

2006 Community Water System Survey

Volume II: Detailed Tables and Survey Methodology



Cover Photo: The Gaffney Board of Public Works Water Tower, Gaffney, South Carolina

The Gaffney Board of Public Works Water Tower, or “Peachoid” as it is known, stands 135 feet tall and holds one million gallons of water. The tank was commissioned to be built in 1980. Contractors took five months to design and mold the steel. A seven-ton, 60-foot long leaf was applied to one side. Peter Freudenburg, an artist specializing in super-graphics and murals spent hours inspecting real peaches to use as a model to paint the tank. Fifty gallons of paint in twenty colors were required to complete the project. EPA wishes to thank the Board for participating in this survey, for allowing us to acknowledge this fact and for providing us with the cover photo.

Photo by Kim Fortner of the Gaffney Board of Public Works

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Contents

Part 1: Detailed Survey Results	1
Interpreting the Survey Results	3
Notes on Interpreting the Detailed Tables	5
Detailed Tables	9
Part 2: Methodology Report.....	221
1. Introduction.....	223
1.1 Study Background	223
1.2 Survey Overview	223
2. Sample Design and Weighting.....	227
2.1 Sample Design and Selection	227
2.1.1 SDWIS Sampling Frame and Coverage	227
2.1.2 Sample Design and Selection.....	228
2.1.3 Stratum Migration.....	230
2.2 Weighting and Estimation	233
2.2.1 Derivation of Base Weight and Non-response Adjustment	233
2.2.2 Variance Estimation.....	235
3. Survey Design and Response.....	239
3.1 Questionnaire Design	239
3.2 Data Verification	239
3.3 The Pilot Test	240
3.4 Site Visit Operations.....	240
3.5 Self-administered Survey Administration	241
3.6 Data Entry.....	242
3.7 Survey Response	245
4. Quality Assurance and Peer Review	247

4.1	Draft Questionnaire Pre-test and Survey Pilot Test.....	247
4.1.1	Pre-test	247
4.1.2	Pilot Test.....	247
4.2	Sampling Quality Assurance	248
4.3	Data Collection Quality Assurance	248
4.4	Expert Review of Responses	250
4.5	Data Processing Quality Assurance.....	248
4.5.1	Data Entry	248
4.5.2	Automated Data Validation Checks.....	249
4.5.3	Database Quality Assurance	249
4.5.4	Tabulation Quality Assurance.....	250
4.6	Quality Assurance during Report Preparation	251
4.7	Peer Review.....	251
	Appendix: Community Water System Survey Questionnaire	253

List of Tables

(Tables are by primary source of water and system service population, unless otherwise noted.)

Table	Description
Table 1	Crosswalk from SDWIS to CWS Survey 2006 Sample
Table 2	Number and Percentages of Systems by Primary Water Source
Table 3	Number and Percentages of Systems by SDWIS Water Source
Table 4	Number of Systems by Type of Ownership
Table 5	Number of Systems by Ownership and Water Source
Table 6	Percentage of Systems with Access to Computers, Peripherals, and the Internet
Table 7	Average Daily Flow for Public Systems by Primary Water Source
Table 8	Average Daily Flow for Private Systems by Primary Water Source
Table 9	Average Daily Flow For All Systems by Primary Water Source
Table 10	Average Annual Flow for Public and Private Systems
Table 11	Annual Water Deliveries and Unaccounted for Water by Ownership
Table 12	Annual Deliveries per Customer Service Connection by Ownership
Table 13	Average Number of Entry Points to the Distribution System
Table 14	Number and Percentage of Systems Selling to Other Public Water Suppliers
Table 15	Water Systems Not Providing Any Treatment
Table 16	Ground Water Entry Points Not Receiving Treatment
Table 17	Treatment Plants per System
Table 18	Number of Wells Treated per Treatment Plant
Table 19	Treatment Plant Flow Characteristics
Table 20	Ratio of Design Capacity to Average and Peak Daily Production
Table 21	Treatment Objectives by Population
Table 22	Treatment Objectives by Daily Flow
Table 23	Treatment Schemes by Population
Table 24	Treatment Schemes by Daily Flow
Table 25	Treatment Practices for Surface Water Plants by Population
Table 26	Treatment Practices for Surface Water Plants by Daily Flow
Table 27	Treatment Practices for Ground Water Plants by Population
Table 28	Treatment Practices for Ground Water Plants by Daily Flow
Table 29	Disinfection Practices and Objectives by Population
Table 30	Disinfection Practices and Objectives by Daily Flow
Table 31	Surface Water Residual Management Processes by Treatment Scheme
Table 32	Ground Water Residual Management Processes by Treatment Scheme
Table 33	Mixed Water Residual Management Processes by and Treatment Scheme
Table 34	All Water Plants Residual Management Processes by Treatment Scheme
Table 35	Surface Water Residual Management Processes by Daily Flow and Treatment Scheme
Table 36	Ground Water Residual Management Processes by Daily Flow and Treatment Scheme
Table 37	Mixed Water Residual Management Processes by Daily Flow and Treatment Scheme
Table 38	All Water Plants Residual Management Processes by Daily Flow and Treatment Scheme
Table 39	Plants With Specific Discharge Options by Population and Treatment Scheme
Table 40	Plants With Specific Discharge Options by Daily Flow and Treatment Scheme
Table 41	Raw Water Concentration of Various Contaminants in Very Large Systems
Table 42	Finished Water Concentration of Various Contaminants in Very Large Systems
Table 43	Percentage of Systems Using Each Treatment Scheme

Table	Description
Table 44	Treated-Water Storage Information
Table 45	Storage Capacity past the First Residential Customer by Type of Vessel
Table 46	Practices to Maintain Water Quality in Storage Vessels
Table 47	Systems that Want Additional Information about Practices
Table 48	Distribution System and Transmission Line Summary
Table 49	Average Size of Pipe in Distribution and Transmission Systems by Ownership
Table 50	Pressure Zones and Booster Disinfection Practices
Table 51	Number of Pressure Losses
Table 52	System Flushing Practices
Table 53	Seasonal Disinfection Residuals for Entry Points and Distribution Systems
Table 54	Water Security Awareness and Security Barriers by Ownership
Table 55	Water Security Awareness and Security Barriers by Adjusted Population Categories
Table 56	Service Connections Profile by Ownership
Table 57	Population Served by Ownership
Table 58	Total Water System Revenue and Revenue Per Thousand Gallons by Source
Table 59	Total Water System Revenue by Ownership
Table 60	Total Water System Revenue by Source, Excluding Zero Revenue
Table 61	Total Water System Revenue by Ownership, Excluding Zero Revenue
Table 62	Revenue if Reporting Positive Revenue and Expenses by Ownership
Table 63	Systems with Each Type of Revenue Source by Ownership
Table 64	Percentage Received From Each Type of Revenue Source by Ownership
Table 65	Average Revenue of Systems Serving 10,000 or fewer
Table 66	Percentage of Revenue from Each Customer Category by Ownership
Table 67	Total Revenue in Dollars per Thousand Gallons Delivered by Ownership
Table 68	Water Sales in Dollars per Thousand Gallons Delivered by Ownership
Table 69	Water Sales in Dollars per Thousand Gallons by Ownership and Customer Class
Table 70	Annual Residential Revenue per Connection by Ownership
Table 71	Residential Rate Structure and Billing Profile by Ownership
Table 72	Non-Residential Rate Structure and Billing Profile by Ownership
Table 73	Programs for Lower Cost Drinking Water for Low-income Households by Ownership
Table 74	Seasonal Populations by Ownership
Table 75	Total Expenses by Source
Table 76	Total Expenses in Dollars per 1000 Gallons Delivered by Source
Table 77	Total Expenses by Ownership
Table 78	Total Expenses in Dollars per 1000 Gallons Delivered by Ownership
Table 79	Expenses if Reporting Positive Revenue and Expenses by Ownership
Table 80	Expense Breakdown by Major Categories by Ownership
Table 81	Ratio of Total Revenue to Total Expenses by Ownership
Table 82	Ratio of Total Revenue to Total Expenses by Private Systems
Table 83	Average System Revenue and Expenses by Type of Revenue and Expense
Table 84	Number of Employees and Annual Labor Costs by Source
Table 85	Number of Employees and Annual Labor Costs by Ownership
Table 86	Percentage of Systems with Major Capital Investment in the Past 5 Years by Source
Table 87	Percentage of Systems with Major Capital Investment in the Past 5 Years by Ownership
Table 88	Amount of Major Capital Investment in the Past 5 Years by Source
Table 89	Amount of Major Capital Investment in the Past 5 Years by Ownership
Table 90	Percentage of Systems Making Major Capital Investments by Source and Type

Table	Description
Table 91	Percentage of Systems Making Major Capital Investments by Ownership and Type
Table 92	Average Amount of Major Capital Investment Allocated Years by Source and Type
Table 93	Average Amount of Major Capital Investment Allocated Years by Ownership and Type
Table 94	Allocation of Major Capital Investments of Average Systems by Source and Type
Table 95	Allocation of Major Capital Investments of Average Systems by Ownership and Type
Table 96	Allocation of Major Capital Investments Nationally by Source and Type
Table 97	Allocation of Major Capital Investments Nationally by Ownership and Type
Table 98	Percentage of Systems Making Major Capital Investments by Ownership and Purpose
Table 99	Amount of Major Capital Investment Allocated by Ownership and Purpose
Table 100	Allocation of Major Capital Investments of Average Systems by Ownership and Purpose
Table 101	Allocation of Major Capital Investments Nationally by Ownership and Purpose
Table 102	Percentage of Systems Acquiring Capital Funds from Each Source by Ownership
Table 103	Amount of Capital Funds Acquired from Each Source in the Past 5 Years
Table 104	Allocation of Sources of Funds for Major Capital Investments of the Average System
Table 105	Allocation of Sources of Funds for Major Capital Investments Nationally
Table 106	Average Interest Rates for Capital Funds
Table 107	Asset Management Plans

Part 1:
Detailed Survey Results

Interpreting the Survey Results

This volume presents extensive and detailed tabulations of the wide variety of data collected by the 2006 Community Water System (CWS) Survey. The tables in this volume summarize the survey results at very fine levels, breaking out the data by eight different population size categories of water systems, and then further breaking out each size category by other system characteristics, such as type of ownership or primary water source.

The report consists of 107 summary tables, many of which include confidence intervals for each estimate presented. In these tables, each confidence interval appears immediately below the calculation to which it applies. Please familiarize yourself with the interpretive notes when you review the tables themselves.

The tabulations presented in this report are based on data collected from a sample of U.S. water systems rather than a census of every water system in the United States. A confidence interval is one way to gauge how precisely an estimate based on a sample of systems represents all water systems in the country. Any result presented in a table must be viewed as the center of a range that would encompass the precise number that would be found if every U.S. water system could have been included in the tabulation, and not only those who were sampled and responded to the survey. The confidence interval expresses this range as a “ \pm ” that is, as an amount to be added to and subtracted from the calculated data point actually presented in the table. The size of the confidence interval is designed to include the true value in the stated range 95 percent of the time; i.e., if we drew repeated samples and produced the confidence interval for each sample, the interval would include the true value 95 percent of the time.

For example, Table 77 shows that the average annual expenses of publicly owned water systems serving more than 500,000 people are \$187.6 million. The table also shows the confidence interval for this estimate to be \pm \$41.2 million. Thus, based on the sample of water systems, we can be 95 percent certain that the average annual per capita expense of all publicly owned systems serving populations of over 500,000 is between \$146.4 million and \$228.8 million.

These tables always express the confidence interval in the same units as the calculation to which it applies. Thus, in Table 9 the confidence interval numbers for average daily water flow represent the same units as the base calculation, namely, millions of gallons per day. In the same table, the confidence interval numbers for the percentage of water derived from different sources are themselves expressed as percentages. In all cases, the confidence interval may be directly added to and subtracted from the corresponding calculation to determine the expected range.

These tables serve as a starting point for detailed analyses of the data. As shown in Volume I, and as will be apparent in many of the tables in this volume, water systems are a diverse group. While the mean or medians as measures of central tendency may be appropriate statistics in some cases, in others further detail will be required. As described in the notes below, outliers were dropped from some of the analyses to produce meaningful estimates of “typical” systems. Additional adjustments may be necessary to support other analyses. Some analyses may require the use of percentiles or other measures of the full distribution of the data. Other analyses may need to exclude the tails of the distribution to characterize typical systems. EPA will continue to analyze the data and present results to support its various regulatory and policy development and implementation analyses.

Finally, several of the tables report results for water systems’ treatment plants and facilities. For this report, a treatment plant or facility is any location where the water system takes steps to change the quality of the water. It includes standard facilities that are clearly recognized as treatment plants, such as conventional filtration plants. It also includes smaller facilities that may not be considered treatment plants in other contexts; for example, a chemical feed on a well that adds chlorine to the water is

considered a treatment facility in this report. There is one exception to the general rule that all points where the system makes changes to the water is a treatment facility. Systems that purchase water may boost disinfection or adjust pH within their distribution system; these sites are not counted as treatment facilities.

