100
	C	20	0	0	0	80	0	0	0	—	—	100
	D	80	7	6	0	7	0	0	0	—	—	100
	E	8	2	0	0	89	0	0	0	—	—	99
June	A	68	0	27	0	0	0	5	0	—	—	100
	B	36	0	0	0	2	0	62	0	—	—	100
	C	19	0	0	0	74	0	7	0	—	—	100
	D	66	2	9	0	2	0	4	17	—	—	100
	E	13	2	1	0	74	5	2	3	—	—	100
July	A	35	0	65	0	0	0	0	0	—	—	100
	B	10	0	0	0	0	0	90	0	—	—	100
	C	17	0	0	0	69	0	14	0	—	—	100
	D	80	0	15	0	3	0	1	0	—	—	99
	E	12	0	1	6	70	7	4	1	—	—	101
August	A	40	0	60	0	0	0	0	0	—	—	100
	B	20	0	0	0	0	0	80	0	—	—	100
	C	20	0	0	0	65	0	14	0	—	—	99
	D	66	0	14	0	1	0	1	18	—	—	100
	E	17	0	1	0	68	7	5	3	—	—	101

Table G-7. Simulated proportionate contribution of water from well or well field to selected pipe-line locations using manual adjustment process, Dover Township area, New Jersey, 1996—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 137 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	23	0	76	0	0	0	1	0	—	—	100
	B	0	0	0	0	3	0	97	0	—	—	100
	C	2	0	0	0	71	0	27	0	—	—	100
	D	67	0	13	0	14	0	6	0	—	—	100
	E	4	0	0	0	77	10	9	0	—	—	100
October	A	7	0	83	0	0	0	11	0	—	—	101
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	0	92	0	8	0	—	—	100
	D	9	0	6	0	65	0	20	0	—	—	100
	E	0	0	0	0	76	20	4	0	—	—	100
November	A	48	0	33	0	0	0	19	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	0	49	0	51	0	—	—	100
	D	56	0	6	0	2	0	16	21	—	—	101
	E	5	0	0	0	59	18	13	5	—	—	100
December	A	96	0	0	0	0	0	4	0	—	—	100
	B	3	0	0	0	0	0	97	0	—	—	100
	C	30	0	0	0	0	0	70	0	—	—	100
	D	1	0	0	0	0	0	0	99	—	—	100
	E	33	0	0	0	0	23	13	30	—	—	99

[1]SUM: sum of percentages across row for each location.

APPENDIX H

GRAPHS OF SIMULATED PROPORTIONATE CONTRIBUTION OF WATER DERIVED USING THE MANUAL ADJUSTMENT PROCESS, DOVER TOWNSHIP AREA, NEW JERSEY MINIMUM-, MAXIMUM-, AND AVERAGE-DEMAND MONTHS 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

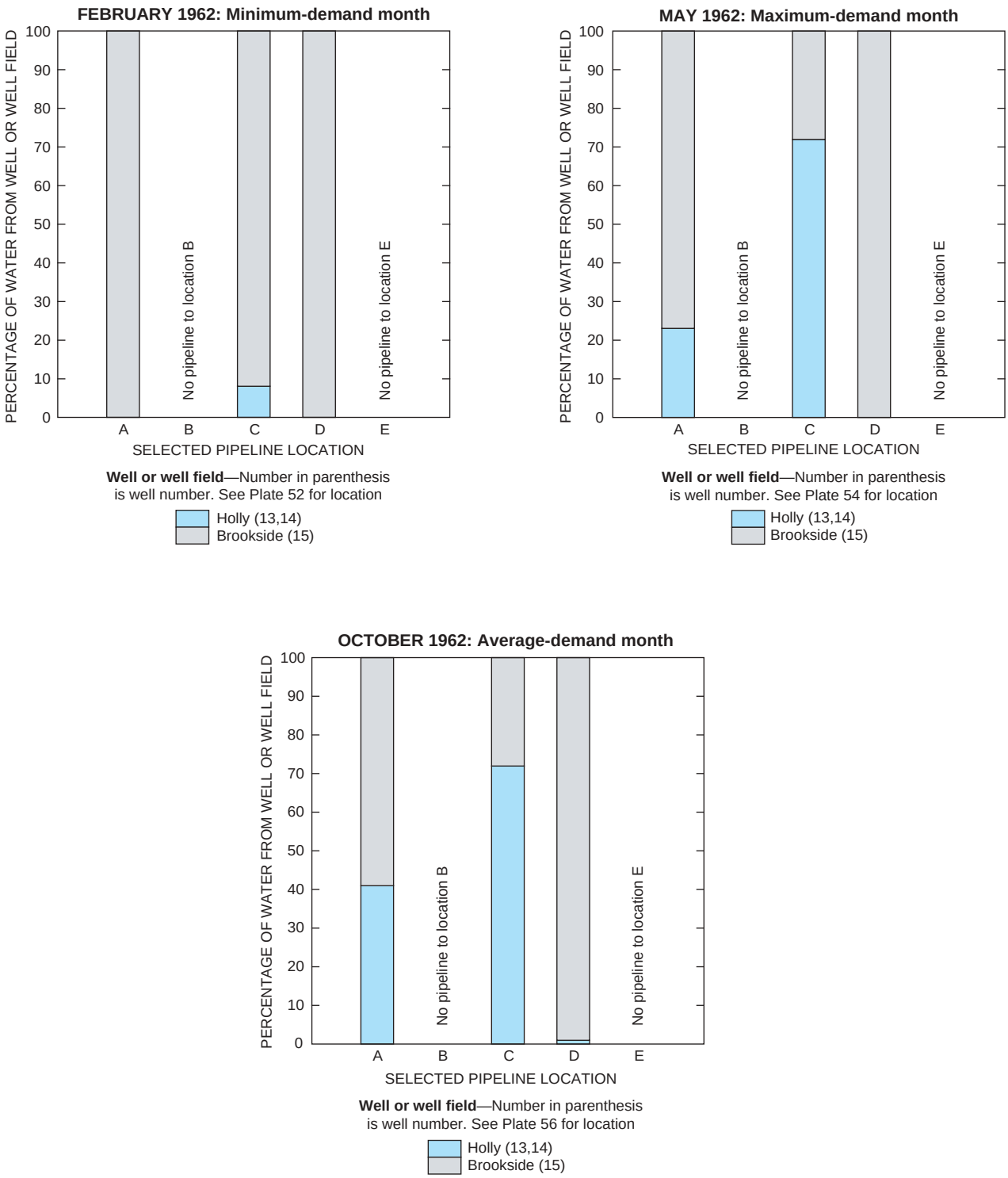

Figure H-1. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1962.

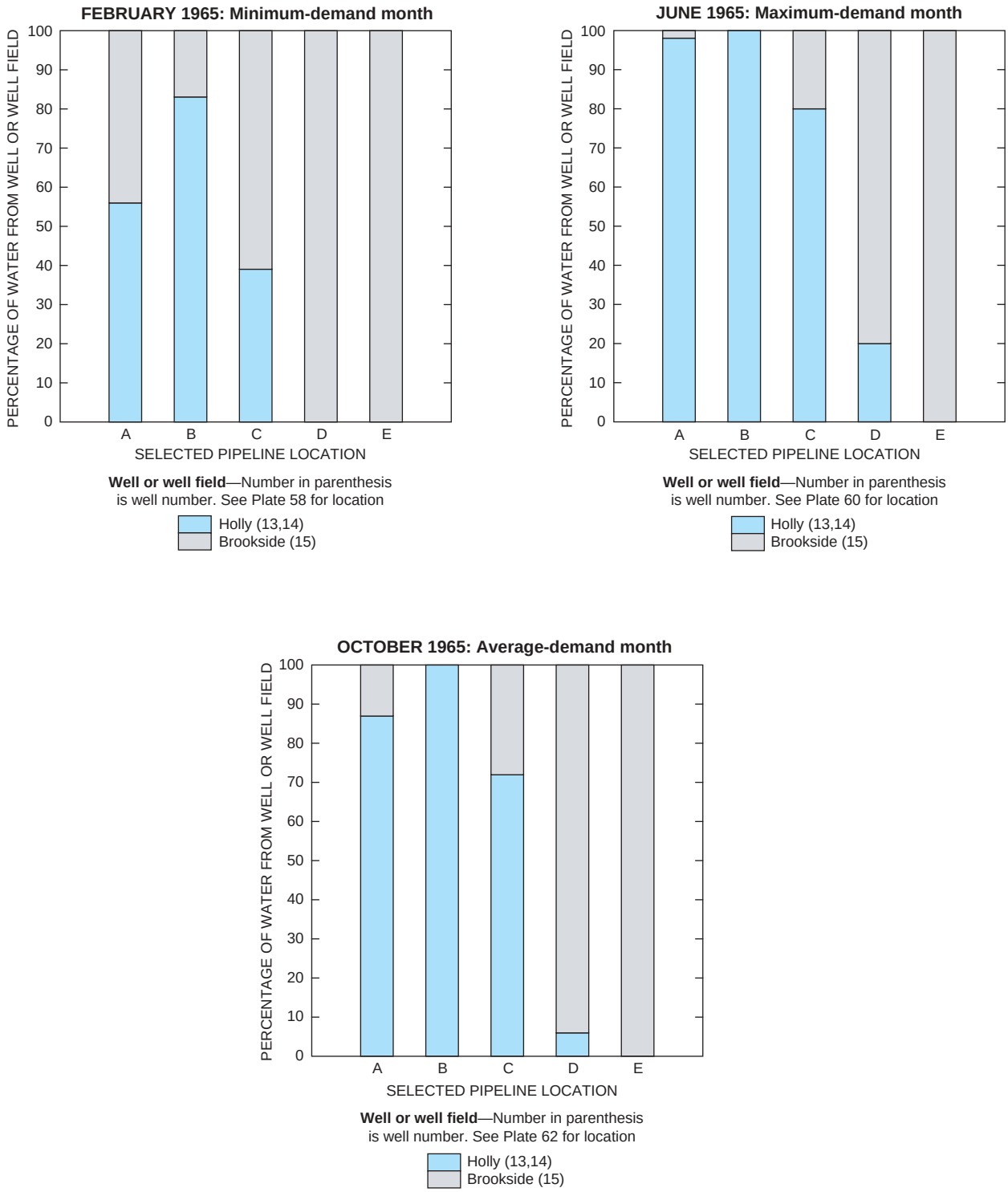

Figure H-2. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1965.