Detailed Survey Result Tables

Notes on Interpreting the Detailed Tables

- 1. Weighted data.** The survey results presented in the following tables are all based on weighted data. As described in Chapter 2 of the methodology report, each water system contained in the final survey database was assigned a sample weight. These weights are necessary because the data are from a statistically representative sample of water systems, rather than from a census of every water system in the U.S. In effect, each sampled system represents some number of similar systems from the entire population of U.S. water systems; the number of systems so represented is equal to the sample weight. When added up, the weights of all systems in the final sample will equal the total number of U.S. CWSs that meet the eligibility definition used for the survey (e.g., Federal and state-owned systems were not included). Thus, for the tables to represent all eligible U.S. water systems, it is necessary to incorporate each system's sample weight as an additional factor in each calculation involving a data item reported by that system. Another way of expressing this is to say that, when tabulating the data, each sampled system counts not just once as itself, but counts as many times as the numerical amount of its weight. See section 2.2 for a detailed discussion of the derivation of the sample weights.
- 2. Interpretation of Table Results.** Each result presented in the tables is the weighted average of the particular data item, for the group of water systems characterized by the row and column headings labeling the table cell where the results appears. The survey data are tabulated so as to facilitate analysis of water systems. In general, this means that the report tabulates all summary results by calculating a given item for each system, factoring into that result the system's sampling weight, then presenting the mean of the weighted results for all the systems falling into the respective table categories (as defined by the table row and column headings). This has significant implications when the calculation of a specific item requires deriving the result from two or more survey variables, e.g., a ratio or a percentage breakdown of component amounts within a total amount. For example, in the case of a ratio, the reported result is the average (mean) of the ratios for each system, rather than the ratio of average values for each of the two variables across systems. This approach treats every system in the universe equally, implying that characteristics of the system are the primary unit of analysis. The alternate approach would treat the content of the component variables in each table as the unit of analysis.

By way of example, consider two systems. One system produces 1,000,000 gallons per day, and 400,000 of those come from ground sources; hence, 40% of the system's water comes from ground sources. The other system produces 2,000,000 gallons per day and 1,600,000 of those come from ground sources; hence, 80% of the systems water comes from ground sources. The CWS Survey report would show a result that, on average, these two systems produce 60% of their water from ground sources: $(40\%+80\%)/2$. If the alternate approach were chosen, gallons would be the unit of analysis, and the calculation would show that 67% of the water in those systems comes from ground sources: $(400,000+1,600,000)/(1,000,000+2,000,000)$. (To focus clearly on the point being illustrated, this example does not attempt to demonstrate the further effect that the system sample weights have on the actual calculations.)

The report has adopted the former approach because this initial view of the data is intended primarily as an analysis of system-level characteristics. There are some exceptions to this approach. Table 17 presents data on both level of the system and a water treatment plant (many systems have more than one treatment plant, while some facilities have none). Tables 18 - 42

present data on the level of a treatment plant. Tables 96, 97, 101, and 105 present data on the share of capital funds in the nation, rather than system averages.

3. **Percentages summing to 100 percent.** Some tables present absolute or percentage breakdowns of the whole into its components, e.g., breakdowns of total revenue into different customer categories, such as Table 66. Logically, in such breakdowns, the line item amounts should sum to the total amount, and line item percentages should sum to 100 percent. However, in some instances, the tabulated results may not sum exactly to the whole. To increase the precision of each individual result, each component line item was calculated separately using all the data available for the line item. Due to differential item non-response, some component variables may actually have more or fewer observations available than other components. While including all available data in the calculation of the component increases the precision of the tabulated result for the component, it can cause a small reduction in consistency across components, since slightly different systems may be represented in the different calculations. EPA and the CWS Survey analysts decided that the increased accuracy for each item outweighs the slight reduction in consistency.

In a few tables, a series of percentages may validly sum to greater than 100%. This occurs when more than one item may apply to the same system. For example, treatment plants may have more than one treatment objective, so the percentage of plants with each objective will sum to more than 100 percent. This situation is always noted on the table.

4. **Confidence Intervals.** The size of the confidence interval is designed to include the true value in the stated range 95 percent of the time. Each confidence interval presented in Part 2 is based on the assumption that the average value reported in a given table cell is normally distributed. Calculations based on small numbers of systems may violate this assumption. In such cases the reported confidence intervals will not be correct. Most of these can be identified by noticing when the plus/minus confidence interval width is larger than, or almost as large as, the calculated average itself. To compute correct confidence intervals for such situations requires examination of the empirical distributions for each variable in the tabulation and is beyond the scope of this report.

The reader should take note of results where the lower end of the confidence interval is below zero, because negative numbers are not meaningful in any of the tabulations presented in this report. Similarly, for calculations of percentages, high ends of ranges above 100% are not meaningful. While the reader should be on the lookout for these conditions when any number is near zero or any percentage is near 100%, they can occur at other times, particularly when the confidence interval is large. As stated in note 3, a series of percentages may validly sum to greater than 100% in some tables, when more than one item may apply to the same system. This situation is not related to the issue of confidence intervals extending an individual percentage beyond 100%.

5. **Treatment of outliers.** For several of the tables, one or two observations have values well above the mean or even the 90th percentile. These outliers would tend to distort the estimates presented in the table and would lead to a misrepresentation of the central tendency for the characteristics in question. In cases like this, the outliers are dropped from the analysis. A note is added at the bottom of the table when outliers are dropped. The note also will show how the exclusion of the outliers affects the estimate.

6. Interpretation of blank cells and cells with calculated results of zero.

Empty Cells: Throughout the tables, some individual cells or blocks of continuous cells have an asterisk, to denote the cell does not contain an estimate. Any empty cell or block of cells means that there were no observations with data for the cell(s) in question. Generally, this occurs for one of three reasons.

- There are no systems in the cell. The most common illustration of this occurs in all tables that break out the data by ownership type. When data are reported for ancillary systems, the cells for the systems serving more than 3,300 people are always blank for ancillary systems, since there are no ancillary systems in these size categories.
- The item does not apply to the group of systems belonging to that cell. For example, in Table 106, the cell for Drinking Water State Revolving Fund (DWSRF) loans for private systems serving 100 or fewer people is empty. This is because no private systems of this size made use of DWSRF loans.
- The item applies to the group of systems belonging to the cell, but no systems provided data for the item (sometimes referred to as “missing data” in terms of the analytical data file and as “item non-response” in terms of the data collection process that led to the final data file). For example, in Table 16, none of the ground water systems serving 3,301 to 10,000 customers provided data on their number of wells per entry point, so these cells are empty on the table.

It is not always possible to distinguish between the last two reasons from the information available in the table. Sometimes the reason is apparent for the table itself. Often, however, further analysis of the database would be needed to determine which particular reason is the basis for a blank cell.

Zero Results: In discussing Table 106 above, it was noted that certain cells are blank for customer categories of private systems. However, other tables have cells which specifically report a zero result and are zero instead of blank. This illustrates an important distinction when interpreting the tables. Blank cells and cells reporting a zero result are not the same, and should not be interpreted as such. A reported result of zero means that data were available to produce a calculation, and the calculation resulted in a zero.

It should also be noted that occasionally a report of a zero result is a function of the level of precision chosen as appropriate for presenting the data in a given table. In a few instances, items appearing as zero results are actually very small numbers that round to zero within the precision limits of the respective table.

- ## 7. Observations.
- The term “observations” refers to the actual number of sampled water systems that provided data for a given tabulated item. Some tables present the number of observations on which the tabulated results are based. In these as in all the tables, the results are still based on the weighted data, not on the simple means of the un-weighted observations. The report of the number of observations can be used as a very approximate indication of the sampling precision of the tabulated result. Results based on a small number of observations may not be precise estimates of the universe of water systems represented by the sampling systems. They are included because they may be useful indicators of areas worth further investigation.

8. **Individual table notes.** Additional specific notes and definitions appear on individual tables. The specific CWS Survey questionnaire item(s) on which each table is based are cited below the table. The citation refers to the corresponding question number(s) on the CWS Survey questionnaire, which can be found in this report as an Appendix to the Methodology Report. The citations are in the format “Q.#;” the question numbering is identical in both questionnaire versions.
9. **Variables for row and column headings.** In addition to the data sources for the specific tabulations, several data items are used repeatedly throughout the tables as the break-out variables for the table row and column headings. Their sources are not cited on the individual tables. These items and their data sources are
- Population served, from question 21. If data were not reported in the survey, the population data from the Safe Drinking Water Information System (SDWIS) are used.
 - Water source, from question 6.
 - Ownership, from question 3. Note: for the sake of brevity in the table headings, privately owned community water systems are labeled as “Private Systems” and publicly owned community water systems are labeled as “Public Systems.” This use of the label “Public Systems” should not be confused with the CFR definitional term Public Water System, which is a broad class of water systems providing the public with piped drinking water for human consumption. A CWS means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. (40 CFR 141.2)
 - Treatment facility flow, from question 7.

For population served and water source, data from SDWIS are used if the system did not provide the data in the survey. Approximately 20 percent of the sample was assigned population data from SDWIS because of missing or incomplete responses to the population served questions. An additional 4 percent were assigned source data from SDWIS.

10. **Estimate of the number of systems in the nation.** The report provides an estimate of the national number of community water systems, 49,133, excluding federally owned systems, tribal systems, and systems in the Trust Territories. This is a weighted estimate based on the sample and responses to the survey regarding water source and the number of people served. Table 1 of this Volume presents the count of systems by water source, system ownership, and population served. It also shows the change in these categories since the 2000 CWS Survey. (The estimate of the number of systems in 2000 is from Table 3 of *Community Water System Survey 2000 Volume II: Detailed Tables and Survey Methodology*.)
11. **Use of the terms expenses and expenditures.** Systems use the terms expenses or expenditures to refer to their spending. Private systems generally use the term “expenses” in accounting as a term for the spending done by a system. Public systems refer to spending as “expenditures”; they reserve the term “expense” for when a cost is incurred, and use the term “expenditure” for when the spending takes place. Tables 62, 75-82, 91, 94, and 95 use the term expenses to report spending by both public and private systems.
12. **Major capital investments.** Systems provided information about major capital investments. This includes spending on land, plant, and equipment that is not part of routine maintenance.

Detailed Tables

Table 1
Change in Estimated Number of Community Water Systems between 2000 and 2006

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	
Primarily Ground Water Systems									
Public Systems									
Systems in 2000	489	3,556	6,694	2,560	1,080	124	143	9	14,655
Systems in 2006	1,069	4,501	6,450	1,999	1,614	195	108	8	15,944
Percentage change	118.6	26.6	-3.6	-21.9	49.4	57.3	-24.5	-11.1	8.8
Private Systems									
Systems in 2000	11,267	9,590	2,276	511	259	12	17	1	23,933
Systems in 2006	9,246	7,857	2,269	630	115	23	8	5	20,153
Percentage change	-17.9	-18.1	-0.3	23.3	-55.6	91.7	-52.9	400.0	-15.8
All Ground Water Systems									
Systems in 2000	11,756	13,146	8,970	3,071	1,339	136	160	10	38,588
Systems in 2006	10,315	12,358	8,719	2,629	1,730	217	116	13	36,097
Percentage change	-12.3	-6.0	-2.8	-14.4	29.2	59.6	-27.5	30.0	-6.5
Primarily Surface Water Systems									
Public Systems									
Systems in 2000	245	683	1,139	935	894	182	162	49	4,289
Systems in 2006	62	245	895	779	809	206	222	55	3,272
Percentage change	-74.7	-64.1	-21.4	-16.7	-9.5	13.2	37.0	12.2	-23.7
Private Systems									
Systems in 2000	588	453	73	73	95	28	16	4	1,330
Systems in 2006	277	365	173	86	117	25	44	8	1,093
Percentage change	-52.9	-19.4	137.0	17.8	23.2	-10.7	175.0	100.0	-17.8
All Surface Water Systems									
Systems in 2000	833	1,136	1,212	1,008	989	210	178	53	5,619
Systems in 2006	339	610	1,068	864	925	231	266	63	4,366
Percentage change	-59.3	-46.3	-11.9	-14.3	-6.5	10.0	49.4	18.9	-22.3

(Continued)

Table 1 (Cont.)
Change in Estimated Number of Community Water Systems between 2000 and 2006

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Public Systems									
Systems in 2000	*	1,513	3,449	819	568	109	89	19	6,566
Systems in 2006	373	1,102	2,430	839	634	137	91	24	5,630
Percentage change	*	-27.2	-29.5	2.4	11.6	25.7	2.2	26.3	-14.3
Private Systems									
Systems in 2000	69	666	386	154	117	16	3	2	1,413
Systems in 2006	390	1,155	1,205	232	43	10	5	*	3,041
Percentage change	465.2	73.4	212.2	50.6	-63.2	-37.5	66.7	*	115.2
All Purchased Water Systems									
Systems in 2000	69	2,179	3,835	973	685	125	92	21	7,979
Systems in 2006	764	2,257	3,634	1,071	677	148	96	24	8,670
Percentage change	1,007.2	3.6	-5.2	10.1	-1.2	18.4	4.3	14.3	8.7
All Systems									
Public Systems									
Systems in 2000	734	5,752	11,282	4,314	2,542	415	394	77	25,510
Systems in 2006	1,505	5,848	9,775	3,617	3,057	538	421	86	24,847
Percentage change	105.0	1.7	-13.4	-16.2	20.3	29.6	6.9	11.7	-2.6
Private Systems									
Systems in 2000	11,924	10,709	2,735	738	471	56	36	7	26,676
Systems in 2006	9,913	9,376	3,647	948	275	57	57	13	24,287
Percentage change	-16.9	-12.4	33.3	28.5	-41.6	1.8	58.3	85.7	-9.0
All Systems									
Systems in 2000	12,658	16,461	14,017	5,052	3,013	471	430	84	52,186
Systems in 2006	11,418	15,224	13,421	4,564	3,332	596	478	100	49,133
Percentage change	-9.8	-7.5	-4.3	-9.7	10.6	26.5	11.2	19.0	-5.9

Data: 2000 Survey: Q.3, Q.7
2006 Survey: Q.3, Q.6

* No purchased water systems of this size in sample.
The counts of systems are weighted estimates based on the sample. Totals may not add due to rounding.

Table 2
Number and Percentage of Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Ground Water Systems									
100% Ground Water									
Number	10,308	12,155	8,409	2,072	1,384	164	70	10	34,570
Percentage of systems with this source designation by service population	90	80	63	45	42	27	15	10	70
Primarily Ground Water									
Number	7	203	310	558	346	54	47	3	1,527
Percentage of systems with this source designation by service population	0	1	2	12	10	9	10	3	3
Surface Water Systems									
100% Surface Water									
Number	319	566	756	646	601	146	170	32	3,237
Percentage of systems with this source designation by service population	3	4	6	14	18	25	35	32	7
Primarily Surface Water									
Number	20	44	311	218	324	84	96	31	1,129
Percentage of systems with this source designation by service population	0	0	2	5	10	14	20	31	2
Purchased Water Systems									
100% Purchased Water									
Number	760	2,131	3,326	967	473	102	47	16	7,823
Percentage of systems with this source designation by service population	7	14	25	21	14	17	10	16	16
Primarily Purchased Water									
Number	3	126	308	103	204	46	49	8	848
Percentage of systems with this source designation by service population	0	1	2	2	6	8	10	8	2
All									
Number	11,418	15,224	13,421	4,564	3,332	596	478	100	49,133
Percentage of systems with this source designation by service population	100	100	100	100	100	100	100	100	100

Data:

Q.6

Notes:

Systems included in one of the Primarily Ground Water, Primarily Surface Water, or Primarily Purchased Water categories have their largest source in that category; however, they have more than one type of source.

Table 3
Number and Percentage of Systems
By SDWIS Source Classification

SDWIS Water Source Classification	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	
Surface Water Systems									
Number	139	379	908	985	1,118	251	299	68	4,148
Percentage	1	2	7	22	34	42	63	68	8
Purchased Surface Water Systems									
Number	643	1,776	2,639	1,426	681	143	89	17	7,413
Percentage	6	12	20	31	20	24	19	17	15
Ground Water Under the Direct Influence of Surface Water (GWUDI) Systems									
Number	200	231	221	48	55	5	6	*	766
Percentage	2	2	2	1	2	1	1	*	2
Purchased GWUDI Systems									
Number	*	*	*	2	*	*	2	*	4
Percentage	*	*	*	0	*	*	0	*	0
100% Ground Water Systems									
Number	10,308	12,358	8,719	2,103	1,447	192	78	13	35,217
Percentage	90	81	65	46	43	32	16	13	72
Purchased Ground Water Systems									
Number	128	481	934	*	31	5	4	2	1,585
Percentage	1	3	7	*	1	1	1	2	3
All Systems									
Number	11,418	15,224	13,421	4,564	3,332	596	478	100	49,133
Percentage	100	100	100	100	100	100	100	100	100

Data:

Q.6

Notes:

Reflects SDWIS classification of water systems, i.e., the hierarchy starting with surface water. If the system receives any of its water from a surface source, it is considered a surface water system. The SDWIS hierarchy is: surface water, purchased surface water, ground water under the direct influence (GWUDI) of surface water, purchased GWUDI, ground water, and purchased ground water.

Table 4
Number of Systems
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Publicly Owned Systems									
Owned and operated by a government or public agency	1,505	5,344	9,514	3,474	2,950	519	409	85	23,799
Owned by a government or public agency and operated by a private contractor		504	261	143	106	19	12	2	1,047
All Public	1,505	5,848	9,775	3,617	3,057	538	421	86	24,847
Privately Owned Systems									
Operated for profit primarily as a water business	1,019	2,161	1,661	299	168	34	53	12	5,406
Not operated for profit	3,529	3,365	1,647	649	107	24	4	2	9,327
Operated a necessary part of another business (i.e., ancillary systems)	5,365	3,851	338	*	*	*	*	*	9,554
All Private	9,913	9,376	3,647	948	275	57	57	13	24,287
All Systems									
All	11,418	15,224	13,421	4,564	3,332	596	478	100	49,133

Data: Q.3

Notes: Publicly owned systems include municipal systems, systems run as public enterprise funds, state-run systems, and special districts. It excludes federal systems. Examples of privately owned systems not operated for profit are homeowners' associations and non-profit cooperatives. Privately owned systems that are a necessary part of another business are referred to as ancillary systems because the water business is not the primary business. The majority of ancillary systems are mobile home parks that provide water as one of a number of services for residents of the park.

Table 5
Number of Systems
By Ownership and Primary Water Source

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Primarily Ground Water Systems	1,069	4,501	6,450	1,999	1,614	195	108	8	15,944
Primarily Surface Water Systems	62	245	895	779	809	206	222	55	3,272
Primarily Purchased Water Systems	373	1,102	2,430	839	634	137	91	24	5,630
All Public	1,505	5,848	9,775	3,617	3,057	538	421	86	24,847
Private Systems									
Primarily Ground Water Systems	9,246	7,857	2,269	630	115	23	8	5	20,153
Primarily Surface Water Systems	277	365	173	86	117	25	44	8	1,093
Primarily Purchased Water Systems	390	1,155	1,205	232	43	10	5	*	3,041
All Private	9,913	9,376	3,647	948	275	57	57	13	24,287
All Systems									
Primarily Ground Water Systems	10,315	12,358	8,719	2,629	1,730	217	116	13	36,097
Primarily Surface Water Systems	339	610	1,068	864	925	231	266	63	4,366
Primarily Purchased Water Systems	764	2,257	3,634	1,071	677	148	96	24	8,670
All	11,418	15,224	13,421	4,564	3,332	596	478	100	49,133

Data: Q.3, Q.6

Notes:

Table 6
Percentage of Systems with Access to Computers, Peripherals, and the Internet
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Systems									
Percentage of systems with access to computers for sending and receiving information	74.2	79.3	91.8	90.4	93.7	100.0	100.0	100.0	82.3
Of the systems with computers, the percentage that have:									
Microsoft Excel	94.8	92.6	100.0	91.6	92.5	100.0	96.4	100.0	95.1
Microsoft Access	53.1	53.9	62.0	63.0	72.2	85.1	82.0	59.8	58.0
CD drive	98.3	96.3	98.5	87.5	92.5	100.0	96.4	100.0	96.5
DVD player	69.7	55.5	73.3	65.9	70.6	81.5	89.1	59.8	65.9
Of the systems with a computer, the percentage with each type of internet access:									
High speed Internet (e.g., cable, DSL, wireless, T1)	89.1	78.4	86.0	89.8	96.0	100.0	98.1	100.0	85.3
Dial-up modem	10.9	20.4	14.0	9.7	4.0	0.0	1.9	0.0	14.3
No access	0.0	1.2	0.0	0.5	0.0	0.0	0.0	0.0	0.4
Observations	88	105	111	42	56	32	49	6	489
Surface Water Systems									
Percentage of systems with access to computers for sending and receiving information	49.2	85.2	95.8	87.2	98.4	100.0	99.1	100.0	89.6
Of the systems with computers, the percentage that have:									
Microsoft Excel	95.9	98.5	97.2	90.9	97.4	100.0	94.1	100.0	96.1
Microsoft Access	47.4	44.2	70.1	53.1	68.1	83.7	80.2	92.3	63.7
CD drive	90.8	98.6	98.4	93.9	98.7	97.8	92.6	100.0	96.9
DVD player	57.2	76.9	65.7	62.1	77.9	72.5	75.1	76.9	70.1
Of the systems with a computer, the percentage with each type of internet access:									
High speed Internet (e.g., cable, DSL, wireless, T1)	58.7	77.4	85.6	88.9	88.3	95.2	97.7	100.0	86.2
Dial-up modem	41.3	21.2	14.4	11.1	10.4	4.8	2.3	0.0	13.3
No access	0.0	1.4	0.0	0.0	1.3	0.0	0.0	0.0	0.5
Observations	49	67	78	48	68	44	101	36	491

(Continued)

Table 6 (Cont.)
Percentage of Systems with Access to Computers, Peripherals, and the Internet
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Purchased Water Systems									
Percentage of systems with access to computers for sending and receiving information	100.0	88.9	93.6	89.9	97.3	100.0	100.0	100.0	92.9
Of the systems with computers, the percentage that have:									
Microsoft Excel	100.0	87.8	96.2	95.2	100.0	96.5	97.8	100.0	94.7
Microsoft Access	49.3	68.4	54.1	52.5	85.8	83.4	91.5	100.0	60.7
CD drive	100.0	100.0	100.0	80.8	90.6	96.5	98.0	100.0	96.8
DVD player	84.6	66.4	64.2	66.9	76.4	76.4	80.9	87.1	68.5
Of the systems with a computer, the percentage with each type of internet access:									
High speed Internet (e.g., cable, DSL, wireless, T1)	67.9	75.7	82.6	79.9	100.0	100.0	100.0	100.0	81.1
Dial-up modem	32.1	24.3	9.4	20.1	0.0	0.0	0.0	0.0	15.5
No access	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	3.4
Observations	8	23	48	19	17	23	37	10	185
All Systems									
Percentage of systems with access to computers for sending and receiving information									
Of the systems with computers, the percentage that have:									
Microsoft Excel	75.2	80.9	92.6	89.7	95.6	100.0	99.5	100.0	84.7
Microsoft Access	95.3	92.1	98.7	92.3	95.4	99.1	95.4	100.0	95.1
CD drive	52.7	55.8	60.5	58.8	73.9	84.1	82.9	90.0	59.1
DVD player	98.3	97.0	98.9	87.2	93.8	98.3	94.6	100.0	96.6
Of the systems with a computer, the percentage with each type of internet access:									
High speed Internet (e.g., cable, DSL, wireless, T1)	70.8	58.2	70.2	65.4	73.9	76.7	79.6	77.2	66.8
Dial-up modem	86.6	77.9	85.0	87.4	94.6	98.1	98.3	100.0	84.6
No access	13.4	21.0	12.8	12.3	5.0	1.9	1.7	0.0	14.4
Observations	0.0	1.0	2.2	0.3	0.4	0.0	0.0	0.0	1.0
	145	195	237	109	141	99	187	52	1,165

Data:

Q.4

Notes:

Table 7
Average Daily Flow (MGD) for Public Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
100% Ground Water									
Average Daily Flow	0.049	0.037	0.170	0.684	2.663	8.316	17.384	201.336	0.607
Confidence interval	+/- 0.050	+/- 0.009	+/- 0.039	+/- 0.158	+/- 0.722	+/- 2.411	+/- 3.789	+/- 73.824	+/- 0.114
Primarily Ground Water									
Average Daily Flow	*	0.029	0.292	1.349	5.664	9.106	39.614	165.945	4.736
Confidence interval	*	+/- 0.000	+/- 0.183	+/- 0.883	+/- 4.609	+/- 2.861	+/- 11.021	+/- 29.336	+/- 2.159
Percentage drawn from each source for Primarily Ground Systems:									
% Ground Water	*	99.5	69.0	81.7	77.4	85.9	68.9	99.9	78.6
Confidence Interval	*	+/- 0.0	+/- 4.9	+/- 10.3	+/- 9.1	+/- 7.7	+/- 3.9	+/- 0.0	+/- 6.0
% Surface Water	*	0.0	8.3	5.0	16.2	3.6	11.1	0.0	9.0
Confidence Interval	*	+/- 0.0	+/- 13.5	+/- 5.3	+/- 11.5	+/- 4.0	+/- 4.1	+/- 0.0	+/- 5.4
% Purchased Water	*	0.5	22.6	13.4	6.4	10.5	20.0	0.1	12.4
Confidence Interval	*	+/- 0.0	+/- 18.3	+/- 10.0	+/- 4.2	+/- 8.2	+/- 4.5	+/- 0.0	+/- 6.2
Observations	11	38	82	46	58	35	51	5	326
Primarily Surface Water Systems									
100% Surface Water									
Average Daily Flow	0.018	0.064	0.215	1.024	3.003	9.116	25.883	178.086	5.527
Confidence interval	+/- 0.012	+/- 0.041	+/- 0.048	+/- 0.185	+/- 0.498	+/- 1.195	+/- 3.829	+/- 48.940	+/- 0.936
Primarily Surface Water									
Average Daily Flow	0.019	0.027	0.304	0.998	3.540	15.009	33.735	196.422	10.708
Confidence interval	+/- 0.000	+/- 0.015	+/- 0.212	+/- 0.324	+/- 0.886	+/- 4.647	+/- 4.493	+/- 44.197	+/- 3.279
Percentage drawn from each source for Primarily Surface Systems:									
% Ground Water	14.6	8.3	19.8	8.4	13.0	11.1	10.6	6.7	13.8
Confidence Interval	+/- 0.0	+/- 7.1	+/- 6.3	+/- 7.6	+/- 5.8	+/- 6.4	+/- 2.6	+/- 3.2	+/- 3.4
% Surface Water	85.4	83.4	79.6	90.3	81.9	79.2	81.6	79.9	82.3
Confidence Interval	+/- 0.0	+/- 7.2	+/- 6.0	+/- 7.5	+/- 6.5	+/- 8.3	+/- 4.1	+/- 5.4	+/- 3.2
% Purchased Water	0.0	8.3	0.7	1.4	5.1	9.8	7.8	13.4	3.9
Confidence Interval	+/- 0.0	+/- 13.6	+/- 0.9	+/- 1.5	+/- 4.1	+/- 7.6	+/- 3.4	+/- 6.0	+/- 1.7
Observations	13	32	62	55	72	48	106	33	421

(Continued)