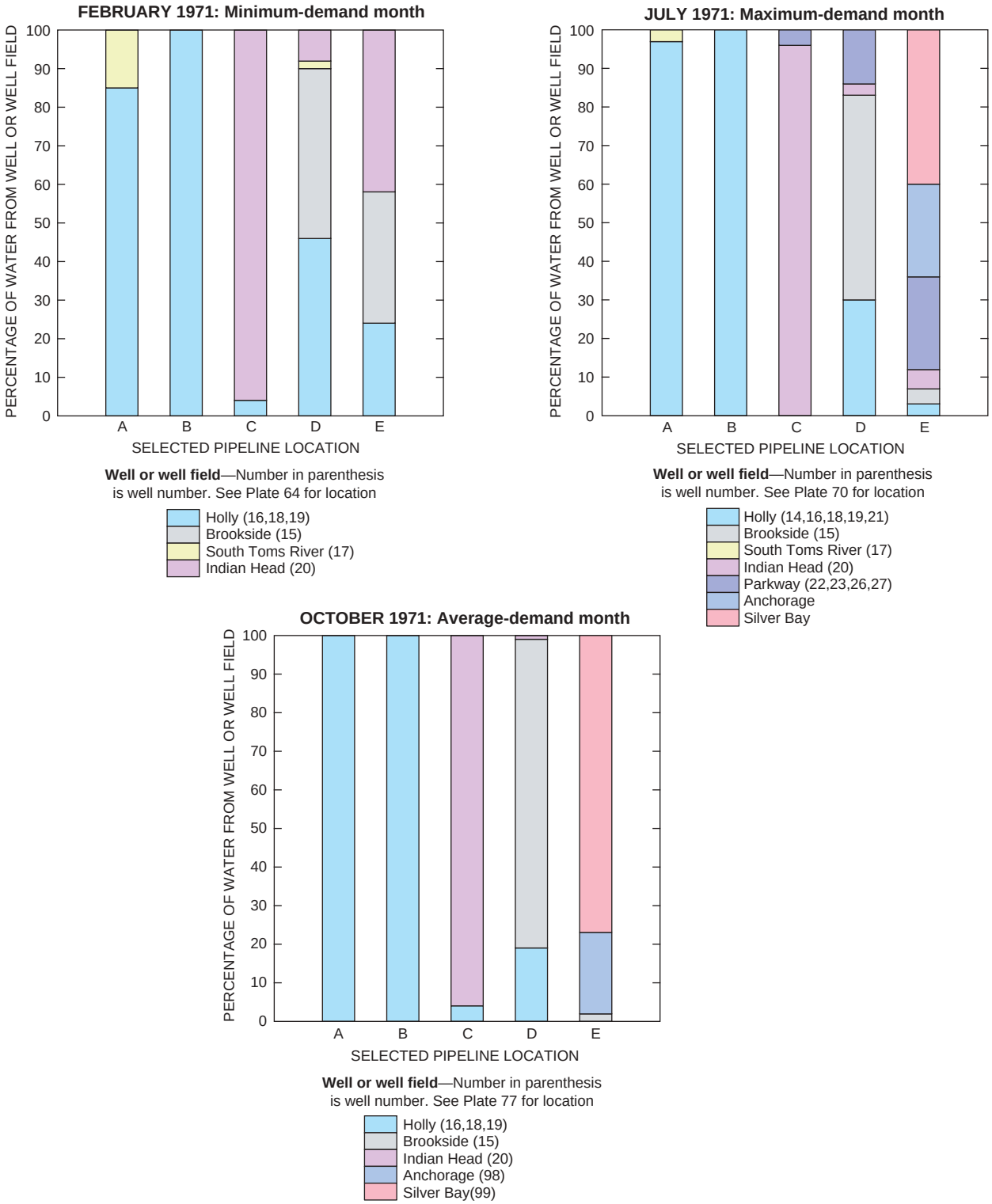

Figure H-3. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1971.

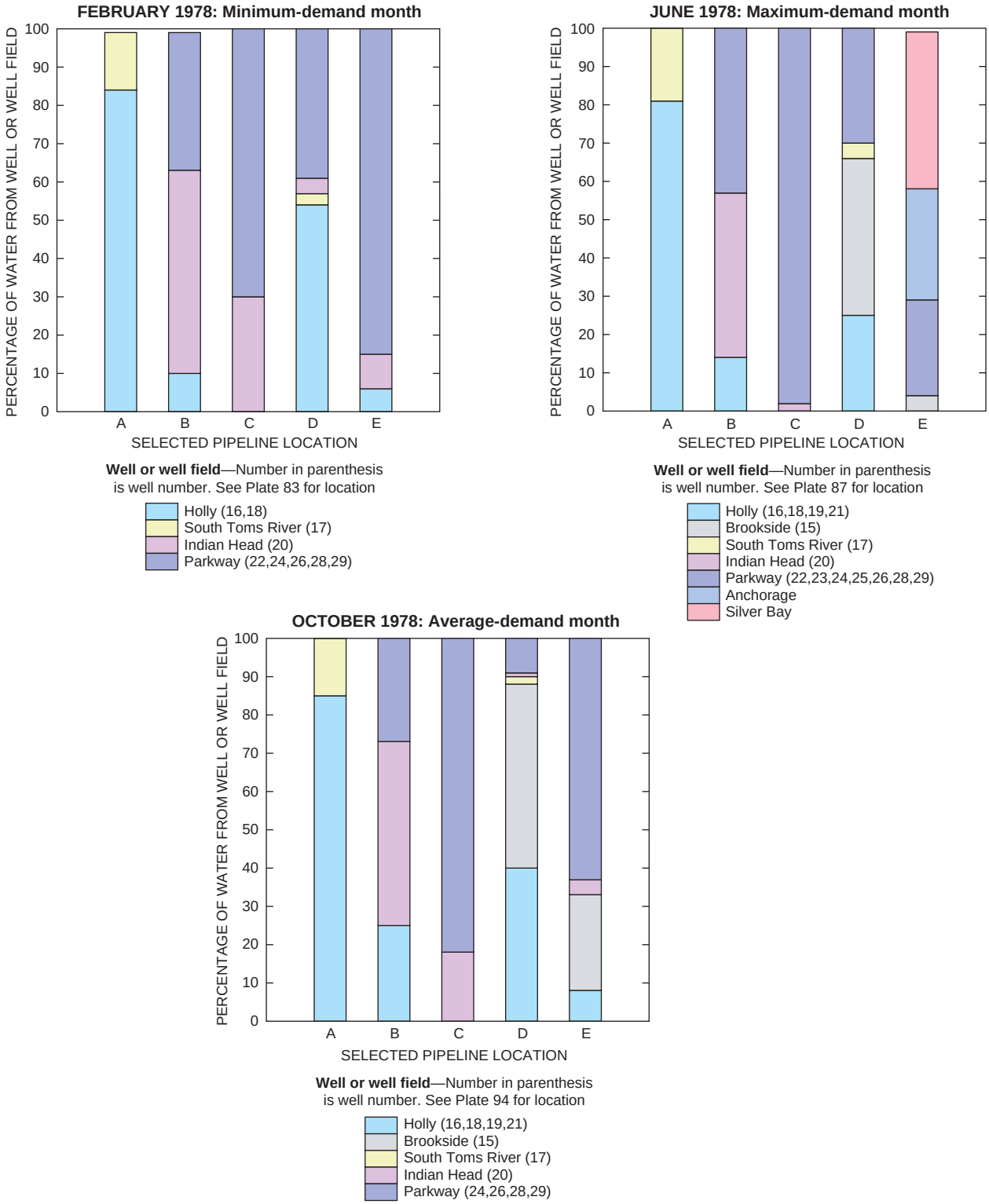

Figure H-4. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1978.

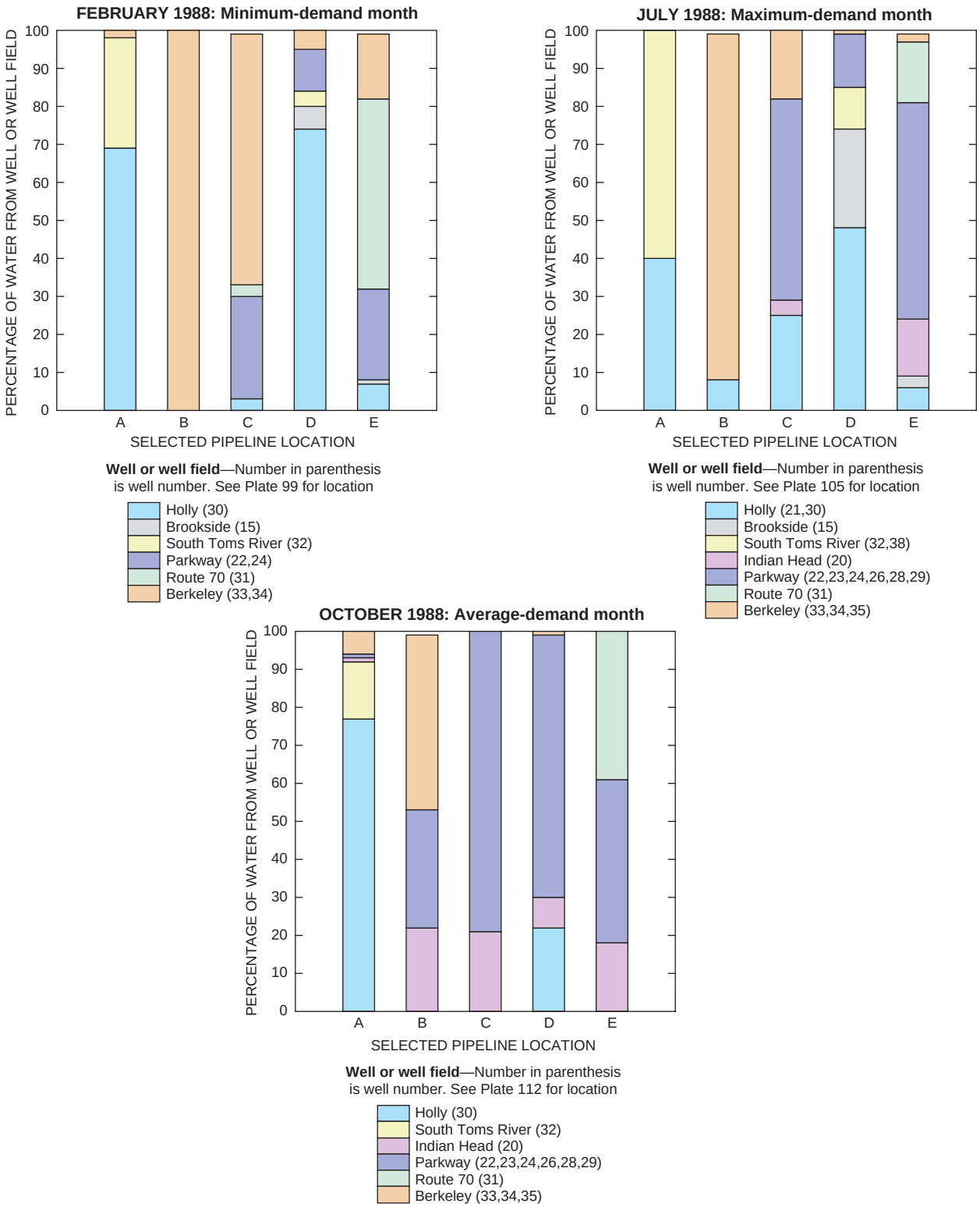

Figure H-5. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1988.