Table 7 (Cont.)
Average Daily Flow (MGD) for Public Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
100% Purchased Water									
Average Daily Flow	0.018	0.032	0.272	0.575	2.968	13.652	24.374	110.083	1.278
Confidence interval	+/- 0.020	+/- 0.013	+/- 0.317	+/- 0.195	+/- 1.198	+/- 7.681	+/- 4.047	+/- 55.798	+/- 0.437
Primarily Purchased Water									
Average Daily Flow	*	*	0.208	0.539	4.952	13.380	37.885	142.877	8.374
Confidence interval	*	*	+/- 0.220	+/- 0.362	+/- 2.127	+/- 4.254	+/- 6.358	+/- 41.514	+/- 3.994
Percentage drawn from each source for Primarily Purchased Systems:									
% Ground Water	*	*	16.6	18.2	3.4	11.4	19.4	5.6	12.0
Confidence Interval	*	*	+/- 23.2	+/- 22.9	+/- 3.6	+/- 6.5	+/- 4.7	+/- 3.7	+/- 8.4
% Surface Water	*	*	0.0	0.3	14.7	5.5	10.3	21.0	6.8
Confidence Interval	*	*	+/- 0.0	+/- 0.7	+/- 15.2	+/- 5.3	+/- 4.6	+/- 12.5	+/- 6.2
% Purchased Water	*	*	83.4	81.5	81.9	83.1	70.3	73.4	81.2
Confidence Interval	*	*	+/- 23.2	+/- 22.9	+/- 14.0	+/- 8.1	+/- 4.8	+/- 10.6	+/- 9.3
Observations	3	13	33	22	23	28	44	13	179
All Systems									
Average Daily Flow	0.040	0.037	0.203	0.786	3.315	10.831	28.672	168.113	1.911
Confidence Interval	+/- 0.035	+/- 0.008	+/- 0.077	+/- 0.131	+/- 0.647	+/- 1.832	+/- 2.325	+/- 26.516	+/- 0.174
Percentage drawn from each source:									
% Ground Water	14.6	79.5	36.0	51.5	37.8	32.2	28.2	14.6	40.7
Confidence Interval	+/- 0.0	+/- 35.2	+/- 16.3	+/- 17.1	+/- 12.9	+/- 10.5	+/- 4.3	+/- 6.5	+/- 8.2
% Surface Water	85.4	18.3	36.7	25.9	37.4	37.5	42.4	59.7	34.6
Confidence Interval	+/- 0.0	+/- 32.2	+/- 21.2	+/- 13.6	+/- 10.6	+/- 11.0	+/- 5.9	+/- 8.2	+/- 7.8
% Purchased Water	0.0	2.2	27.3	22.6	24.8	30.3	29.3	25.7	24.7
Confidence Interval	+/- 0.0	+/- 4.2	+/- 21.5	+/- 14.9	+/- 12.6	+/- 10.6	+/- 4.8	+/- 8.1	+/- 8.1
Observations	27	83	177	123	153	111	201	51	926

Data: Q.6

Notes: Flow is the amount of water drawn from each source. It includes water delivered to customers and system losses.

Table 8
Average Daily Flow (MGD) for Private Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
100% Ground Water									
Average Daily Flow	0.007	0.021	0.093	0.855	1.580	14.463	27.711	17.038	0.066
Confidence interval	+/- 0.002	+/- 0.005	+/- 0.026	+/- 0.373	+/- 0.422	+/- 14.896	+/- 12.607	+/- 0.000	+/- 0.020
Primarily Ground Water									
Average Daily Flow	0.011	*	0.147	0.641	3.146	5.648	37.250	*	1.247
Confidence interval	+/- 0.000	*	+/- 0.000	+/- 0.224	+/- 1.588	+/- 5.444	+/- 9.999	*	+/- 0.815
Percentage drawn from each source for Primarily Ground Systems:									
% Ground Water	99.7	*	66.5	87.4	60.3	54.0	69.0	*	79.6
Confidence Interval	+/- 0.0	*	+/- 0.0	+/- 6.0	+/- 2.4	+/- 0.5	+/- 2.6	*	+/- 8.7
% Surface Water	0.3	*	0.0	0.5	24.5	12.8	30.6	*	2.6
Confidence Interval	+/- 0.0	*	+/- 0.0	+/- 1.1	+/- 21.5	+/- 20.9	+/- 2.3	*	+/- 3.4
% Purchased Water	0.0	*	33.5	12.1	15.2	33.2	0.3	*	17.8
Confidence Interval	+/- 0.0	*	+/- 0.0	+/- 6.2	+/- 21.1	+/- 20.3	+/- 0.3	*	+/- 9.4
Observations	68	61	27	12	7	4	4	1	184
Primarily Surface Water Systems									
100% Surface Water									
Average Daily Flow	0.021	0.030	0.301	0.569	4.005	7.674	23.717	110.103	1.043
Confidence interval	+/- 0.010	+/- 0.010	+/- 0.193	+/- 0.241	+/- 1.937	+/- 3.775	+/- 5.327	+/- 0.000	+/- 0.542
Primarily Surface Water									
Average Daily Flow	0.003	3.424	*	1.115	3.538	7.687	18.200	93.348	9.554
Confidence interval	+/- 0.002	+/- 4.164	*	+/- 0.000	+/- 1.982	+/- 2.687	+/- 5.567	+/- 51.678	+/- 3.947
Percentage drawn from each source for Primarily Surface Systems:									
% Ground Water	11.1	43.0	*	32.6	13.8	16.6	1.0	2.9	18.0
Confidence Interval	+/- 18.2	+/- 10.4	*	+/- 0.0	+/- 14.3	+/- 21.1	+/- 1.0	+/- 2.8	+/- 9.0
% Surface Water	83.8	57.0	*	67.4	84.2	79.9	93.4	91.4	79.6
Confidence Interval	+/- 15.3	+/- 10.4	*	+/- 0.0	+/- 13.7	+/- 16.7	+/- 4.8	+/- 9.3	+/- 8.3
% Purchased Water	5.0	0.0	*	0.0	2.0	3.5	5.6	5.7	2.5
Confidence Interval	+/- 7.4	+/- 0.0	*	+/- 0.0	+/- 2.6	+/- 4.8	+/- 5.3	+/- 6.5	+/- 1.7
Observations	31	29	11	6	11	6	15	5	114

(Continued)

Table 8 (Cont.)
Average Daily Flow (MGD) for Private Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
100% Purchased Water									
Average Daily Flow	0.008	0.024	0.125	0.426	0.790	12.245	6.655	*	0.163
Confidence interval	+/- 0.008	+/- 0.017	+/- 0.044	+/- 0.130	+/- 0.000	+/- 0.330	+/- 0.000	*	+/- 0.081
Primarily Purchased Water									
Average Daily Flow	0.007	0.022	0.699	*	1.830	*	*	*	0.447
Confidence interval	+/- 0.000	+/- 0.000	+/- 0.749	*	+/- 0.000	*	*	*	+/- 0.567
Percentage drawn from each source for Primarily Purchased Systems:									
% Ground Water	0.0	10.0	3.6	*	0.0	*	*	*	6.1
Confidence Interval	+/- 0.0	+/- 0.0	+/- 1.0	*	+/- 0.0	*	*	*	+/- 3.8
% Surface Water	17.9	0.0	0.0	*	47.2	*	*	*	2.1
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.0	*	*	*	+/- 4.1
% Purchased Water	82.1	90.0	96.4	*	52.8	*	*	*	91.7
Confidence Interval	+/- 0.0	+/- 0.0	+/- 1.0	*	+/- 0.0	*	*	*	+/- 4.7
Observations	5	9	14	4	2	2	1	0	37
All Systems									
Average Daily Flow	0.007	0.031	0.139	0.676	2.536	9.638	20.846	65.673	0.198
Confidence Interval	+/- 0.002	+/- 0.018	+/- 0.054	+/- 0.183	+/- 0.749	+/- 3.708	+/- 4.667	+/- 42.005	+/- 0.029
Percentage drawn from each source:									
% Ground Water	39.7	15.0	24.8	84.0	21.8	31.2	13.0	2.9	38.5
Confidence Interval	+/- 46.0	+/- 10.3	+/- 34.5	+/- 8.6	+/- 16.1	+/- 19.2	+/- 11.6	+/- 2.8	+/- 18.8
% Surface Water	44.3	8.6	0.0	4.7	66.7	53.6	82.3	91.4	17.0
Confidence Interval	+/- 38.7	+/- 17.5	+/- 0.0	+/- 8.2	+/- 17.3	+/- 32.1	+/- 10.3	+/- 9.3	+/- 10.1
% Purchased Water	15.9	76.5	75.2	11.3	11.5	15.1	4.7	5.7	44.5
Confidence Interval	+/- 25.2	+/- 27.6	+/- 34.5	+/- 6.0	+/- 12.8	+/- 17.0	+/- 4.6	+/- 6.5	+/- 22.9
Observations	104	99	52	22	20	12	20	6	335

Data: Q.6

Notes: Flow is the amount of water drawn from each source. It includes water delivered to customers and system losses.

Table 9
Average Daily Flow (MGD) for Public and Private Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
100% Ground Water									
Average Daily Flow	0.012	0.027	0.151	0.710	2.586	8.715	18.031	104.015	0.313
Confidence interval	+/- 0.006	+/- 0.005	+/- 0.030	+/- 0.145	+/- 0.675	+/- 2.572	+/- 3.669	+/- 92.488	+/- 0.050
Primarily Ground Water									
Average Daily Flow	0.011	0.029	0.256	1.090	5.525	8.650	39.418	165.945	3.960
Confidence interval	+/- 0.000	+/- 0.000	+/- 0.150	+/- 0.601	+/- 4.347	+/- 2.749	+/- 10.134	+/- 29.326	+/- 1.656
Percentage drawn from each source for Primarily Ground Systems:									
% Ground Water	99.7	99.5	68.4	83.8	76.4	81.7	68.9	99.9	78.8
Confidence Interval	+/- 0.0	+/- 0.0	+/- 3.8	+/- 6.9	+/- 8.6	+/- 8.5	+/- 3.6	+/- 0.0	+/- 5.0
% Surface Water	0.3	0.0	6.2	3.4	16.7	4.8	12.8	0.0	7.6
Confidence Interval	+/- 0.0	+/- 0.0	+/- 10.7	+/- 3.3	+/- 11.0	+/- 4.2	+/- 4.0	+/- 0.0	+/- 4.4
% Purchased Water	0.0	0.5	25.3	12.9	6.9	13.5	18.3	0.1	13.6
Confidence Interval	+/- 0.0	+/- 0.0	+/- 14.5	+/- 6.7	+/- 4.1	+/- 9.1	+/- 4.4	+/- 0.0	+/- 5.4
Observations	79	99	109	58	65	39	55	6	510
Primarily Surface Water Systems									
100% Surface Water									
Average Daily Flow	0.021	0.044	0.232	0.980	3.101	8.982	25.721	174.508	4.301
Confidence interval	+/- 0.009	+/- 0.021	+/- 0.054	+/- 0.169	+/- 0.491	+/- 1.134	+/- 3.548	+/- 46.473	+/- 0.809
Primarily Surface Water									
Average Daily Flow	0.009	1.741	0.304	1.007	3.539	14.051	30.431	174.722	10.549
Confidence interval	+/- 0.008	+/- 2.614	+/- 0.212	+/- 0.299	+/- 0.803	+/- 4.161	+/- 4.081	+/- 38.059	+/- 2.855
Percentage drawn from each source for Primarily Surface Systems:									
% Ground Water	12.4	25.8	19.8	10.2	13.2	11.8	8.7	5.9	14.4
Confidence Interval	+/- 11.7	+/- 16.8	+/- 6.3	+/- 7.8	+/- 5.4	+/- 6.2	+/- 2.3	+/- 2.6	+/- 3.2
% Surface Water	84.4	70.1	79.6	88.5	82.4	79.3	83.9	82.3	81.9
Confidence Interval	+/- 9.8	+/- 13.5	+/- 6.0	+/- 7.6	+/- 5.8	+/- 7.5	+/- 3.4	+/- 4.8	+/- 3.0
% Purchased Water	3.2	4.1	0.7	1.3	4.5	8.9	7.4	11.8	3.7
Confidence Interval	+/- 5.4	+/- 7.6	+/- 0.9	+/- 1.4	+/- 3.3	+/- 6.7	+/- 2.9	+/- 4.9	+/- 1.5
Observations	44	61	73	61	83	54	121	38	535

(Continued)

Table 9 (Cont.)
Average Daily Flow (MGD) for Public and Private Water Systems
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
100% Purchased Water									
Average Daily Flow	0.013	0.028	0.225	0.545	2.823	13.509	22.430	110.083	0.898
Confidence interval	+/- 0.012	+/- 0.011	+/- 0.214	+/- 0.159	+/- 1.141	+/- 6.896	+/- 4.746	+/- 55.780	+/- 0.282
Primarily Purchased Water									
Average Daily Flow	0.007	0.022	0.452	0.539	4.772	13.380	37.885	142.877	5.625
Confidence interval	+/- 0.000	+/- 0.000	+/- 0.451	+/- 0.362	+/- 2.047	+/- 4.248	+/- 6.356	+/- 41.523	+/- 2.783
Percentage drawn from each source for Primarily Purchased Systems:									
% Ground Water	0.0	10.0	10.2	18.2	3.2	11.4	19.4	5.6	10.0
Confidence Interval	+/- 0.0	+/- 0.0	+/- 13.3	+/- 22.9	+/- 3.4	+/- 6.5	+/- 4.7	+/- 3.7	+/- 5.8
% Surface Water	17.9	0.0	0.0	0.3	16.6	5.5	10.3	21.0	5.2
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.7	+/- 14.9	+/- 5.3	+/- 4.6	+/- 12.5	+/- 4.5
% Purchased Water	82.1	90.0	89.8	81.5	80.2	83.1	70.3	73.4	84.9
Confidence Interval	+/- 0.0	+/- 0.0	+/- 13.3	+/- 22.8	+/- 13.6	+/- 8.1	+/- 4.8	+/- 10.6	+/- 6.9
Observations	8	22	47	26	25	30	45	13	216
All Systems									
Average Daily Flow	0.012	0.033	0.186	0.767	3.250	10.725	27.907	154.287	1.106
Confidence Interval	+/- 0.006	+/- 0.011	+/- 0.058	+/- 0.113	+/- 0.598	+/- 1.694	+/- 2.168	+/- 26.076	+/- 0.090
Percentage drawn from each source:									
% Ground Water	34.3	40.9	33.2	59.9	36.2	32.1	26.4	12.8	40.2
Confidence Interval	+/- 38.3	+/- 47.6	+/- 15.3	+/- 13.4	+/- 11.8	+/- 9.6	+/- 4.2	+/- 5.5	+/- 7.7
% Surface Water	53.2	12.5	27.4	20.4	40.5	39.1	47.1	64.6	30.6
Confidence Interval	+/- 35.4	+/- 17.0	+/- 16.9	+/- 10.2	+/- 10.1	+/- 10.3	+/- 5.7	+/- 7.4	+/- 6.8
% Purchased Water	12.5	46.6	39.5	19.7	23.4	28.8	26.5	22.6	29.2
Confidence Interval	+/- 20.2	+/- 52.2	+/- 20.8	+/- 11.4	+/- 11.4	+/- 9.7	+/- 4.3	+/- 7.1	+/- 8.9
Observations	131	182	229	145	173	123	221	57	1,261

Data: Q.6

Notes: Flow is the amount of water drawn from each source. It includes water delivered to customers and system losses.