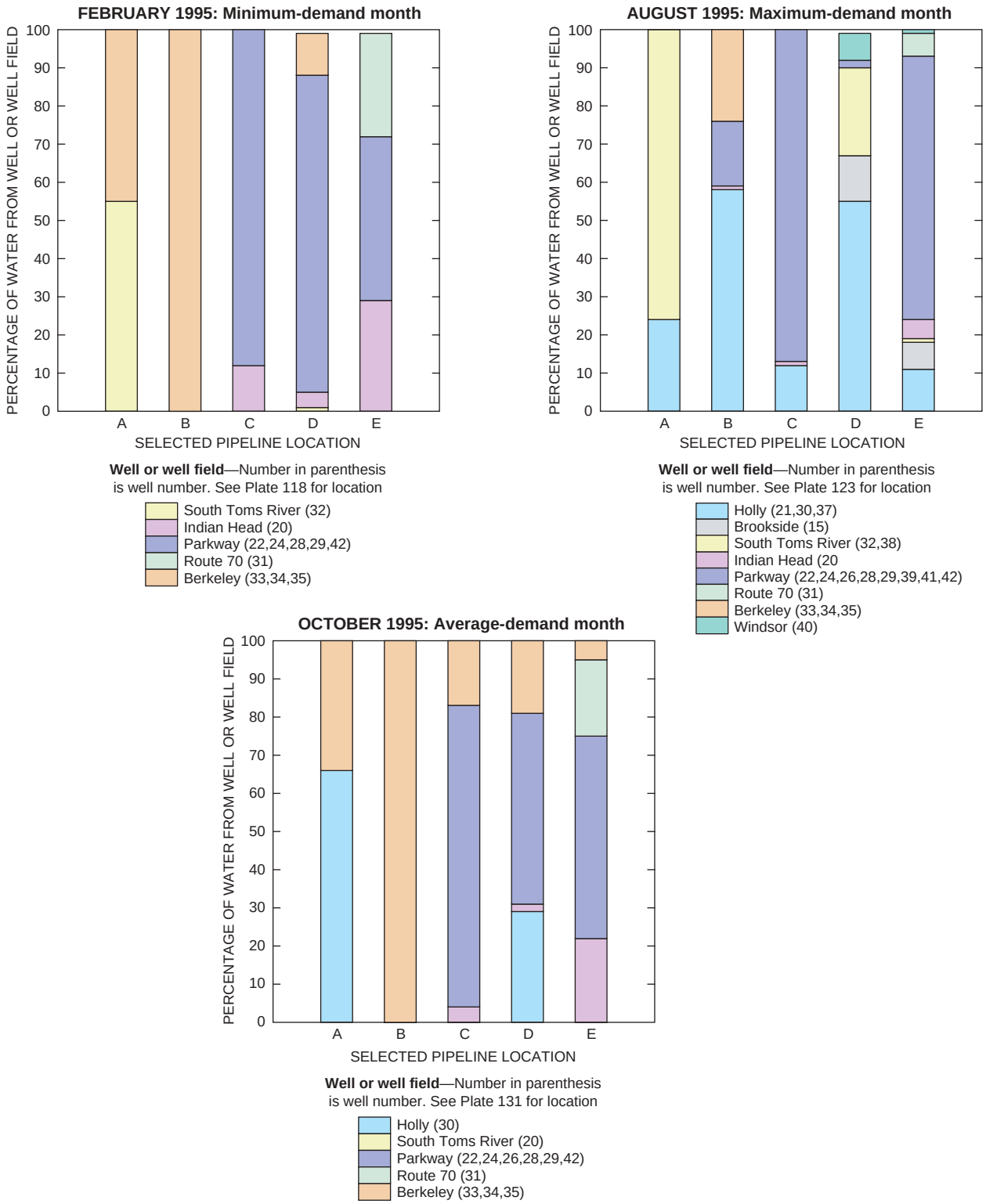

Figure H-6. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1995.

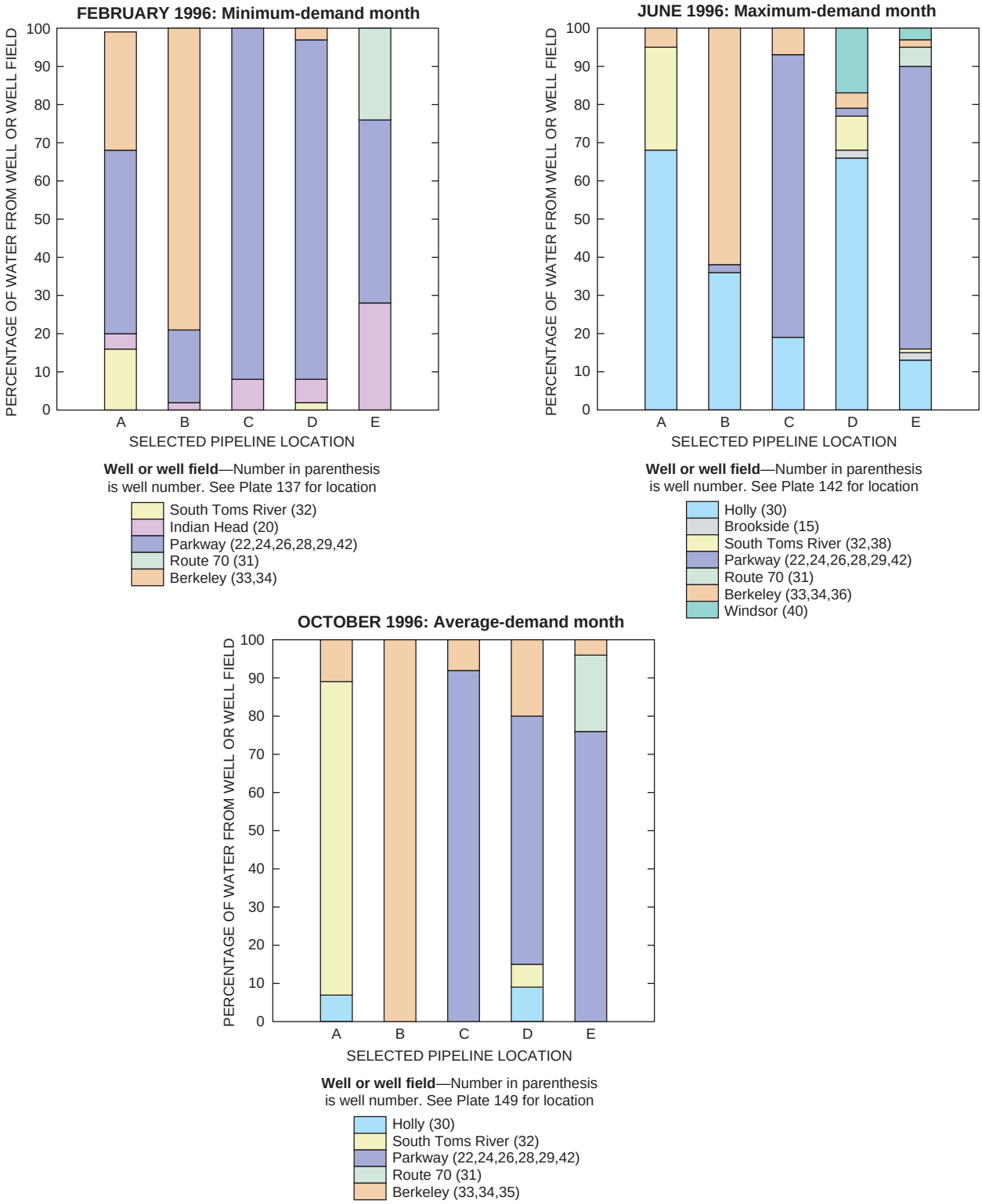

Figure H-7. Simulated proportionate contribution of water derived using the manual adjustment process, Dover Township area, New Jersey, 1996.

APPENDIX I

TABLES OF SIMULATED PROPORTIONATE CONTRIBUTION OF WATER DERIVED USING GENETIC ALGORITHM (GA) METHODS, SENSITIVITY ANALYSES SENS0, DOVER TOWNSHIP AREA, NEW JERSEY 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

Table I-1. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1962

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 52 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	2	98	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	[2]0
	C	25	75	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
February	A	0	100	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	1	99	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
March	A	11	89	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	31	69	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
April	A	15	85	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	43	57	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
May	A	21	79	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	73	27	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
June	A	28	72	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	85	15	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
July	A	22	78	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	84	16	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
August	A	22	78	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	49	51	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0

Table I-1. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1962—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 52 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	41	59	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	90	10	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
October	A	39	61	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	76	24	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
November	A	23	77	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	40	60	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0
December	A	23	77	—	—	—	—	—	—	—	—	100
	B	0	0	—	—	—	—	—	—	—	—	0
	C	44	57	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	0	—	—	—	—	—	—	—	—	0

[1]SUM: sum of percentages across row for each location.

[2]A sum of 0% indicates node was not part of water distribution-system for this month and year.

Table I-2. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1965

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 58 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	54	46	—	—	—	—	—	—	—	—	100
	B	91	9	—	—	—	—	—	—	—	—	100
	C	47	53	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
February[3]	A	56	44	—	—	—	—	—	—	—	—	100
	B	83	17	—	—	—	—	—	—	—	—	100
	C	39	61	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
March	A	56	44	—	—	—	—	—	—	—	—	100
	B	86	14	—	—	—	—	—	—	—	—	100
	C	43	57	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
April	A	89	11	—	—	—	—	—	—	—	—	100
	B	99	1	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	6	94	—	—	—	—	—	—	—	—	100
	E	3	97	—	—	—	—	—	—	—	—	100
May	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	78	22	—	—	—	—	—	—	—	—	100
	D	20	80	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
June	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	80	20	—	—	—	—	—	—	—	—	100
	D	20	80	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
July	A	98	2	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	78	22	—	—	—	—	—	—	—	—	100
	D	21	79	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
August	A	99	1	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	82	18	—	—	—	—	—	—	—	—	100
	D	22	78	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100

Table I-2. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1965—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 58 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	97	3	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	21	79	—	—	—	—	—	—	—	—	100
	E	1	99	—	—	—	—	—	—	—	—	100
October	A	87	13	—	—	—	—	—	—	—	—	100
	B	100	0	—	—	—	—	—	—	—	—	100
	C	72	28	—	—	—	—	—	—	—	—	100
	D	6	94	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
November	A	73	27	—	—	—	—	—	—	—	—	100
	B	92	8	—	—	—	—	—	—	—	—	100
	C	37	63	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100
December	A	59	41	—	—	—	—	—	—	—	—	100
	B	89	11	—	—	—	—	—	—	—	—	100
	C	38	62	—	—	—	—	—	—	—	—	100
	D	0	100	—	—	—	—	—	—	—	—	100
	E	0	100	—	—	—	—	—	—	—	—	100

[1]SUM: sum of percentages across row for each location.

Table I-3. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1971

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 64 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	93	0	7	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	26	73	1	0	0	—	—	—	0	0	100
	E	34	60	0	6	0	—	—	—	0	0	100
February	A	84	0	16	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	44	45	2	9	0	—	—	—	0	0	100
	E	24	33	0	43	0	—	—	—	0	0	100
March	A	81	0	19	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	36	61	2	1	0	—	—	—	0	0	100
	E	40	48	1	12	0	—	—	—	0	0	101
April	A	79	0	21	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	7	0	0	93	0	—	—	—	0	0	100
	D	40	55	1	3	0	—	—	—	0	0	99
	E	28	48	0	20	0	—	—	—	2	2	100
May	A	89	0	11	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	43	55	2	1	0	—	—	—	0	0	101
	E	23	22	0	18	0	—	—	—	2	35	100
June	A	88	0	12	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	11	0	0	89	0	—	—	—	0	0	100
	D	44	52	3	0	1	—	—	—	0	0	100
	E	22	10	0	13	10	—	—	—	12	33	100
July	A	96	0	4	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	96	4	—	—	—	0	0	100
	D	29	53	0	3	15	—	—	—	0	0	100
	E	4	4	0	5	23	—	—	—	24	40	100
August	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	92	8	—	—	—	0	0	100
	D	41	58	0	0	1	—	—	—	0	0	100
	E	2	3	0	3	16	—	—	—	23	53	100

Table I-3. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1971—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node ; *see* Plate 64 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	0	0	0	96	4	—	—	—	0	0	100
	D	17	78	0	1	5	—	—	—	0	0	101
	E	0	7	0	1	3	—	—	—	20	69	100
October	A	99	0	1	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	4	0	0	96	0	—	—	—	0	0	100
	D	21	79	0	0	0	—	—	—	0	0	100
	E	0	0	0	0	0	—	—	—	16	84	100
November	A	99	0	1	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	2	0	0	98	0	—	—	—	0	0	100
	D	16	81	0	3	0	—	—	—	0	0	100
	E	7	43	0	17	0	—	—	—	9	25	101
December	A	100	0	0	0	0	—	—	—	0	0	100
	B	100	0	0	0	0	—	—	—	0	0	100
	C	3	0	0	97	0	—	—	—	0	0	100
	D	28	71	0	1	0	—	—	—	0	0	100
	E	16	50	0	34	0	—	—	—	0	0	100

[1]SUM: sum of percentages across row for each location.