Table 10
Average Annual Flow for Public and Private Systems (Millions of Gallons per Year)
From Each Source Type

Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Sources									
Average Annual Flow	4.3	11.1	53.1	260.8	917.8	2,382.9	5,274.0	19,276.3	161.5
<i>Confidence Interval</i>	+/- 2.2	+/- 2.9	+/- 10.1	+/- 59.8	+/- 232.5	+/- 507.5	+/- 893.5	+/- 7,402.3	+/- 21.7
Percentage systems with ground water sources	80.0	77.4	68.1	57.8	60.0	49.8	44.7	36.0	71.7
Surface Water Sources									
Average Annual Flow	7.2	20.5	85.4	316.3	1,097.7	3,290.2	8,467.9	54,027.7	2,167.6
<i>Confidence Interval</i>	+/- 4.0	+/- 10.2	+/- 23.8	+/- 59.0	+/- 269.8	+/- 517.2	+/- 807.4	+/- 9,662.1	+/- 246.0
Percentage systems with surface water sources	1.1	2.2	6.3	18.7	31.9	41.3	58.4	67.6	7.8
GWUDI Sources									
Average Annual Flow	7.0	67.6	78.6	159.6	511.2	1,026.8	5,667.9	2,175.8	279.7
<i>Confidence Interval</i>	+/- 4.5	+/- 122.3	+/- 57.9	+/- 54.5	+/- 459.2	+/- 711.7	+/- 1,867.0	+/- 0.0	+/- 148.0
Percentage systems with GWUDI sources	1.8	1.5	1.9	1.3	2.4	4.0	4.8	1.6	1.8
Unknown Surface Water Sources									
Average Annual Flow	*	*	*	*	*	1,398.0	3,498.0	*	1,973.1
<i>Confidence Interval</i>	*	*	*	*	*	+/- 0.0	+/- 0.0	*	+/- 930.9
Percentage systems with unknown surface water sources	0.0	0.0	0.0	0.0	0.0	0.9	0.4	0.0	0.0
Purchased Finished Ground Water									
Average Annual Flow	2.1	3.6	40.9	44.3	242.5	796.8	2,158.4	320.2	78.6
<i>Confidence Interval</i>	+/- 0.0	+/- 3.2	+/- 19.7	+/- 33.4	+/- 343.7	+/- 1,001.9	+/- 1,143.9	+/- 301.2	+/- 43.3
Percentage systems with purchased finished ground water	1.1	3.7	9.9	1.0	3.9	5.9	5.5	6.4	4.6
Purchased Partial/Untreated Ground Water									
Average Annual Flow	*	*	*	*	365.0	5.0	3,657.3	8,529.8	3,188.0
<i>Confidence Interval</i>	*	*	*	*	+/- 0.0	+/- 0.0	+/- 2,358.5	+/- 2,678.5	+/- 1,928.6
Percentage systems with purchased partial/untreated ground water	0.0	0.0	0.0	0.0	0.2	0.4	2.2	3.1	0.0
Purchased Finished Surface Water									
Average Annual Flow	5.3	11.9	100.9	133.3	917.4	3,374.9	5,324.2	23,575.3	427.9
<i>Confidence Interval</i>	+/- 5.1	+/- 4.4	+/- 98.6	+/- 46.6	+/- 330.1	+/- 1,533.6	+/- 863.0	+/- 7,315.1	+/- 111.3
Percentage systems with purchased finished surface water	5.6	10.8	19.1	29.4	23.3	30.1	29.7	25.9	14.9

(Continued)

Table 10 (Cont.)
Average Annual Flow for Public and Private Systems (Millions of Gallons per Year)
From Each Source Type

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Purchased Partial/Untreated Surface Water									
Average Annual Flow	5.9	6.9	218.0	503.9	197.5	5,572.4	7,376.2	40,833.3	4,155.8
<i>Confidence Interval</i>	+/- 5.6	+/- 0.0	+/- 0.0	+/- 200.4	+/- 268.6	+/- 1,101.1	+/- 2,395.9	+/- 16,413.0	+/- 2,237.6
Percentage systems with purchased partial/untreated surface water	0.1	0.1	0.1	1.1	1.7	3.9	5.7	11.4	0.4
Purchased Finished GWUDI Water									
Average Annual Flow	*	*	*	60.3	*	*	2.4	*	58.9
<i>Confidence Interval</i>	*	*	*	+/- 66.7	*	*	+/- 0.0	*	+/- 64.4
Percentage systems with purchased finished GUDI water	0.0	0.0	0.0	1.8	0.0	0.0	0.4	0.0	0.2
Purchased Partial/Untreated GWUDI Water									
Average Annual Flow	*	*	*	*	*	*	200.0	*	200.0
<i>Confidence Interval</i>	*	*	*	*	*	*	+/- 0.0	*	+/- 0.0
Percentage systems with purchased partial/untreated GWUDI water	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Unknown Purchased Water									
Average Annual Flow	*	4.1	*	88.8	843.2	1.7	384.5	21,534.2	1,226.4
<i>Confidence Interval</i>	*	+/- 0.0	*	+/- 77.7	+/- 1,180.8	+/- 0.0	+/- 312.4	+/- 1,333.1	+/- 1,206.3
Percentage systems with unknown purchased water	0.0	0.0	0.0	2.1	3.2	0.8	0.8	8.4	0.5
Observations	158	217	294	205	260	184	380	98.000	1796

Data:

Q.6

Notes:

Flow is the amount of water drawn from each source. It includes water delivered to customers and system losses.

Table 11
Annual Water Deliveries and Unaccounted for Water (Millions of Gallons per Year)
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Sold to Other Water Suppliers									
Finished Water	0.0	5.1	6.6	44.9	77.8	500.6	1,669.3	13,028.9	350.4
Confidence Interval	+/- 0.0	+/- 0.8	+/- 6.3	+/- 27.9	+/- 30.2	+/- 198.9	+/- 393.5	+/- 3,852.1	+/- 64.7
Partially or Untreated Water	0.0	0.0	0.0	9.1	0.6	0.4	86.5	2,949.2	59.7
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 14.0	+/- 1.1	+/- 0.6	+/- 86.0	+/- 3,079.1	+/- 55.3
Residential Customers	7.0	11.1	54.6	148.1	647.4	2,034.4	4,980.0	22,759.5	291.2
Confidence Interval	+/- 5.4	+/- 1.9	+/- 20.0	+/- 23.9	+/- 131.7	+/- 323.1	+/- 499.1	+/- 4,200.6	+/- 38.4
Non-residential Customers									
Finished Water	1.0	1.5	20.7	76.0	378.8	976.0	2,969.2	12,846.4	278.8
Confidence Interval	+/- 1.3	+/- 1.2	+/- 12.5	+/- 23.4	+/- 136.9	+/- 292.3	+/- 341.0	+/- 2,245.3	+/- 42.2
Partially or Untreated Water	0.0	*	5.7	19.4	1.5	16.4	304.0	482.5	36.3
Confidence Interval	+/- 0.0	*	+/- 11.1	+/- 23.1	+/- 2.2	+/- 17.5	+/- 166.2	+/- 371.9	+/- 15.9
Unaccounted for Water	1.7	3.0	9.4	37.2	113.2	302.8	763.5	8,057.9	87.7
Confidence Interval	+/- 1.8	+/- 2.9	+/- 2.7	+/- 10.3	+/- 24.6	+/- 96.7	+/- 140.4	+/- 1,829.8	+/- 14.3
Unaccounted for Water as Percentage of Total	12.1	16.2	16.6	12.8	10.1	8.5	7.9	13.2	14.7
Confidence Interval	+/- 9.5	5	+/- 3.7	+/- 2.8	+/- 1.9	+/- 1.7	+/- 0.9	+/- 2.4	+/- 2.1
Observations	24	79	173	77	117	81	161	48	760
Private Systems									
Sold to Other Water Suppliers									
Finished Water	0.0	0.0	1.8	16.4	160.9	1,646.6	1,006.3	2,298.3	60.5
Confidence Interval	+/- 0.0	+/- 0.0	+/- 2.9	+/- 26.6	+/- 120.7	+/- 1,307.4	+/- 804.0	+/- 1,079.2	+/- 35.7
Partially or Untreated Water	0.3	0.0	0.0	0.0	17.6	0.0	0.0	0.0	0.4
Confidence Interval	+/- 0.4	+/- 0.0	+/- 0.0	+/- 0.0	+/- 37.7	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.7
Residential Customers	2.6	7.7	43.3	169.3	345.7	1,730.6	5,039.3	23,665.0	38.2
Confidence Interval	+/- 0.7	+/- 1.7	+/- 19.1	+/- 46.0	+/- 92.3	+/- 582.0	+/- 1,456.0	+/- 9,047.6	+/- 11.4
Non-residential Customers									
Finished Water	0.5	0.4	15.5	36.0	39.9	1,567.2	3,651.4	13,186.0	90.6
Confidence Interval	+/- 0.9	+/- 0.7	+/- 12.8	+/- 29.5	+/- 41.0	+/- 775.8	+/- 927.8	+/- 6,343.1	+/- 47.7
Partially or Untreated Water	1.3	0.0	0.0	0.0	0.0	0.0	0.0	1,746.3	7.7
Confidence Interval	+/- 2.6	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 2,598.6	+/- 9.0
Unaccounted for Water	0.2	0.8	4.6	23.0	102.3	1,214.4	3,496.7	7,893.7	39.4
Confidence Interval	+/- 0.2	+/- 0.3	+/- 1.6	+/- 10.3	+/- 57.6	+/- 1,475.8	+/- 1,760.6	+/- 2,790.6	+/- 26.1
Unaccounted for Water as Percentage of Total	6.7	10.7	11.3	11.4	15.5	17.2	24.5	15.8	10.1
Confidence Interval	+/- 5.8	+/- 3.0	+/- 3.6	+/- 5.5	+/- 5.7	+/- 15.2	+/- 6.3	+/- 1.4	+/- 2.2
Observations	95	96	52	16	11	8	16	4	298

(Continued)

Table 11 (Cont.)
Annual Water Deliveries and Unaccounted for Water (Millions of Gallons per Year)
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems									
Sold to Other Water Suppliers									
Finished Water	0.0	0.8	6.0	38.8	83.1	586.8	1,576.1	12,311.0	264.8
<i>Confidence Interval</i>	+/- 0.0	+/- 1.8	+/- 5.5	+/- 22.8	+/- 29.5	+/- 221.6	+/- 360.7	+/- 3,600.7	+/- 43.3
Partially or Untreated Water	0.2	0.0	0.0	7.2	1.3	0.3	81.5	2,593.9	35.8
<i>Confidence Interval</i>	+/- 0.4	+/- 0.0	+/- 0.0	+/- 11.2	+/- 1.8	+/- 0.6	+/- 81.5	+/- 2,719.3	+/- 32.5
Residential Customers	3.1	9.1	51.5	152.8	627.2	2,016.9	4,988.1	22,817.7	166.9
<i>Confidence Interval</i>	+/- 1.1	+/- 1.4	+/- 15.4	+/- 21.4	+/- 124.3	+/- 303.8	+/- 475.7	+/- 3,975.3	+/- 15.4
Non-residential Customers									
Finished Water	0.7	1.1	19.7	66.2	359.0	1,010.9	3,070.2	12,869.2	232.0
<i>Confidence Interval</i>	+/- 0.8	+/- 0.8	+/- 10.5	+/- 19.6	+/- 130.2	+/- 284.5	+/- 337.0	+/- 2,138.7	+/- 29.2
Partially or Untreated Water	1.0	0.0	4.7	13.5	1.5	14.8	285.3	664.0	24.5
<i>Confidence Interval</i>	+/- 2.0	+/- 0.0	+/- 9.1	+/- 15.8	+/- 2.1	+/- 15.9	+/- 156.1	+/- 447.0	+/- 9.4
Unaccounted for Water	0.6	2.0	8.3	33.4	112.6	358.1	1,157.5	8,046.9	71.6
<i>Confidence Interval</i>	+/- 0.6	+/- 1.6	+/- 2.1	+/- 8.0	+/- 23.4	+/- 140.4	+/- 421.3	+/- 1,716.9	+/- 11.4
Unaccounted for Water as Percentage of Total	8.2	13.6	15.4	12.5	10.4	9.0	10.4	13.4	13.1
<i>Confidence interval</i>	+/- 5.0	+/- 3.2	+/- 3.0	+/- 2.5	+/- 1.9	+/- 2.0	+/- 2.1	+/- 2.3	+/- 1.6
Observations	119	175	225	93	128	89	177	52	1,058

Data:

Q.21.A

Notes:

Unaccounted for water includes system losses, water for fire suppression, and water used in the treatment process.

Average deliveries only includes estimates for systems reporting each type.