Table I-4. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1978

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 83 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	81	0	19	0	0	—	—	—	0	0	100
	B	23	0	0	49	29	—	—	—	0	0	101
	C	0	0	0	34	66	—	—	—	0	0	100
	D	65	0	6	2	27	—	—	—	0	0	100
	E	10	0	1	11	78	—	—	—	0	0	100
February	A	81	0	19	0	0	—	—	—	0	0	100
	B	10	0	0	56	33	—	—	—	0	0	99
	C	0	0	0	29	71	—	—	—	0	0	100
	D	47	0	4	6	43	—	—	—	0	0	100
	E	6	0	0	4	89	—	—	—	0	0	99
March	A	80	0	12	2	6	—	—	—	0	0	100
	B	8	0	0	54	38	—	—	—	0	0	100
	C	0	0	0	31	69	—	—	—	0	0	100
	D	44	0	3	3	50	—	—	—	0	0	100
	E	5	0	0	4	90	—	—	—	0	0	99
April	A	76	0	24	0	0	—	—	—	0	0	100
	B	19	0	0	36	45	—	—	—	0	0	100
	C	0	0	0	15	85	—	—	—	0	0	100
	D	43	23	7	1	25	—	—	—	0	0	99
	E	1	6	0	3	35	—	—	—	35	19	99
May	A	75	0	25	0	0	—	—	—	0	0	100
	B	17	0	0	51	32	—	—	—	0	0	100
	C	0	0	0	13	87	—	—	—	0	0	100
	D	34	33	3	1	29	—	—	—	0	0	100
	E	2	15	0	1	46	—	—	—	20	16	100
June	A	80	0	20	0	0	—	—	—	0	0	100
	B	18	0	0	40	41	—	—	—	0	0	99
	C	0	0	0	1	99	—	—	—	0	0	100
	D	22	42	4	0	33	—	—	—	0	0	101
	E	0	5	0	0	23	—	—	—	32	39	99
July	A	80	0	20	0	0	—	—	—	0	0	100
	B	17	0	0	39	44	—	—	—	0	0	100
	C	0	0	0	0	100	—	—	—	0	0	100
	D	20	50	3	0	28	—	—	—	0	0	101
	E	1	7	0	0	34	—	—	—	31	27	100
August	A	92	0	6	0	2	—	—	—	0	0	100
	B	20	0	0	44	36	—	—	—	0	0	100
	C	0	0	0	16	84	—	—	—	0	0	100
	D	13	52	1	0	34	—	—	—	0	0	100
	E	0	4	0	0	16	—	—	—	40	40	100

Table I-4. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1978—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 83 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	86	0	14	0	0	—	—	—	0	0	100
	B	18	0	0	49	33	—	—	—	0	0	100
	C	0	0	0	17	83	—	—	—	0	0	100
	D	19	51	2	0	28	—	—	—	0	0	100
	E	1	15	0	0	31	—	—	—	23	29	99
October	A	84	0	16	0	0	—	—	—	0	0	100
	B	26	0	0	45	28	—	—	—	0	0	99
	C	0	0	0	29	71	—	—	—	0	0	100
	D	31	55	3	1	10	—	—	—	0	0	100
	E	5	27	0	5	63	—	—	—	0	0	100
November	A	96	0	4	0	0	—	—	—	0	0	100
	B	19	0	0	46	36	—	—	—	0	0	101
	C	0	0	0	30	70	—	—	—	0	0	100
	D	51	15	1	3	29	—	—	—	0	0	99
	E	7	6	0	2	84	—	—	—	0	0	99
December	A	72	0	25	0	3	—	—	—	0	0	100
	B	17	0	0	0	83	—	—	—	0	0	100
	C	0	0	0	0	100	—	—	—	0	0	100
	D	52	0	5	0	44	—	—	—	0	0	101
	E	7	0	1	0	93	—	—	—	0	0	101

[1]SUM: sum of percentages across row for each location.

Table I-5. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1988

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 99 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	80	0	20	0	0	0	0	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	13	0	0	0	54	9	23	—	—	—	99
	D	39	53	1	0	6	0	1	—	—	—	100
	E	5	8	0	0	39	45	2	—	—	—	99
February	A	71	0	29	0	0	0	1	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	5	0	0	0	24	0	71	—	—	—	100
	D	75	7	4	0	11	0	4	—	—	—	100
	E	7	1	0	0	28	46	18	—	—	—	100
March	A	50	0	34	0	0	0	16	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	0	22	2	75	—	—	—	99
	D	38	35	8	0	9	0	9	—	—	—	99
	E	3	7	0	0	38	40	12	—	—	—	100
April	A	80	0	16	0	0	0	5	—	—	—	101
	B	0	0	0	0	0	0	100	—	—	—	100
	C	1	0	0	0	39	1	60	—	—	—	101
	D	40	52	2	0	4	0	3	—	—	—	101
	E	2	6	0	0	40	44	9	—	—	—	101
May	A	83	0	14	0	0	0	3	—	—	—	100
	B	0	0	0	0	0	0	100	—	—	—	100
	C	1	0	0	0	46	0	53	—	—	—	100
	D	49	43	1	0	6	0	1	—	—	—	100
	E	2	3	0	0	50	37	8	—	—	—	100
June	A	48	0	49	0	0	0	3	—	—	—	100
	B	16	0	0	0	1	0	83	—	—	—	100
	C	9	0	0	4	80	0	7	—	—	—	100
	D	46	30	7	0	16	0	1	—	—	—	100
	E	5	5	0	5	63	22	1	—	—	—	101
July	A	40	0	60	0	0	0	0	—	—	—	100
	B	10	0	0	0	0	0	90	—	—	—	100
	C	17	0	0	4	65	0	14	—	—	—	100
	D	48	28	9	0	14	0	1	—	—	—	100
	E	5	3	0	15	59	15	2	—	—	—	99
August	A	52	0	47	0	0	0	1	—	—	—	100
	B	46	0	0	1	4	0	49	—	—	—	100
	C	6	0	0	15	79	0	0	—	—	—	100
	D	45	32	9	0	13	0	0	—	—	—	99
	E	4	4	0	15	57	20	0	—	—	—	100

Table I-5. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1988—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 99 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	72	0	19	0	0	0	8	—	—	—	99
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	34	65	0	0	—	—	—	99
	D	24	24	0	5	43	0	4	—	—	—	100
	E	0	1	0	25	44	30	0	—	—	—	100
October	A	73	0	22	1	1	0	4	—	—	—	101
	B	0	0	0	16	26	0	58	—	—	—	100
	C	0	0	0	22	78	0	0	—	—	—	100
	D	20	0	0	7	72	0	1	—	—	—	100
	E	0	0	0	17	44	39	0	—	—	—	100
November	A	58	0	30	0	0	0	13	—	—	—	101
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	42	29	1	27	—	—	—	99
	D	30	26	1	11	20	1	11	—	—	—	100
	E	1	2	0	22	29	43	4	—	—	—	101
December	A	0	0	18	3	21	0	57	—	—	—	99
	B	0	0	0	0	0	0	100	—	—	—	100
	C	0	0	0	18	75	7	0	—	—	—	100
	D	0	0	0	6	88	1	5	—	—	—	100
	E	0	0	0	4	56	39	1	—	—	—	100

[1]SUM: sum of percentages across row for each location.

Table I-6. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1995

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 118 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	0	0	80	0	0	0	20	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	13	69	0	18	0	—	—	100
	D	0	0	4	4	69	0	23	0	—	—	100
	E	0	0	0	24	42	28	6	0	—	—	100
February	A	0	0	50	0	1	0	49	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	19	78	0	3	0	—	—	100
	D	0	0	3	8	77	0	13	0	—	—	100
	E	0	0	0	25	46	30	0	0	—	—	100
March	A	0	0	10	1	31	0	58	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	11	80	0	10	0	—	—	100
	D	0	0	0	3	93	0	4	0	—	—	100
	E	0	0	0	24	45	30	1	0	—	—	100
April	A	6	0	66	1	2	0	26	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	15	76	0	9	0	—	—	100
	D	5	0	4	3	73	0	16	0	—	—	100
	E	0	0	0	15	58	24	4	0	—	—	100
May	A	37	0	59	0	0	0	4	0	—	—	100
	B	0	0	0	9	8	0	83	0	—	—	100
	C	0	0	0	4	76	0	21	0	—	—	100
	D	37	0	6	1	47	0	10	0	—	—	100
	E	1	0	0	17	58	19	6	0	—	—	100
June	A	54	0	41	0	0	0	5	0	—	—	100
	B	39	0	0	5	3	0	54	0	—	—	100
	C	4	0	0	2	80	0	14	0	—	—	100
	D	64	2	6	0	23	0	5	0	—	—	100
	E	2	0	0	12	70	14	3	0	—	—	100
July	A	22	0	76	0	0	0	2	0	—	—	100
	B	45	0	0	4	15	0	36	0	—	—	100
	C	11	0	0	7	75	0	7	0	—	—	100
	D	66	9	9	0	14	0	2	0	—	—	100
	E	4	0	0	10	74	11	2	0	—	—	100
August	A	25	0	74	0	0	0	1	0	—	—	100
	B	50	0	0	2	32	0	17	0	—	—	100
	C	14	0	0	1	82	0	3	0	—	—	100
	D	45	15	23	0	5	0	1	11	—	—	100
	E	8	3	2	7	72	7	1	2	—	—	100

Table I-6. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1995—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 118 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	49	0	45	0	0	0	6	0	—	—	100
	B	44	0	0	0	5	0	51	0	—	—	100
	C	8	0	0	3	70	0	19	0	—	—	100
	D	62	17	7	0	10	0	4	0	—	—	100
	E	2	1	0	11	78	9	1	0	—	—	101
October	A	66	0	0	0	0	0	34	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	7	70	0	22	0	—	—	100
	D	25	0	0	2	56	0	17	0	—	—	100
	E	0	0	0	18	56	22	5	0	—	—	100
November	A	0	0	0	3	20	0	77	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	5	70	0	24	0	—	—	100
	D	0	0	0	3	81	0	16	0	—	—	100
	E	0	0	0	22	46	26	6	0	—	—	100
December	A	0	0	3	3	15	0	79	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	7	55	0	38	0	—	—	100
	D	0	0	0	3	84	0	13	0	—	—	100
	E	0	0	0	23	45	27	6	0	—	—	100

[1]SUM: sum of percentages across row for each location.