Table 12
Annual Deliveries per Customer Service Connection
By Ownership
(Thousands of Gallons)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean Residential Deliveries	109	107	94	86	89	115	123	135	98
Confidence Interval	+/- 61	+/- 22	+/- 11	+/- 11	+/- 8	+/- 17	+/- 8	+/- 18	+/- 9
Median Residential Deliveries	112	80	77	75	77	102	112	116	79
Non-Residential Deliveries									
Mean Finished Water Deliveries	1,499	156	325	694	639	727	869	1,276	455
Confidence Interval	+/- 3,058	+/- 91	+/- 103	+/- 294	+/- 156	+/- 152	+/- 85	+/- 429	+/- 82
Median Finished Water Deliveries	142	98	185	329	444	657	645	870	223
Mean Partially or Untreated Water Deliveries	*	*	317	14,131	9,867	15,261	324,478	93,992	57,284
Confidence Interval	*	*	+/- 0	+/- 11,841	+/- 16,549	+/- 19,498	+/- 136,099	+/- 92,803	+/- 23,644
Median Partially or Untreated Water Deliveries	*	*	317	9,000	4,114	9,557	65,833	32,182	4,114
Observations	27	84	157	64	98	65	136	40	671
Private Systems									
Mean Residential Deliveries	96	86	104	91	83	78	71	98	93
Confidence Interval	+/- 22	+/- 14	+/- 18	+/- 25	+/- 28	+/- 37	+/- 21	+/- 5	+/- 11
Median Residential Deliveries	67	70	87	81	67	62	57	95	73
Non-Residential Deliveries									
Mean Finished Water Deliveries	1,339	95	3,053	4,330	511	545	868	629	2,457
Confidence Interval	+/- 426	+/- 100	+/- 4,595	+/- 7,352	+/- 119	+/- 220	+/- 426	+/- 74	+/- 2,587
Median Finished Water Deliveries	1,560	62	367	116	460	606	462	623	228
Mean Partially or Untreated Water Deliveries	429	*	*	*	*	*	*	21,028	685
Confidence Interval	+/- 0	*	*	*	*	*	*	+/- 0	+/- 607
Median Partially or Untreated Water Deliveries	429	*	*	*	*	*	*	21,028	429
Observations	81	111	56	27	20	13	21	4	333

(Continued)

Table 12 (Cont.)
Annual Deliveries per Customer Service Connection
By Ownership
(Thousands of Gallons)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Mean Residential Deliveries	98	94	97	87	88	112	115	129	96
Confidence Interval	+/- 23	+/- 12	+/- 9	+/- 10	+/- 8	+/- 16	+/- 9	+/- 16	+/- 7
Median Residential Deliveries	71	74	82	81	77	102	105	110	77
Non-Residential Deliveries									
Mean Finished Water Deliveries	1,410	145	825	1,588	636	712	869	1,173	797
Confidence Interval	+/- 1,343	+/- 80	+/- 801	+/- 1,858	+/- 152	+/- 143	+/- 102	+/- 386	+/- 438
Median Finished Water Deliveries	183	84	197	311	444	620	631	811	223
Mean Partially or Untreated Water Deliveries	429	317	14,131	9,867	15,261	324,478	79,103	*	40,337
Confidence Interval	+/- 0	+/- 0	+/- 11,841	+/- 16,549	+/- 19,498	+/- 136,099	+/- 72,199	*	+/- 29,139
Median Partially or Untreated Water Deliveries	429	*	317	9,000	4,114	9,557	65,833	29,200	1,213
Observations	108	195	213	91	118	78	157	44	1,004

Data:

Q.21A

Notes:

Average deliveries per connection are for systems that have deliveries and connections for that delivery type; it excludes systems that do not have positive deliveries per connection.

Average deliveries per connection exclude the upper and lower 5 percent of the observations.

Table 13
Number of Entry Points to the Distribution System
Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Entry Points from Ground Water Sources	1.1	1.2	1.7	2.1	3.4	9.7	11.6	39.3	1.6
<i>Confidence interval</i>	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.4	+/- 0.7	+/- 8.7	+/- 3.0	+/- 38.4	+/- 0.1
Entry Points from Surface Water Sources	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.0	0.0
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.0	+/- 0.0
Observations	83	99	110	57	60	38	54	6	507
Primarily Surface Water Systems									
Entry Points from Ground Water Sources	0.1	0.1	0.2	0.1	0.3	0.3	0.8	1.4	0.2
<i>Confidence interval</i>	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.3	+/- 0.3	+/- 0.9	+/- 0.1
Entry Points from Surface Water Sources	1.0	1.1	1.0	1.0	1.1	1.4	1.4	3.0	1.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.1	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.1	+/- 0.3	+/- 0.0
Observations	47	66	78	64	83	54	122	39	553
Primarily Purchased Water Systems									
Entry Points from Ground Water Sources	0.0	2.0	1.0	0.9	2.6	2.3	2.8	15.7	1.8
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.2	+/- 1.1	+/- 1.1	+/- 0.8	+/- 13.3	+/- 0.5
Entry Points from Surface Water Sources	1.0	0.0	0.0	0.1	0.2	0.6	0.7	1.0	0.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.2	+/- 0.2	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.1
Observations	1	1	4	4	7	9	23	5	54
All Systems									
Entry Points from Ground Water Sources	1.1	1.2	1.5	1.6	2.3	4.5	3.9	8.6	1.4
<i>Confidence interval</i>	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.3	+/- 0.4	+/- 4.4	+/- 0.9	+/- 4.4	+/- 0.1
Entry Points from Surface Water Sources	0.0	0.1	0.1	0.3	0.4	0.7	1.0	2.4	0.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.1	+/- 0.4	+/- 0.0
Observations	131	166	192	125	150	101	199	50	1,114

Data:

Q.6, Q. 7

Notes:

For primarily purchased water systems, the estimate of ground water and surface water entry points are for non-purchased water entry points only.

The average number of entry points for ground water systems is driven up by one system with over 200 entry points. The average is reduced to 14.5 entry points when this system is excluded.

Table 14
Number and Percentage of Systems Selling to Other Public Water Suppliers
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Finished Water	*	129	436	343	401	70	29	10	1,418
% of Systems Selling Finished Water	0.0	1.0	5.0	13.0	23.2	32.3	25.0	76.1	3.9
Partially Treated or Untreated Water	242	*	*	48	31	5	4	*	330
% of Systems Selling Treated or Untreated Water	2.3	0.0	0.0	1.8	1.8	2.1	3.6	0.0	0.9
Observations	88	105	111	62	66	40	56	6	534
Primarily Surface Water Systems									
Finished Water	*	*	181	195	308	140	176	56	1,056
% of Systems Selling Finished Water	0.0	0.0	16.9	22.6	33.2	60.7	66.3	89.7	24.2
Partially Treated or Untreated Water	*	*	*	12	20	5	25	13	75
% of Systems Selling Treated or Untreated Water	0.0	0.0	0.0	1.4	2.2	2.0	9.5	20.5	1.7
Observations	49	67	78	65	85	54	124	39	561
Primarily Purchased Water Systems									
Finished Water	*	*	12	174.2	111.2	35	35	9	378
% of Systems Selling Finished Water	0.0	0.0	0.3	16.3	16.4	24.0	36.9	39.4	4.4
Partially Treated or Untreated Water	*	*	*	*	*	*	2	3	5
% of Systems Selling Treated or Untreated Water	0.0	0.0	0.0	0.0	0.0	0.0	2.0	12.9	0.1
Observations	8	23	48	27	25	30	45	13	219
All Systems									
Finished Water	*	129	628	713	820	246	241	76	2,851
% of Systems Selling Finished Water	0.0	0.8	4.7	15.6	24.6	41.2	50.3	75.9	5.8
Partially Treated or Untreated Water	242	*	*	60	52	9	32	16	410
% of Systems Selling Treated or Untreated Water	2.1	0.0	0.0	1.3	1.6	1.5	6.6	16.1	0.8
Observations	145	195	237	154	176	124	225	58	1,314

Data:

Q.21.A

Notes:

Table 15
Water Systems Not Providing Any Treatment
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
% of Systems	28.1	24.3	10.3	4.0	0.0	2.5	5.7	0.0	19.1
Confidence Interval	+/- 10.4	+/- 10.2	+/- 8.3	+/- 5.4	+/- 0.0	+/- 4.4	+/- 4.5	+/- 0.0	+/- 5.1
# of Entry Points	1.1	1.3	2.0	3.5	*	1.0	7.3	*	0.2
Confidence Interval	+/- 0.1	+/- 0.2	+/- 0.6	+/- 4.3	*	+/- 0.0	+/- 7.4	*	+/- 0.1
Observations	22	23	11	2	60	1	3	6	62
Primarily Surface Water Systems									
% of Systems	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0
# of Entry Points	*	*	*	*	*	*	*	*	*
Confidence Interval	*	*	*	*	*	*	*	*	*
Observations	0	0	0	0	0	0	0	0	0
Primarily Purchased Water Systems									
% of Systems	0.0	0.0	25.2	0.0	22.2	23.7	4.5	0.0	15.5
Confidence Interval	+/- 0.0	+/- 0.0	+/- 43.0	+/- 0.0	+/- 36.9	+/- 25.8	+/- 6.3	+/- 0.0	+/- 19.6
# of Entry Points	*	*	1.0	*	4.0	3.1	7.0	*	0.2
Confidence Interval	*	*	+/- 0.0	*	+/- 0.0	+/- 1.3	+/- 0.0	*	+/- 0.2
Observations	1	1	1	4	1	2	1	5	5
All Systems									
% of Systems	27.5	22.8	9.6	2.8	1.2	3.1	2.0	0.0	17.0
Confidence Interval	+/- 10.2	+/- 9.6	+/- 7.3	+/- 3.9	+/- 2.3	+/- 3.1	+/- 1.4	+/- 0.0	+/- 4.5
# of Entry Points	1.1	1.3	1.9	3.5	4.0	2.3	7.3	*	1.6
Confidence Interval	+/- 0.1	+/- 0.2	+/- 0.6	+/- 4.3	+/- 0.0	+/- 1.9	+/- 5.5	*	+/- 0.1
Observations	22	23	12	2	1	3	4	50	67

Data: Q.6

Notes: Number of entry points and observations are for systems that do not treat.
Categories where all systems treat are denoted as zero.
Excludes systems that purchase 100% of their water.

Table 16
Ground Water Entry Points Not Receiving Treatment
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
# of Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	0.3 +/- 0.1	0.3 +/- 0.1	0.2 +/- 0.2	0.2 +/- 0.2	0.1 +/- 0.2	2.9 +/- 4.7	1.2 +/- 0.9	0.0 +/- 0.0	0.3 +/- 0.1
# of Wells per Untreated Entry Point <i>Confidence Interval</i>	1.2 +/- 0.2	1.3 +/- 0.3	1.1 +/- 0.3	* *	3.8 +/- 0.0	2.6 +/- 1.5	* *	* *	1.2 +/- 0.1
% Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	28.8 +/- 10.5	24.3 +/- 10.2	10.7 +/- 8.3	5.1 +/- 5.9	3.4 +/- 6.1	9.9 +/- 12.2	10.1 +/- 5.6	0.0 +/- 0.0	19.7 +/- 5.2
% that are Seasonal/Emergency <i>Confidence Interval</i>	3.7 +/- 7.6	3.8 +/- 8.1	0.0 +/- 0.0	* *	100.0 +/- 0.0	47.9 +/- 36.5	* *	* *	5.0 +/- 4.7
Observations	83	99	110	57	60	38	54	6	507
Primarily Surface Water Systems									
# of Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	0.0 +/- 0.0	0.0 +/- 0.0	0.0 +/- 0.0	0.1 +/- 0.1	0.0 +/- 0.0	0.0 +/- 0.0	0.1 +/- 0.1	0.0 +/- 0.0	0.0 +/- 0.0
# of Wells per Untreated Entry Point <i>Confidence Interval</i>	1.2 +/- 0.2	* *	* *	* *	2.5 +/- 1.8	* *	* *	* *	3.7 +/- 1.9
% Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	0.0 +/- 0.0	0.0 +/- 0.0	2.0 +/- 4.2	17.0 +/- 35.4	4.6 +/- 5.9	0.0 +/- 0.0	9.1 +/- 8.6	1.3 +/- 1.5	5.2 +/- 5.2
% that are Seasonal/Emergency <i>Confidence Interval</i>	6.4 +/- 8.8	* *	* *	* *	1.6 +/- 2.8	* *	* *	* *	88.9 +/- 8.0
Observations	47	66	78	64	83	54	122	39	553

(Continued)

Table 16 (Cont.)
Ground Water Entry Points Not Receiving Treatment
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
# of Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	0.0 +/- 0.0	1.0 +/- 0.0	0.3 +/- 0.4	0.0 +/- 0.0	0.9 +/- 1.5	0.7 +/- 0.9	0.8 +/- 0.6	0.8 +/- 0.8	0.5 +/- 0.4
# of Wells per Untreated Entry Point <i>Confidence Interval</i>	1.0 +/- 0.0	1.0 +/- 0.0	1.0 +/- 0.0	20.0 +/- 0.0	3.7 +/- 1.9	* *	* *	* *	1.4 +/- 0.6
% Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	* *	50.0 +/- 0.0	25.2 +/- 43.1	0.0 +/- 0.0	26.7 +/- 43.4	30.5 +/- 32.0	16.0 +/- 11.0	2.0 +/- 2.0	26.1 +/- 21.8
% that are Seasonal/Emergency <i>Confidence Interval</i>	0.0 +/- 0.0	100.0 +/- 0.0	25.9 +/- 15.5	0.0 +/- 0.0	88.9 +/- 8.0	* *	* *	* *	44.4 +/- 55.1
Observations	1	1	4	4	7	9	23	5	54
All Systems									
# of Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	0.3 +/- 0.1	0.3 +/- 0.1	0.2 +/- 0.2	0.1 +/- 0.2	0.1 +/- 0.1	1.3 +/- 2.2	0.4 +/- 0.3	0.1 +/- 0.1	0.3 +/- 0.1
# of Wells per Untreated Entry Point <i>Confidence Interval</i>	1.2 +/- 0.2	1.2 +/- 0.2	1.2 +/- 0.3	1.1 +/- 0.3	1.0 +/- 0.0	7.0 +/- 8.1	2.7 +/- 1.3	* *	1.3 +/- 0.1
% Ground Water Entry Points Untreated per System <i>Confidence Interval</i>	28.8 +/- 10.4	24.5 +/- 10.2	11.0 +/- 8.0	5.3 +/- 5.6	5.1 +/- 6.2	11.4 +/- 10.3	11.1 +/- 4.4	0.8 +/- 0.8	19.6 +/- 5.1
% that are Seasonal/Emergency <i>Confidence Interval</i>	3.7 +/- 7.6	6.2 +/- 8.5	7.4 +/- 11.8	0.0 +/- 0.0	25.9 +/- 15.5	80.0 +/- 49.8	18.6 +/- 12.9	* *	6.2 +/- 4.9
Observations	131	166	192	125	150	101	199	50	1,114

Data:

Q.6

Notes:

Number of entry points that are not treated per system include both treated and untreated entry points, i.e., systems that treat all of their entry points are included in the analysis as zeros.