Table I-7. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1996

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 137 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
January	A	0	0	4	1	9	0	86	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	19	66	0	15	0	—	—	100
	D	0	0	0	5	81	0	13	0	—	—	99
	E	0	0	0	28	40	27	5	0	—	—	100
February	A	0	0	12	7	49	0	32	0	—	—	100
	B	0	0	0	6	8	0	87	0	—	—	101
	C	0	0	0	8	92	0	0	0	—	—	100
	D	0	0	0	4	94	0	2	0	—	—	100
	E	0	0	0	27	49	25	0	0	—	—	101
March	A	28	0	17	3	27	0	26	0	—	—	101
	B	0	0	0	4	12	0	84	0	—	—	100
	C	0	0	0	6	93	0	0	0	—	—	99
	D	5	0	1	3	86	0	5	0	—	—	100
	E	0	0	0	28	48	24	0	0	—	—	100
April	A	49	0	50	0	0	0	1	0	—	—	100
	B	36	0	0	0	0	0	64	0	—	—	100
	C	9	0	0	1	88	0	1	0	—	—	99
	D	82	0	5	0	12	0	1	0	—	—	100
	E	3	0	0	4	92	0	0	0	—	—	99
May	A	68	0	32	0	0	0	0	0	—	—	100
	B	60	0	0	0	8	0	32	0	—	—	100
	C	3	0	0	0	97	0	0	0	—	—	100
	D	74	0	7	0	10	0	0	0	—	—	100
	E	7	0	0	0	91	0	0	1	—	—	101
June	A	61	0	30	0	0	0	9	0	—	—	100
	B	38	0	0	0	3	0	59	0	—	—	100
	C	13	0	0	0	83	0	4	0	—	—	100
	D	62	0	12	0	3	0	6	15	—	—	101
	E	11	0	1	0	76	5	1	2	—	—	99
July	A	39	0	61	0	0	0	0	0	—	—	100
	B	13	0	0	0	0	0	87	0	—	—	100
	C	24	0	0	0	57	0	19	0	—	—	100
	D	81	0	13	0	5	0	1	0	—	—	100
	E	11	0	1	5	67	12	4	0	—	—	100
August	A	40	0	60	0	0	0	0	0	—	—	100
	B	19	0	0	0	0	0	81	0	—	—	100
	C	13	0	0	0	78	0	10	0	—	—	101
	D	66	0	13	0	2	0	1	18	—	—	100
	E	16	0	1	0	65	12	3	3	—	—	100

Table I-7. Simulated proportionate contribution of water from well or well field to selected pipeline locations, Genetic Algorithm (GA) simulation SENS0, Dover Township area, New Jersey, 1996—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node; *see* Plate 137 for pipeline location]

Month	Pipeline location	Water contributed from well or well field (percentage)										
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay	SUM[1]
September	A	25	0	73	0	0	0	1	0	—	—	99
	B	0	0	0	0	0	0	100	0	—	—	100
	C	3	0	0	0	65	0	32	0	—	—	100
	D	62	0	12	0	21	0	6	0	—	—	101
	E	4	0	0	0	75	10	10	0	—	—	99
October	A	6	0	81	0	0	0	14	0	—	—	101
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	0	87	0	13	0	—	—	100
	D	8	0	5	0	69	0	17	0	—	—	99
	E	0	0	0	0	72	23	6	0	—	—	101
November	A	54	0	30	0	0	0	16	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	0	0	0	0	47	0	53	0	—	—	100
	D	62	0	8	0	2	0	17	11	—	—	100
	E	6	0	1	0	51	24	15	4	—	—	101
December	A	96	0	0	0	0	0	4	0	—	—	100
	B	0	0	0	0	0	0	100	0	—	—	100
	C	43	0	0	0	0	0	57	0	—	—	100
	D	2	0	0	0	0	0	0	98	—	—	100
	E	34	0	0	0	0	21	16	30	—	—	101

[1]SUM: sum of percentages across row for each location.

APPENDIX J

GRAPHS OF SIMULATED PROPORTIONATE CONTRIBUTION OF WATER DERIVED USING GENETIC ALGORITHM (GA) METHODS, SENSITIVITY ANALYSES SENS0, DOVER TOWNSHIP AREA, NEW JERSEY, MINIMUM-, MAXIMUM-, AND AVERAGE-DEMAND MONTHS 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

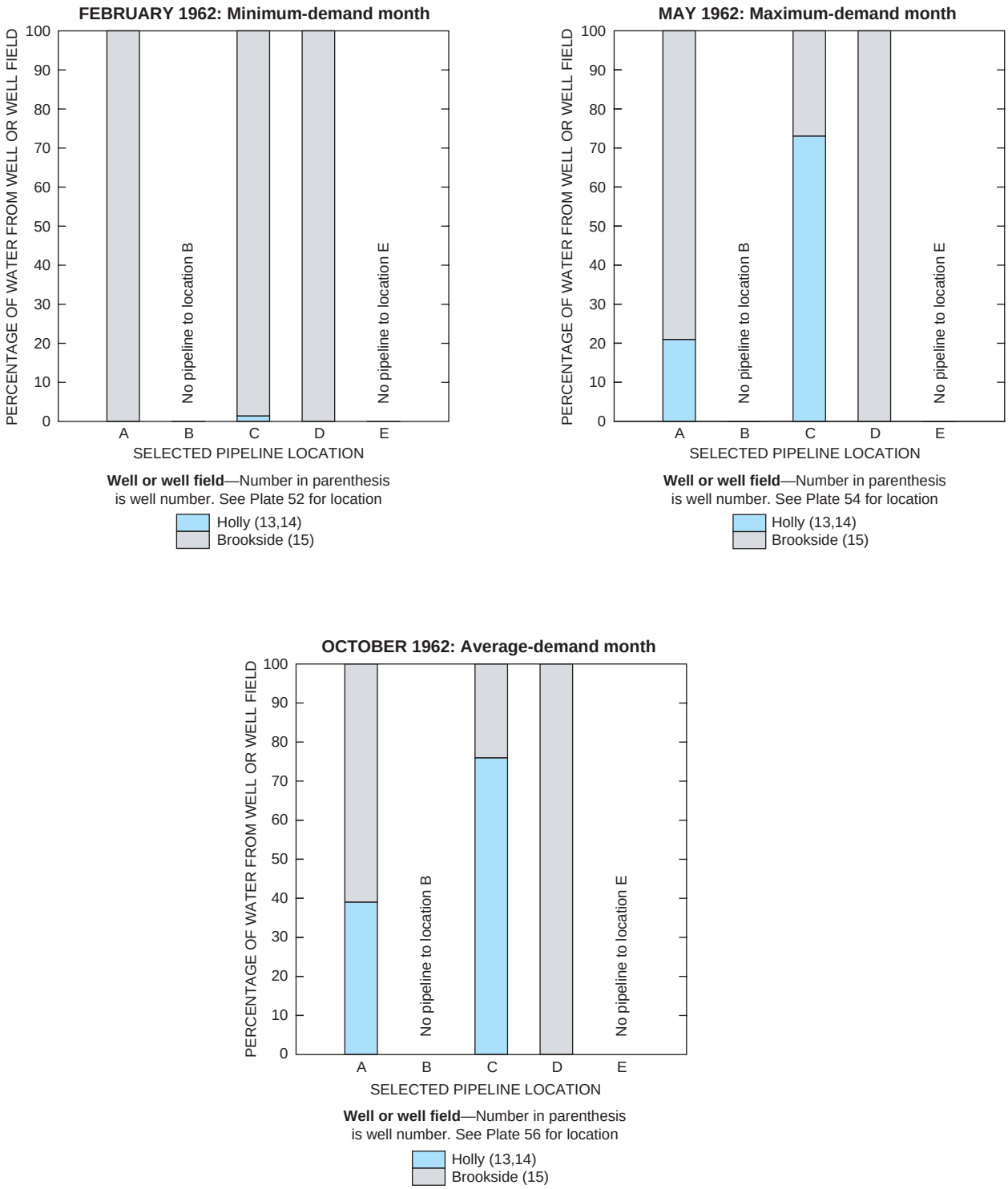

Figure J-1. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1962 [Genetic Algorithm (GA) optimization simulation SENS0].

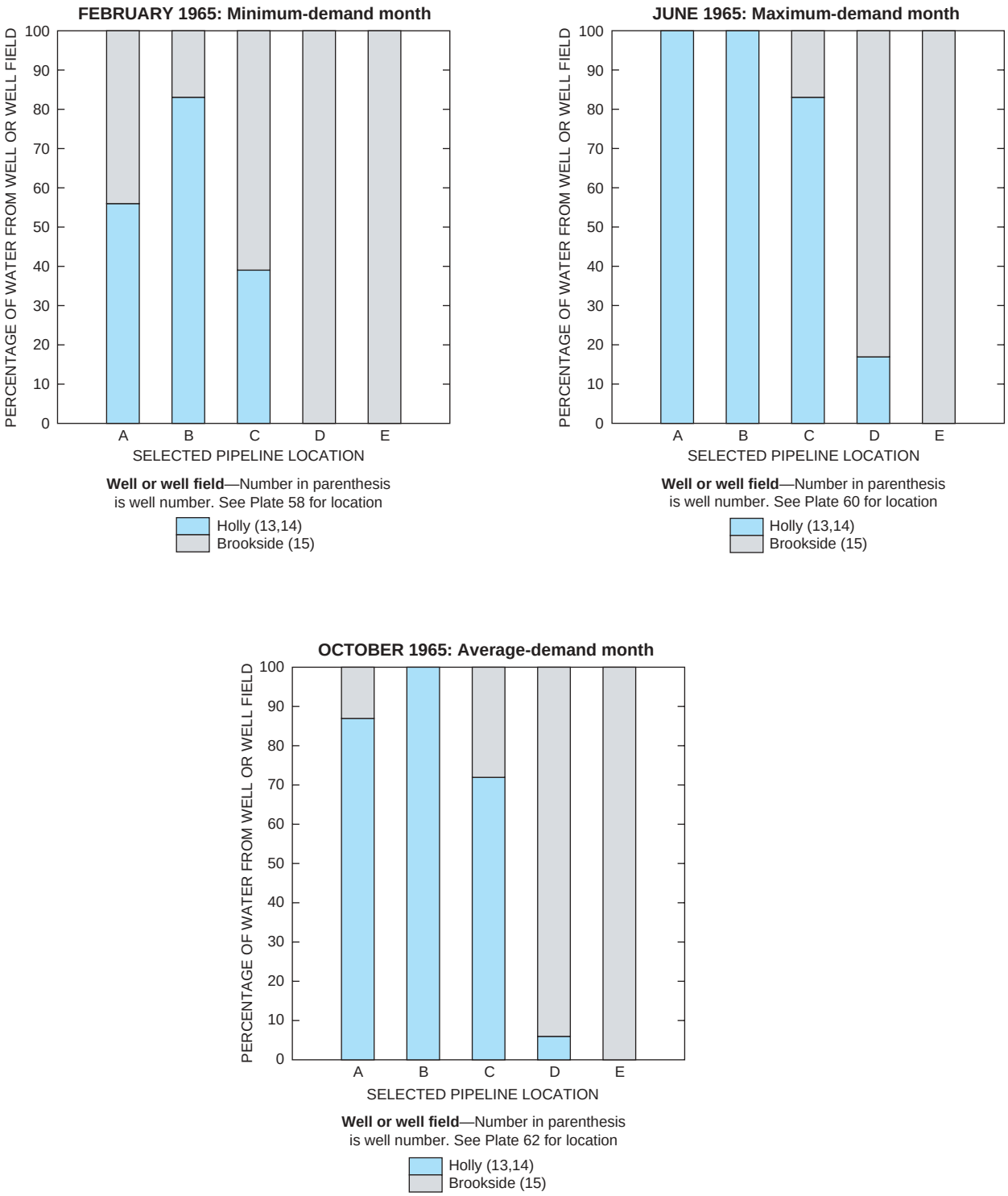

Figure J-2. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1965 [Genetic Algorithm (GA) optimization simulation SENS0].

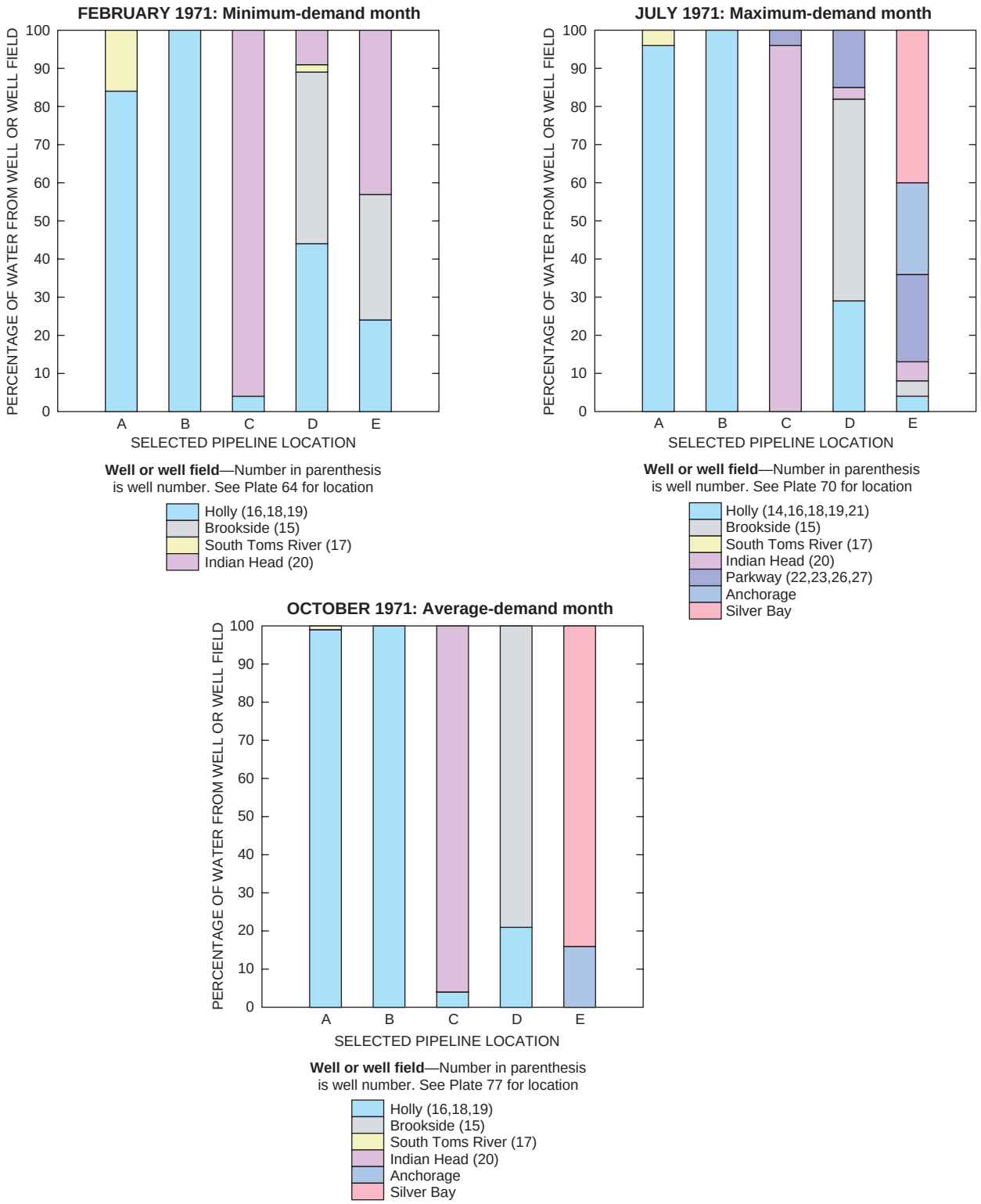

Figure J-3. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1971 [Genetic Algorithm (GA) optimization simulation SENS0].

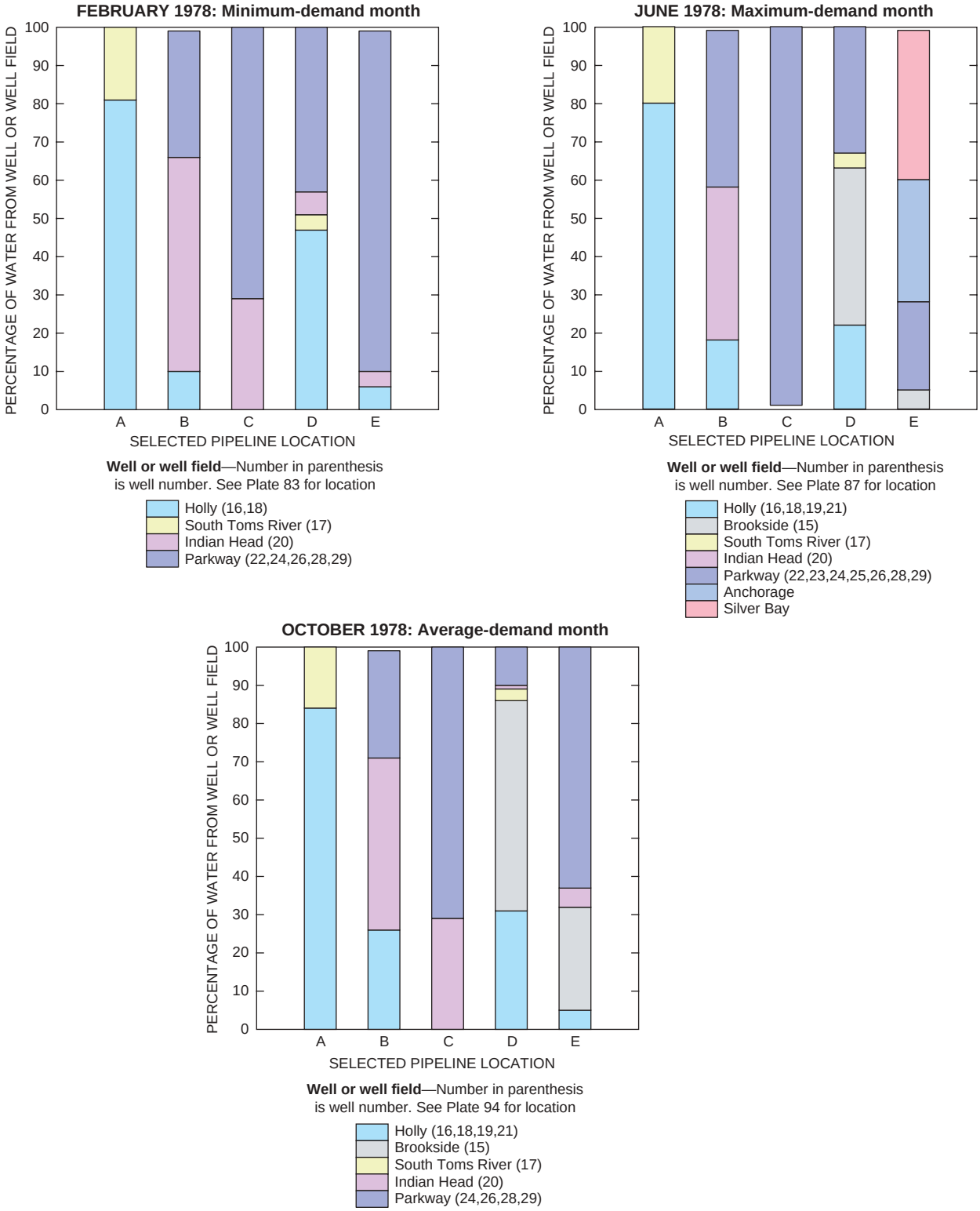

Figure J-4. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1978 [Genetic Algorithm (GA) optimization simulation SENS0].

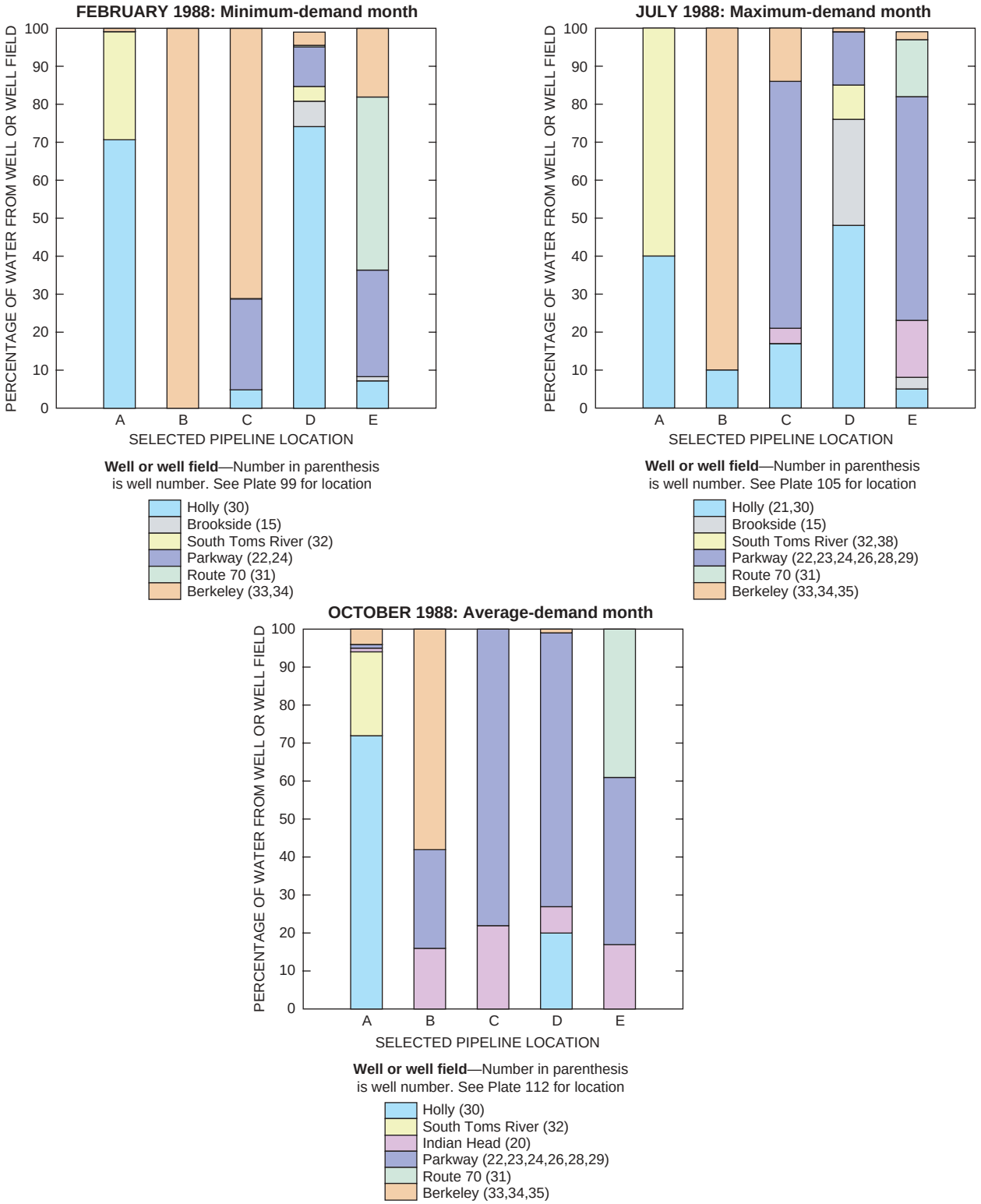

Figure J-5. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1988 [Genetic Algorithm (GA) optimization simulation SENS0].