Table 17
Number of Water Treatment Plants per System
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Ground Water Systems									
100% Ground Water Systems									
Number of Water Treatment Plants/System	1.1	1.2	1.7	2.1	3.4	7.6	9.3	11.1	1.5
<i>Confidence Interval</i>	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.5	+/- 0.8	+/- 5.3	+/- 2.6	+/- 11.7	+/- 0.1
Number of Wells/Plant	1.6	1.8	1.8	2.4	2.3	1.8	8.8	5.3	2.0
<i>Confidence Interval</i>	+/- 0.4	+/- 0.3	+/- 0.4	+/- 0.9	+/- 0.6	+/- 2.4	+/- 6.1	+/- 3.2	+/- 0.2
Observations	60	75	95	41	47	26	30	4	378
Primarily Ground Water Systems									
Number of Water Treatment Plants/System	1.0	1.0	1.5	1.7	2.7	5.7	13.7	129.0	2.7
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.5	+/- 0.4	+/- 1.2	+/- 2.2	+/- 6.2	+/- 80.7	+/- 0.6
Number of Wells/Plant	4.0	1.0	2.8	5.7	2.1	1.9	3.1	2.7	3.3
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 2.0	+/- 4.1	+/- 0.9	+/- 0.9	+/- 1.3	+/- 0.3	+/- 1.2
Percentage of Plants Treating Surface Water	100.0	0.0	16.7	11.7	14.7	4.2	5.1	0.0	10.1
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 25.8	+/- 11.1	+/- 14.0	+/- 3.4	+/- 2.7	+/- 0.0	+/- 5.7
Observations	1	1	4	17	16	11	22	2	74
Surface Water Systems									
100% Surface Water Systems									
Number of Water Treatment Plants/System	1.0	1.1	1.1	1.1	1.1	1.5	1.3	3.2	1.1
<i>Confidence Interval</i>	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.3	+/- 0.1	+/- 0.4	+/- 0.0
Observations	42	62	61	49	57	35	76	20	402
Primarily Surface Water Systems									
Number of Water Treatment Plants/System	1.6	2.3	1.7	1.1	1.9	2.1	3.5	5.8	1.9
<i>Confidence Interval</i>	+/- 0.6	+/- 2.0	+/- 0.2	+/- 0.1	+/- 0.5	+/- 0.8	+/- 0.8	+/- 1.9	+/- 0.2
Number of Wells/Plant	0.5	0.9	0.9	0.3	1.7	1.6	1.6	1.2	1.3
<i>Confidence Interval</i>	+/- 0.2	+/- 0.3	+/- 0.4	+/- 0.2	+/- 0.9	+/- 1.0	+/- 0.8	+/- 0.4	+/- 0.4
Percentage of Plants Treating Surface Water	60.7	44.3	57.4	74.1	59.1	60.4	44.0	48.2	56.7
<i>Confidence Interval</i>	+/- 23.9	+/- 38.7	+/- 8.2	+/- 31.3	+/- 12.8	+/- 22.8	+/- 9.0	+/- 15.8	+/- 6.0
Observations	5	4	17	15	28	19	46	19	153

(Continued)

Table 17 (Cont.)
Number of Water Treatment Plants per System
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Purchased Water Systems									
100% Purchased Water Systems									
Number of Water Treatment Plants/System	1.0	1.4	1.4	1.0	1.0	2.4	1.3	1.5	1.3
Confidence Interval	+/- 0.0	+/- 0.5	+/- 0.2	+/- 0.0	+/- 0.0	+/- 0.9	+/- 0.4	+/- 0.4	+/- 0.2
Observations	2	4	12	6	2	3	7	2	38
Primarily Purchased Water Systems									
Number of Water Treatment Plants/System	1.0	1.0	1.3	1.3	2.2	2.9	3.1	15.9	1.8
Confidence Interval	0.0	0.0	+/- 0.5	+/- 0.5	+/- 0.9	+/- 1.3	+/- 0.8	+/- 12.2	+/- 0.5
Number of Wells/Plant	0.0	3.0	7.7	0.9	0.8	1.2	4.4	1.0	3.0
Confidence Interval	0.0	0.0	+/- 13.4	+/- 0.7	+/- 0.3	+/- 0.6	+/- 3.5	+/- 0.0	+/- 2.8
Percentage of Plants Treating Surface Water	100.0	0.0	0.0	9.1	6.3	22.9	24.1	6.3	7.9
Confidence Interval	0.0	0.0	+/- 0.0	+/- 18.7	+/- 9.6	+/- 18.0	+/- 11.6	+/- 6.4	+/- 4.9
Observations	1.0	1.0	3	4	8	8	22	5	52
All Systems									
Number of Water Treatment Plants/System	1.1	1.2	1.6	1.7	2.5	4.1	4.4	10.6	1.5
Confidence Interval	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.3	+/- 0.4	+/- 2.1	+/- 0.9	+/- 4.5	+/- 0.1
Number of Wells/Plant	1.6	1.6	1.7	2.5	2.0	1.5	4.2	2.2	1.9
Confidence Interval	+/- 0.3	+/- 0.2	+/- 0.5	+/- 1.0	+/- 0.4	+/- 1.1	+/- 2.0	+/- 0.4	+/- 0.2
Percentage of Plants Treating Surface Water	3.0	5.5	7.4	16.5	17.2	18.8	23.1	21.5	9.9
Confidence Interval	+/- 0.8	+/- 2.4	+/- 2.2	+/- 3.9	+/- 3.9	+/- 12.4	+/- 4.7	+/- 9.2	+/- 1.1
Observations	111	147	192	132	158	102	203	52	1,097

Data:

Q.6, Q.7

Notes:

Includes systems with at least one treatment plant only.

See "Plant" definition in introduction.

Number of Wells/Plant refers to the average number of ground water wells treated at each water treatment plant. For primarily surface water systems, a treatment plant may only treat ground water, but the majority of the water in the system comes from a surface water source.

**Please note that the unit of analysis changes for the following tables.
Tables 18 - 42 report data for treatment plants rather than water systems.**

Table 18
Number of Wells Treated per Treatment Plant
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Plants									
Number of Wells/Plant	1.7	1.8	1.8	3.2	2.3	3.4	5.4	2.8	2.1
Confidence Interval	+/- 0.4	+/- 0.2	+/- 0.4	+/- 1.3	+/- 0.5	+/- 1.3	+/- 2.7	+/- 0.6	+/- 0.2
Observations	65	93	170	104	210	133	604	439	1,818
Mixed Plants									
Number of Wells/Plant	2.6	1.8	7.8	1.9	3.2	7.6	9.7	1.0	4.5
Confidence Interval	+/- 1.8	+/- 0.3	+/- 8.4	+/- 0.9	+/- 1.5	+/- 4.3	+/- 7.5	+/- 0.0	+/- 3.4
Observations	3	7	9	7	11	4	12	1	54
All Plants									
Number of Wells/Plant	1.7	1.8	1.9	3.1	2.3	3.6	5.5	2.8	2.2
Confidence Interval	+/- 0.4	+/- 0.2	+/- 0.6	+/- 1.3	+/- 0.5	+/- 1.2	+/- 2.6	+/- 0.6	+/- 0.3
Observations	68	100	179	111	221	137	616	440	1,872

Data:

Q.6, Q.7

Notes:

This table reports the number of wells treated per ground water plant. Plants with sources other than wells are excluded. Ground water plants are defined as treating wells only. For this analysis mixed plants treat at least one well and one non-ground water source.

Table 19
Treatment Plant Flow Characteristics
By Water Source
(Thousands of Gallons/Day)

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Plants									
Average Daily Flow	19	23	89	397	862	2,686	2,502	3,260	370
Confidence Interval	+/- 14	+/- 5	+/- 20	+/- 110	+/- 276	+/- 1,234	+/- 631	+/- 2,565	+/- 54
Peak Daily Flow	36	48	196	770	1,728	4,367	4,793	5,330	695
Confidence Interval	+/- 20	+/- 12	+/- 48	+/- 204	+/- 480	+/- 1,827	+/- 1,172	+/- 3,425	+/- 93
Design Capacity	121	186	536	1,278	2,309	5,789	5,907	6,633	1,061
Confidence Interval	+/- 55	+/- 54	+/- 151	+/- 407	+/- 674	+/- 2,465	+/- 1,467	+/- 3,702	+/- 136
Surface Water Plants									
Average Daily Flow	9	52	226	819	2,763	7,105	16,297	62,444	5,507
Confidence Interval	+/- 3	+/- 25	+/- 63	+/- 113	+/- 733	+/- 1,200	+/- 1,647	+/- 10,508	+/- 652
Peak Daily Flow	23	122	476	1,364	4,955	11,739	27,271	96,947	8,999
Confidence Interval	+/- 8	+/- 69	+/- 142	+/- 218	+/- 1,644	+/- 2,090	+/- 2,996	+/- 15,924	+/- 1,055
Design Capacity	61	249	835	2,196	6,718	16,503	37,032	127,739	12,226
Confidence Interval	+/- 28	+/- 130	+/- 231	+/- 355	+/- 2,074	+/- 3,007	+/- 4,141	+/- 22,571	+/- 1,443
Mixed Plants									
Average Daily Flow	30	29	208	2,086	2,961	5,141	20,651	47,328	1,994
Confidence Interval	40	+/- 2	+/- 46	+/- 1,582	+/- 1,108	+/- 3,464	+/- 5,458	+/- 36,992	+/- 1,042
Peak Daily Flow	37	335	332	3,967	4,151	7,598	34,470	58,628	3,250
Confidence Interval	36	+/- 115	+/- 88	+/- 3,346	+/- 1,586	+/- 5,400	+/- 10,080	+/- 42,574	+/- 1,662
Design Capacity	106	364	455	8,405	5,748	12,054	46,633	81,635	4,974
Confidence Interval	104	+/- 121	+/- 207	+/- 7,788	+/- 2,191	+/- 4,002	+/- 13,460	+/- 58,714	+/- 2,883

(Continued)

Table 19 (Cont.)
(Table 13 in the 2000 Report, Table 16 from draft 1)
Treatment Plant Flow Characteristics
By Water Source
(Thousands of Gallons/Day)

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Plants									
Average Daily Flow	19	24	104	523	1,290	3,979	6,892	19,623	986
Confidence Interval	+/- 14	+/- 5	+/- 20	+/- 129	+/- 295	+/- 1,143	+/- 1,226	+/- 11,009	+/- 103
Peak Daily Flow	35	56	223	966	2,425	6,519	11,948	30,600	1,689
Confidence Interval	+/- 20	+/- 16	+/- 48	+/- 237	+/- 545	+/- 1,780	+/- 2,046	+/- 16,693	+/- 170
Design Capacity	119	191	559	1,647	3,265	8,997	15,805	40,009	2,407
Confidence Interval	+/- 53	+/- 52	+/- 138	+/- 497	+/- 746	+/- 2,458	+/- 2,795	+/- 21,639	+/- 241

Data: Q.6,

Q.7

Notes:

Excludes plants that treat only treated purchased water.

Table presents average flows for plants in the sample. It includes only plants that reported complete data for average daily production, peak daily production, and design capacity.