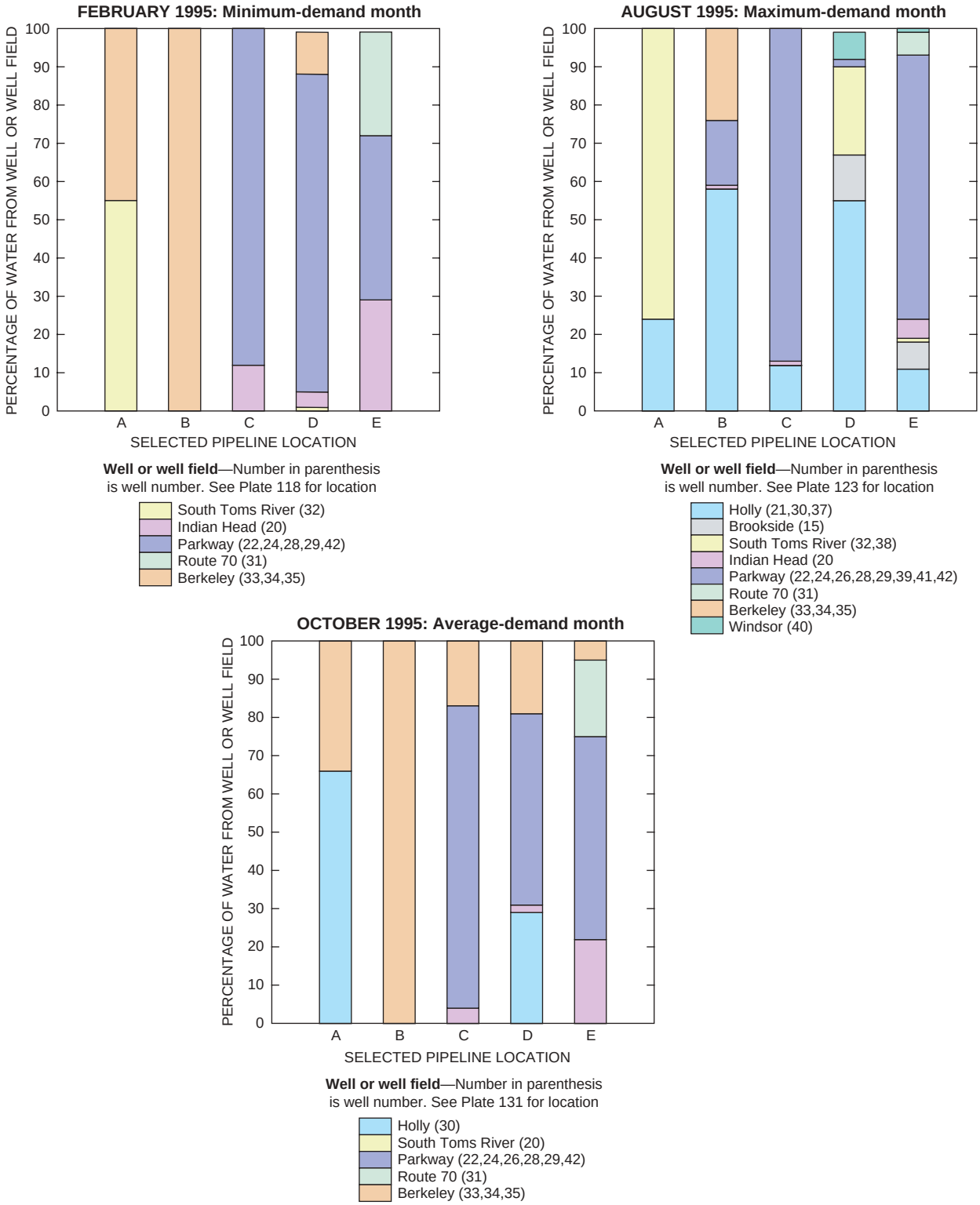

Figure J-6. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1995 [Genetic Algorithm (GA) optimization simulation SENS0].

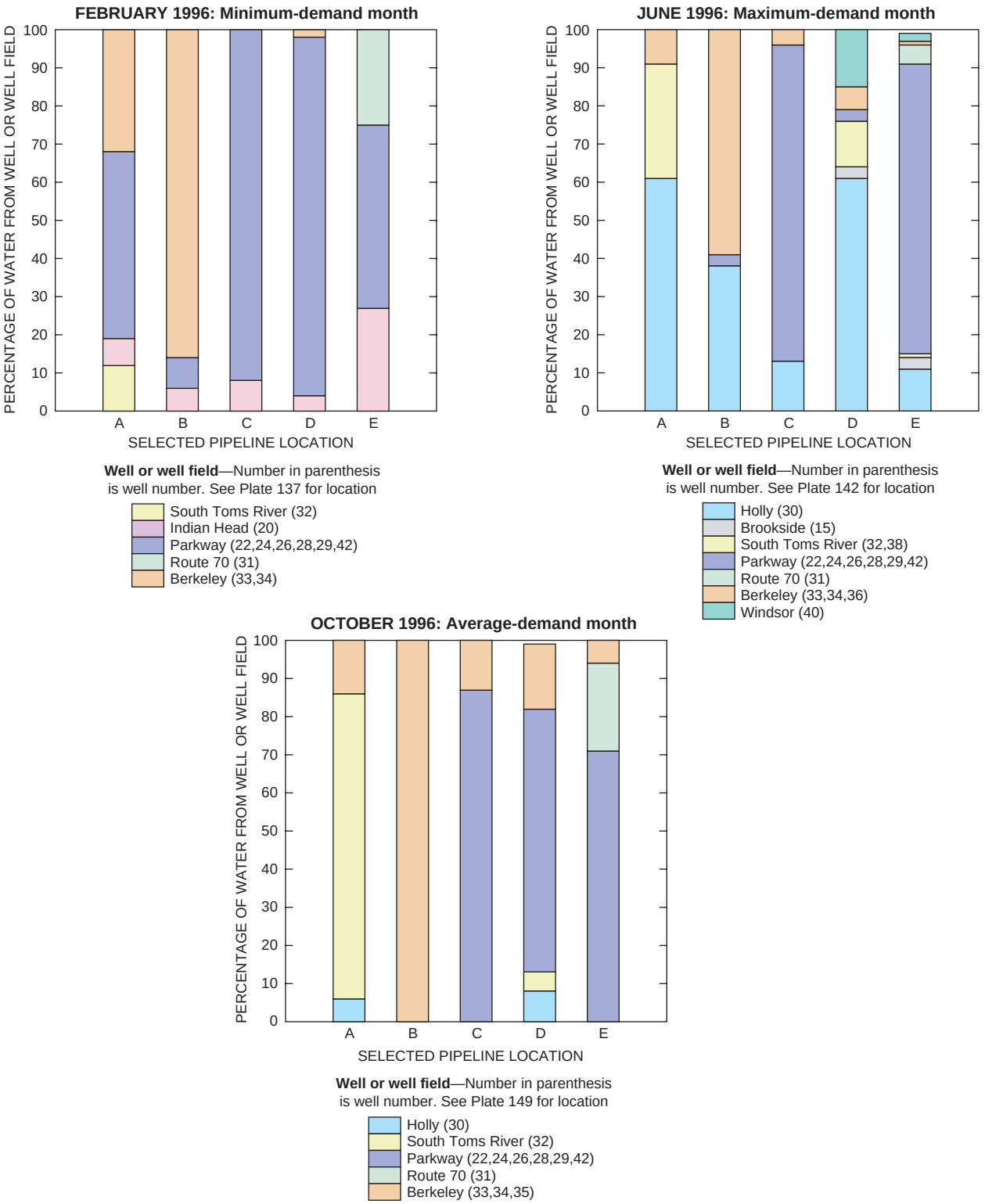

Figure J-7. Simulated proportionate contribution of water from wells and well fields to selected locations, Dover Township area, New Jersey, 1996 [Genetic Algorithm (GA) optimization simulation SENS0].

APPENDIX K

TABLES OF ABSOLUTE DIFFERENCE IN SIMULATED PROPORTIONATE CONTRIBUTION OF WATER BETWEEN THE MANUAL ADJUSTMENT PROCESS AND GENETIC ALGORITHM (GA) METHODS FOR SENSITIVITY ANALYSES SENS0, DOVER TOWNSHIP AREA, NEW JERSEY, 1962, 1965, 1971, 1978, 1988, 1995, AND 1996

Table K-1. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1962

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	7	7	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
February	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	7	7	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
Mar ch	A	1	1	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	10	10	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
April	A	13	13	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	4	4	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
May	A	2	2	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	1	1	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
June	A	1	1	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	5	5	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
July	A	2	2	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	6	6	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
August	A	9	9	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	13	13	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—

Table K-1. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1962—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	8	8	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	6	6	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
October	A	2	2	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	4	4	—	—	—	—	—	—	—	—
	D	1	1	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
November	A	3	3	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	4	4	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
December	A	3	3	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	4	4	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—

Table K-2. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1965

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
February	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
Mar ch	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
April	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
May	A	1	1	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	4	4	—	—	—	—	—	—	—	—
	D	1	1	—	—	—	—	—	—	—	—
	E	2	2	—	—	—	—	—	—	—	—
June	A	2	2	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	3	3	—	—	—	—	—	—	—	—
	D	3	3	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
July	A	2	2	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	2	2	—	—	—	—	—	—	—	—
	D	1	1	—	—	—	—	—	—	—	—
	E	1	1	—	—	—	—	—	—	—	—
August	A	1	1	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	3	3	—	—	—	—	—	—	—	—
	D	1	1	—	—	—	—	—	—	—	—
	E	1	1	—	—	—	—	—	—	—	—

Table K-2. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1965—Continued

[—, well or well field not part of distribution-system network for this year; *see* Table 18 for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	1	1	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	2	2	—	—	—	—	—	—	—	—
	D	1	1	—	—	—	—	—	—	—	—
	E	2	2	—	—	—	—	—	—	—	—
October	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
November	A	0	0	—	—	—	—	—	—	—	—
	B	1	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—
December	A	0	0	—	—	—	—	—	—	—	—
	B	0	0	—	—	—	—	—	—	—	—
	C	0	0	—	—	—	—	—	—	—	—
	D	0	0	—	—	—	—	—	—	—	—
	E	0	0	—	—	—	—	—	—	—	—

Table K-3. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1971

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	0	0	0	0	0	—	—	—	0	0
	E	2	2	0	0	0	—	—	—	0	0
February	A	1	0	1	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	2	1	0	1	0	—	—	—	0	0
	E	0	1	0	1	0	—	—	—	0	0
March	A	2	0	2	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	1	1	0	0	0	—	—	—	0	0
	E	4	6	0	3	0	—	—	—	0	0
April	A	5	0	5	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	3	0	0	3	0	—	—	—	0	0
	D	1	1	0	0	0	—	—	—	0	0
	E	1	1	0	0	0	—	—	—	1	0
May	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	0	1	0	0	0	—	—	—	0	0
	E	1	2	0	0	0	—	—	—	1	0
June	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	7	0	0	7	0	—	—	—	0	0
	D	0	0	0	1	0	—	—	—	0	0
	E	2	1	0	3	3	—	—	—	0	0
July	A	1	0	1	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	1	1	0	0	1	—	—	—	0	0
	E	1	0	0	0	1	—	—	—	0	0
August	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	4	4	—	—	—	0	0
	D	2	3	0	0	0	—	—	—	0	0
	E	0	1	0	1	2	—	—	—	4	0

Table K-3. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1971—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	1	0	1	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	1	3	0	1	1	—	—	—	0	0
	E	1	1	0	0	0	—	—	—	1	0
October	A	1	0	1	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	2	1	0	1	0	—	—	—	0	0
	E	0	2	0	0	0	—	—	—	5	7
November	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	2	2	0	0	0	—	—	—	0	0
	E	3	7	0	2	0	—	—	—	0	3
December	A	0	0	0	0	0	—	—	—	0	0
	B	0	0	0	0	0	—	—	—	0	0
	C	1	0	0	1	0	—	—	—	0	0
	D	1	1	0	0	0	—	—	—	0	0
	E	1	1	0	2	0	—	—	—	0	0

Table K-4. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1978

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	7	0	7	0	0	—	—	—	0	0
	B	3	0	0	1	1	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	5	0	3	1	4	—	—	—	0	0
	E	1	0	0	1	1	—	—	—	0	0
February	A	3	0	4	0	0	—	—	—	0	0
	B	0	0	0	3	3	—	—	—	0	0
	C	0	0	0	1	1	—	—	—	0	0
	D	8	0	1	2	4	—	—	—	0	0
	E	0	0	0	5	4	—	—	—	0	0
March	A	6	0	8	1	1	—	—	—	0	0
	B	0	0	0	1	1	—	—	—	0	0
	C	0	0	0	4	4	—	—	—	0	0
	D	6	0	1	1	7	—	—	—	0	0
	E	0	0	0	0	4	—	—	—	0	0
April	A	0	0	0	0	0	—	—	—	0	0
	B	1	0	0	2	1	—	—	—	0	0
	C	0	0	0	1	1	—	—	—	0	0
	D	1	1	0	1	1	—	—	—	0	0
	E	1	2	0	1	4	—	—	—	4	2
May	A	3	0	3	0	0	—	—	—	0	0
	B	3	0	0	1	2	—	—	—	0	0
	C	0	0	0	5	5	—	—	—	0	0
	D	7	7	4	2	2	—	—	—	0	0
	E	1	2	0	1	1	—	—	—	1	3
June	A	1	0	1	0	0	—	—	—	0	0
	B	4	0	0	3	3	—	—	—	0	0
	C	0	0	0	1	1	—	—	—	0	0
	D	3	0	0	0	3	—	—	—	0	0
	E	0	1	0	0	2	—	—	—	3	2
July	A	2	0	2	0	0	—	—	—	0	0
	B	2	0	0	1	1	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	3	4	0	0	0	—	—	—	0	0
	E	0	0	0	0	7	—	—	—	0	7
August	A	8	0	8	0	0	—	—	—	0	0
	B	4	0	0	2	2	—	—	—	0	0
	C	0	0	0	3	3	—	—	—	0	0
	D	5	7	3	0	15	—	—	—	0	0
	E	0	0	0	0	3	—	—	—	11	7

Table K-4. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1978—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	2	0	2	0	0	—	—	—	0	0
	B	0	0	0	1	1	—	—	—	0	0
	C	0	0	0	6	6	—	—	—	0	0
	D	6	3	2	0	5	—	—	—	0	0
	E	0	4	0	0	3	—	—	—	7	2
October	A	1	0	1	0	0	—	—	—	0	0
	B	1	0	0	311	1	—	—	—	0	0
	C	0	0	0	0	11	—	—	—	0	0
	D	9	7	1	1	1	—	—	—	0	0
	E	3	2	0		0	—	—	—	0	0
November	A	2	0	2	0	0	—	—	—	0	0
	B	2	0	0	1	0	—	—	—	0	0
	C	0	0	0	1	1	—	—	—	0	0
	D	1	5	1	1	2	—	—	—	0	0
	E		1	0	4	5	—	—	—	0	0
December	A	12	0	13	0	1	—	—	—	0	0
	B	2	0	0	0	2	—	—	—	0	0
	C	0	0	0	0	0	—	—	—	0	0
	D	4	0	2	0	3	—	—	—	0	0
	E	0	0	1	0	1	—	—	—	0	0

Table K-5. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1988

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	1	0	0	0	0	0	1	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	2	0	0	0	1	3	1	—	—	—
	D	1	1	0	0	2	0	0	—	—	—
	E	0	0	0	0	3	2	2	—	—	—
February	A	2	0	1	0	0	0	1	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	2	0	0	0	3	3	5	—	—	—
	D	1	1	0	0	1	0	2	—	—	—
	E	0	0	0	0	4	5	1	—	—	—
March	A	8	0	3	0	0	0	5	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	0	0	0	0	7	0	6	—	—	—
	D	6	0	6	0	3	1	3	—	—	—
	E	1	3	0	0	7	9	2	—	—	—
April	A	1	0	0	0	0	0	0	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	1	0	0	0	4	0	3	—	—	—
	D	1	5	1	0	4	0	0	—	—	—
	E	0	0	0	0	3	1	1	—	—	—
May	A	1	0	1	0	0	0	0	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	0	0	0	0	8	1	9	—	—	—
	D	7	7	0	0	0	0	0	—	—	—
	E	1	3	0	0	8	4	0	—	—	—
June	A	2	0	1	0	0	0	0	—	—	—
	B	1	0	0	1	0	0	0	—	—	—
	C	0	0	0	0	0	0	0	—	—	—
	D	0	0	0	0	1	0	0	—	—	—
	E	0	0	0	0	1	1	0	—	—	—
July	A	0	0	0	0	0	0	0	—	—	—
	B	2	0	0	0	0	0	1	—	—	—
	C	8	0	0	0	12	0	4	—	—	—
	D	1	2	2	0	0	0	0	—	—	—
	E	1	0	0	0	2	1	0	—	—	—
August	A	0	0	0	0	0	0	0	—	—	—
	B	3	0	0	0	0	0	2	—	—	—
	C	0	0	0	1	1	0	0	—	—	—
	D	0	0	0	1	0	0	0	—	—	—
	E	0	0	0	0	1	1	0	—	—	—

Table K-5. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1988—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	2	0	0	0	0	0	1	—	—	—
	B	1	0	0	0	0	0	1	—	—	—
	C	0	0	0	3	4	0	0	—	—	—
	D	0	1	0	0	0	0	1	—	—	—
	E	0	0	0	0	0	0	0	—	—	—
October	A	4	0	7	0	0	0	2	—	—	—
	B	0	0	0	6	5	0	12	—	—	—
	C	0	0	0	1	1	0	0	—	—	—
	D	2	0	0	1	3	0	0	—	—	—
	E	0	0	0	1	1	0	0	—	—	—
Nov ember	A	0	0	2	0	0	0	1	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	0	0	0	12	2	1	10	—	—	—
	D	0	6	0	1	3	0	2	—	—	—
	E	0	0	0	3	7	4	1	—	—	—
December	A	0	0	1	1	8	0	11	—	—	—
	B	0	0	0	0	0	0	0	—	—	—
	C	0	0	0	3	4	6	0	—	—	—
	D	0	0	0	2	2	0	0	—	—	—
	E	0	0	0	0	9	9	1	—	—	—

Table K-6. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1995

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	0	0	10	0	0	0	10	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	5	13	0	8	0	—	—
	D	0	0	1	1	5	0	3	0	—	—
	E	0	0	0	3	2	5	1	0	—	—
February	A	0	0	5	0	1	0	4	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	7	10	0	3	0	—	—
	D	0	0	2	4	6	0	2	0	—	—
	E	0	0	0	4	3	3	0	0	—	—
Mar ch	A	0	0	5	1	7	0	11	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	1	7	0	9	0	—	—
	D	0	0	0	4	3	0	1	0	—	—
	E	0	0	0	4	2	1	0	0	—	—
April	A	2	0	9	1	2	0	8	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	12	10	0	2	0	—	—
	D	4	0	1	1	6	0	2	0	—	—
	E	0	0	0	7	3	3	2	0	—	—
May	A	5	0	4	0	0	0	0	0	—	—
	B	0	0	0	8	7	0	15	0	—	—
	C	0	0	0	4	10	0	7	0	—	—
	D	5	0	1	1	3	0	2	0	—	—
	E	1	0	0	1	0	1	3	0	—	—
June	A	0	0	1	0	0	0	1	0	—	—
	B	17	0	0	5	2	0	23	0	—	—
	C	2	0	0	2	14	0	10	0	—	—
	D	9	0	2	0	5	0	1	0	—	—
	E	0	0	0	2	4	5	2	0	—	—
July	A	5	0	5	0	0	0	0	0	—	—
	B	4	0	0	4	9	0	17	0	—	—
	C	7	0	0	7	4	0	5	0	—	—
	D	7	3	0	0	4	0	1	0	—	—
	E	3	1	0	3	3	2	1	0	—	—
August	A	1	0	2	0	0	0	1	0	—	—
	B	9	0	0	1	15	0	7	0	—	—
	C	2	0	0	0	5	0	3	0	—	—
	D	10	3	0	0	3	0	1	4	—	—
	E	3	4	1	2	3	1	1	1	—	—

Table K-6. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1995—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	5	0	5	0	0	0	1	0	—	—
	B	17	0	0	1	5	0	21	0	—	—
	C	6	0	0	0	7	0	13	0	—	—
	D	4	1	3	0	1	0	0	0	—	—
	E	2	0	0	3	8	0	0	0	—	—
October	A	0	0	0	0	0	0	0	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	3	9	0	5	0	—	—
	D	4	0	0	0	6	0	3	0	—	—
	E	0	0	0	5	2	2	0	0	—	—
November	A	0	0	0	2	4	0	6	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	0	11	0	10	0	—	—
	D	0	0	0	2	0	0	2	0	—	—
	E	0	0	0	10	8	2	1	0	—	—
December	A	0	0	3	2	3	0	8	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	1	22	0	21	0	—	—
	D	0	0	0	3	2	0	1	0	—	—
	E	0	0	0	5	9	1	4	0	—	—

Table K-7. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1996

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
January	A	0	0	8	1	1	0	7	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	12	13	0	1	0	—	—
	D	0	0	0	1	7	0	8	0	—	—
	E	0	0	0	6	6	0	0	0	—	—
February	A	0	0	4	3	1	0	1	0	—	—
	B	0	0	0	4	11	0	8	0	—	—
	C	0	0	0	0	0	0	0	0	—	—
	D	0	0	2	2	5	0	1	0	—	—
	E	0	0	0	1	1	1	0	0	—	—
Mar ch	A	2	0	9	3	2	0	4	0	—	—
	B	0	0	0	3	8	0	4	0	—	—
	C	0	0	0	5	5	0	0	0	—	—
	D	5	0	1	1	7	0	0	0	—	—
	E	0	0	0	4	3	0	0	0	—	—
April	A	1	0	2	0	0	0	1	0	—	—
	B	2	0	0	0	0	0	3	0	—	—
	C	4	0	0	1	3	0	0	0	—	—
	D	3	0	1	0	4	0	0	0	—	—
	E	1	0	0	0	1	0	0	0	—	—
May	A	4	0	3	0	0	0	0	0	—	—
	B	4	0	0	0	0	0	4	0	—	—
	C	17	0	0	0	17	0	0	0	—	—
	D	6	2	1	0	3	0	0	0	—	—
	E	1	0	0	0	2	0	0	1	—	—
June	A	7	0	3	0	0	0	4	0	—	—
	B	2	0	0	0	1	0	3	0	—	—
	C	6	0	0	0	9	0	3	0	—	—
	D	4	1	3	0	1	0	2	2	—	—
	E	2	1	0	0	2	0	1	1	—	—
July	A	4	0	4	0	0	0	0	0	—	—
	B	3	0	0	0	0	0	3	0	—	—
	C	7	0	0	0	12	0	5	0	—	—
	D	1	0	2	0	2	0	0	0	—	—
	E	1	0	0	1	3	5	0	1	—	—
August	A	0	0	0	0	0	0	0	0	—	—
	B	1	0	0	0	0	0	1	0	—	—
	C	7	0	0	0	13	0	4	0	—	—
	D	0	0	1	0	1	0	0	0	—	—
	E	1	0	0	0	3	5	2	0	—	—

Table K-7. Absolute difference in proportionate contribution of water from well or well field to selected pipeline locations, between the manual adjustment process and Genetic Algorithm (GA) methods for sensitivity analyses SENS0, Dover Township area, New Jersey, 1996—Continued

[—, well or well field not part of distribution-system network for this year; *see Table 18* for correspondence between pipeline location and model node]

Month	Pipeline location	Absolute difference in percentage of water contributed from well or well field									
		Holly	Brookside	South Toms River	Indian Head	Parkway	Route 70	Berkeley	Windsor	Anchorage	Silver Bay
September	A	2	0	3	0	0	0	0	0	—	—
	B	0	0	0	0	3	0	3	0	—	—
	C	1	0	0	0	6	0	5	0	—	—
	D	5	0	1	0	7	0	0	0	—	—
	E	0	0	0	0	2	0	1	0	—	—
October	A	1	0	2	0	0	0	3	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	0	5	0	5	0	—	—
	D	1	0	1	0	4	0	3	0	—	—
	E	0	0	0	0	4	3	2	0	—	—
November	A	6	0	3	0	0	0	3	0	—	—
	B	0	0	0	0	0	0	0	0	—	—
	C	0	0	0	0	2	0	2	0	—	—
	D	6	0	2	0	0	0	1	10	—	—
	E	1	0	1	0	8	6	2	1	—	—
December	A	0	0	0	0	0	0	0	0	—	—
	B	3	0	0	0	0	0	3	0	—	—
	C	13	0	0	0	0	0	13	0	—	—
	D	1	0	0	0	0	0	0	1	—	—
	E	1	0	0	0	0	2	3	0	—	—