Table 20
Ratio of Design Capacity to Average and Peak Daily Production
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Plants									
Ratio: Design Capacity to Average Daily Production	16.77	10.57	7.91	5.55	3.60	2.85	3.83	6.51	8.78
<i>Confidence interval</i>	+/- 9.49	+/- 3.05	+/- 1.90	+/- 2.08	+/- 0.69	+/- 0.38	+/- 0.80	+/- 1.42	+/- 1.70
Ratio: Design Capacity to Peak Daily Production	7.49	5.05	3.79	1.81	1.48	2.09	1.28	2.51	4.00
<i>Confidence interval</i>	+/- 3.41	+/- 1.35	+/- 1.05	+/- 0.31	+/- 0.20	+/- 0.90	+/- 0.09	+/- 0.51	+/- 0.69
Observations	43	72	137	84	175	169	430	281	1,391
Surface Water Plants									
Ratio: Design Capacity to Average Daily Production	8.42	7.18	4.26	2.96	3.50	2.62	2.90	2.14	3.85
<i>Confidence interval</i>	+/- 3.56	+/- 4.01	+/- 0.54	+/- 0.47	+/- 1.69	+/- 0.53	+/- 0.56	+/- 0.10	+/- 0.55
Ratio: Design Capacity to Peak Daily Production	3.60	2.58	2.19	1.75	1.93	1.47	1.40	1.32	1.95
<i>Confidence interval</i>	+/- 1.57	+/- 1.00	+/- 0.53	+/- 0.19	+/- 0.99	+/- 0.11	+/- 0.05	+/- 0.04	+/- 0.28
Observations	34	46	65	70	88	79	191	108	681
Mixed Plants									
Ratio: Design Capacity to Average Daily Production	4.71	12.55	2.10	3.40	1.99	4.20	2.40	3.21	4.64
<i>Confidence interval</i>	+/- 2.87	+/- 4.17	+/- 0.64	+/- 0.91	+/- 0.43	+/- 3.04	+/- 0.36	+/- 1.33	+/- 3.63
Ratio: Design Capacity to Peak Daily Production	2.57	1.11	1.40	1.92	1.38	3.68	1.51	1.44	1.51
<i>Confidence interval</i>	+/- 1.00	+/- 0.07	+/- 0.54	+/- 0.31	+/- 0.22	+/- 3.30	+/- 0.26	+/- 0.05	+/- 0.31
Observations	+/- 3.00	5	10	6	9	4	15	2	54
All Plants									
Ratio: Design Capacity to Average Daily Production	16.46	10.47	7.46	4.97	3.54	3.04	3.51	5.24	8.13
<i>Confidence interval</i>	+/- 9.16	+/- 2.87	+/- 1.70	+/- 1.62	+/- 0.63	+/- 0.46	+/- 0.56	+/- 1.63	+/- 1.46
Ratio: Design Capacity to Peak Daily Production	7.34	4.88	3.60	1.82	1.56	1.95	1.32	2.16	3.71
<i>Confidence interval</i>	+/- 3.28	+/- 1.28	+/- 0.93	+/- 0.25	+/- 0.25	+/- 0.65	+/- 0.06	+/- 0.53	+/- 0.59
Observations	80	123	212	160	272	252	636	391	2,126

Data:

Q.6, Q.7

Notes:

Table presents average ratios for plants in the sample. It includes only plants that reported complete data for average daily production, peak daily production, and design capacity.

Excludes plants that treat only purchased treated water.

Table 21
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Plants									
Algae control	0.0	0.0	2.4	0.0	0.3	1.4	4.6	0.0	0.9
Corrosion control	11.5	14.0	14.5	20.2	32.7	18.1	31.7	54.0	17.9
Primary disinfection	86.6	90.6	90.8	91.1	91.4	97.2	89.9	93.2	90.4
Secondary disinfection	12.9	13.6	14.3	5.1	5.6	7.1	6.6	11.2	11.4
Disinfectant byproduct control	0.0	0.0	1.0	12.2	7.1	7.1	6.8	6.5	3.0
Dechlorination	0.0	0.0	0.0	1.0	0.6	0.6	0.0	0.0	0.2
Oxidation	1.5	13.9	6.3	10.5	6.7	4.6	4.2	11.0	7.7
Iron removal	23.3	20.8	28.5	19.0	18.2	51.5	9.2	18.6	23.6
Manganese removal	6.5	13.9	10.3	14.9	14.0	51.7	5.2	7.8	12.6
Taste/odor control	3.0	3.4	7.7	12.3	14.7	8.1	8.2	10.5	7.3
TOC removal	0.0	0.0	0.6	2.0	1.0	1.4	1.8	0.2	0.6
Particulate/turbidity removal	10.2	3.6	4.8	8.9	3.7	7.7	6.8	4.6	5.9
Softening (hardness removal)	10.2	4.5	3.6	8.5	1.4	5.7	4.4	1.9	5.2
Recarbonation	0.0	0.0	0.6	2.0	0.0	1.0	1.2	0.9	0.5
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.0	0.4	2.0	5.8	4.9	9.4	11.6	1.7
Inorganic chemical contaminant removal (e.g., arsenic)	6.7	11.5	0.6	2.0	0.1	1.4	2.5	2.5	4.4
Radionuclides contaminant removal	1.7	0.0	0.6	0.0	4.1	1.4	0.4	0.2	1.0
Security	0.0	0.0	0.0	1.0	2.3	0.0	0.0	0.0	0.4
Mussel control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fluoridation	1.7	8.0	14.5	30.7	11.3	29.3	29.6	12.8	12.8
Other	1.7	1.1	0.0	6.1	1.0	0.3	4.6	0.9	1.5
Observations	62	89	161	108	230	197	658	444	1,949

(Continued)

Table 21 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Surface Water Plants									
Algae control	0.0	2.4	5.2	19.5	16.6	17.4	15.7	20.2	12.1
Corrosion control	11.2	14.3	27.5	43.0	59.3	46.5	72.9	73.1	41.9
Primary disinfection	100.0	97.2	98.9	93.0	90.8	91.0	94.9	89.1	94.6
Secondary disinfection	15.5	37.4	48.1	39.0	45.2	51.1	61.7	63.9	45.0
Disinfectant byproduct control	0.0	1.2	4.8	29.3	30.0	41.6	39.3	36.1	21.0
Dechlorination	0.0	0.0	0.0	0.0	0.0	3.9	0.5	0.0	0.3
Oxidation	3.1	7.3	7.5	23.7	21.8	33.9	36.5	37.8	19.0
Iron removal	3.1	5.9	11.1	22.3	25.6	42.4	24.8	15.9	18.9
Manganese removal	0.0	3.9	2.6	25.1	38.1	42.4	34.3	20.1	20.8
Taste/odor control	3.1	7.6	8.5	26.5	45.2	45.5	43.9	47.1	26.7
TOC removal	8.7	11.0	8.6	36.2	35.2	43.8	45.4	50.4	27.2
Particulate/turbidity removal	77.5	65.4	97.1	91.8	88.4	86.2	93.8	85.7	87.8
Softening (hardness removal)	1.6	3.6	3.7	9.8	8.1	3.9	7.0	11.8	6.3
Recarbonation	0.0	0.0	0.0	2.8	2.3	2.6	3.7	5.9	1.8
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	1.7	0.0	9.8	10.7	7.9	15.0	7.6	6.5
Inorganic chemical contaminant removal (e.g., arsenic)	1.5	0.0	0.0	8.4	6.1	3.9	7.5	2.5	4.0
Radionuclides contaminant removal	0.0	0.0	0.0	0.0	1.3	0.0	4.7	0.8	0.7
Security	0.0	0.0	0.0	0.0	1.2	0.0	2.0	0.0	0.4
Mussel control	0.0	1.2	1.1	4.2	3.6	6.6	8.1	5.0	3.3
Fluoridation	0.0	2.4	15.5	40.3	54.6	63.0	64.6	72.3	36.1
Other	1.5	1.2	0.0	2.8	6.2	5.2	5.4	1.7	3.0
Observations	43	62	70	68	89	80	197	111	720

(Continued)

Table 21 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source

Water Source	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	
Mixed Plants									
Algae control	0.0	0.0	4.1	7.5	0.0	0.0	7.1	0.0	3.1
Corrosion control	0.0	8.4	25.7	51.6	42.7	48.4	45.6	48.7	31.3
Primary disinfection	100.0	100.0	100.0	100.0	85.8	100.0	73.4	100.0	96.3
Secondary disinfection	0.0	0.0	35.8	36.6	71.5	24.2	80.5	0.0	36.2
Disinfectant byproduct control	0.0	0.0	0.0	22.5	24.1	24.2	47.3	100.0	11.4
Dechlorination	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxidation	0.0	8.4	13.6	15.0	28.5	72.6	13.6	51.3	16.9
Iron removal	0.0	12.6	5.5	7.5	17.0	48.4	20.1	51.3	11.0
Manganese removal	0.0	8.4	5.5	7.5	17.0	48.4	20.1	0.0	10.0
Taste/odor control	0.0	0.0	0.0	26.7	24.1	72.6	33.1	0.0	12.4
TOC removal	23.5	0.0	5.5	36.6	21.4	72.6	33.1	100.0	16.4
Particulate/turbidity removal	75.3	12.6	21.8	51.6	66.8	72.6	65.7	100.0	38.0
Softening (hardness removal)	0.0	0.0	21.6	7.5	33.2	0.0	20.1	0.0	15.9
Recarbonation	0.0	0.0	0.0	7.5	14.2	24.2	20.1	0.0	5.4
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.0	0.0	0.0	7.1	100.0	0.0	51.3	3.7
Inorganic chemical contaminant removal (e.g., arsenic)	0.0	0.0	0.0	0.0	7.1	24.2	0.0	51.3	2.1
Radionuclides contaminant removal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.3	0.2
Security	0.0	0	0.0	0.0	7.1	0.0	0.0	0.0	1.4
Mussel control	0.0	0.0	0.0	36.6	7.1	0.0	6.5	0.0	8.5
Fluoridation	0.0	0.0	13.6	51.6	28.5	48.4	67.4	48.7	23.5
Other	0.0	0.0	0.0	0.0	0.0	24.2	13.6	0.0	1.0
Observations	3	7	10	6	13	4	15	2	60

(Continued)

Table 21 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Plants									
Algae control	0.0	0.1	2.6	3.2	2.8	4.4	7.2	4.4	2.0
Corrosion control	11.5	13.9	15.7	24.6	37.1	23.7	41.3	58.1	20.5
Primary disinfection	87.0	91.1	91.6	91.7	91.2	96.1	90.8	92.4	90.9
Secondary disinfection	13.0	14.7	17.2	11.3	13.4	15.5	20.4	22.6	15.0
Disinfectant byproduct control	0.0	0.1	1.2	15.2	11.1	13.7	14.9	13.3	4.8
Dechlorination	0.0	0.0	0.0	0.8	0.5	1.2	0.1	0.0	0.2
Oxidation	1.6	13.4	6.5	12.7	9.6	10.8	11.7	17.0	8.9
Iron removal	22.6	19.9	26.7	19.2	19.3	49.8	12.9	18.1	22.9
Manganese removal	6.3	13.2	9.6	16.3	17.8	49.9	12.1	10.4	13.4
Taste/odor control	3.0	3.6	7.6	14.9	19.7	15.7	16.8	18.4	9.2
TOC removal	0.3	0.6	1.3	8.3	6.9	10.0	12.3	11.5	3.4
Particulate/turbidity removal	12.2	7.1	12.0	22.9	18.6	23.0	27.7	22.5	14.2
Softening (hardness removal)	9.9	4.4	4.0	8.6	3.2	5.3	5.2	4.0	5.5
Recarbonation	0.0	0.0	0.5	2.3	0.7	1.5	2.1	2.0	0.7
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.1	0.3	3.2	6.6	6.4	10.5	10.8	2.2
Inorganic chemical contaminant removal (e.g., arsenic)	6.5	10.7	0.5	3.0	1.2	2.1	3.6	2.7	4.3
Radionuclides contaminant removal	1.7	0.0	0.5	0.0	3.6	1.1	1.4	0.5	1.0
Security	0.0	0	0.0	0.8	2.3	0.0	0.5	0.0	0.4
Mussel control	0.0	0.1	0.1	1.7	0.7	1.2	2.0	1.1	0.5
Fluoridation	1.7	7.6	14.6	32.8	18.5	39.4	38.2	25.8	15.3
Other	1.7	1.1	0.0	5.5	1.8	1.5	4.9	1.1	1.6
Observations	108	158	241	182	332	281	870	557	2,729

Data: Q.8

Notes:

Excludes plants that treat purchased water.

Table 22
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source and Plant Average Daily Production

Water Source	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Ground Water Plants							
Algae control	0.0	1.4	1.0	1.5	4.7	0.0	1.0
Corrosion control	12.4	11.9	26.2	31.4	26.6	50.0	17.5
Primary disinfection	89.1	90.8	91.1	93.1	94.5	100.0	90.7
Secondary disinfection	13.0	12.9	8.4	6.9	19.2	0.0	11.3
Disinfectant byproduct control	0.3	1.6	5.0	11.0	8.6	50.0	3.0
Dechlorination	0.0	0.0	0.7	0.3	0.0	0.0	0.2
Oxidation	7.1	8.9	7.4	8.9	16.7	0.0	8.1
Iron removal	26.7	21.4	26.3	15.9	62.1	50.0	23.9
Manganese removal	13.7	9.7	17.2	12.3	58.2	50.0	13.2
Taste/odor control	2.4	5.1	11.2	18.6	24.1	0.0	7.3
TOC removal	0.0	0.0	1.6	2.3	5.7	50.0	0.6
Particulate/turbidity removal	7.5	3.7	5.8	9.2	42.6	100.0	5.9
Softening (hardness removal)	7.4	3.0	5.2	3.7	24.0	100.0	4.9
Recarbonation	0.0	0.0	1.5	0.3	8.5	100.0	0.5
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.4	3.4	7.5	12.5	50.0	1.7
Inorganic chemical contaminant removal (e.g., arsenic)	8.3	4.4	1.5	1.7	4.7	0.0	4.3
Radionuclides contaminant removal	1.3	0.0	1.7	3.6	3.9	0.0	1.1
Security	0.0	0.3	1.1	0.0	0.0	0.0	0.4
Mussel control	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fluoridation	0.4	13.8	19.4	21.3	47.6	50.0	12.7
Other	1.3	0.7	2.5	3.1	6.4	0.0	1.6
Observations	121	339	796	631	60	2	1,949

(Continued)

Table 22 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source and Plant Average Daily Production

Water Source	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Surface Water Plants							
Algae control	0.0	3.6	12.1	17.8	16.8	5.3	12.2
Corrosion control	22.1	26.7	32.4	56.6	67.6	68.4	42.6
Primary disinfection	100.0	98.0	96.7	89.9	97.5	89.5	94.9
Secondary disinfection	28.4	48.1	41.7	45.6	57.6	73.7	45.2
Disinfectant byproduct control	1.4	2.8	17.1	32.3	40.8	52.6	21.3
Dechlorination	0.0	0.0	0.0	1.0	0.0	0.0	0.3
Oxidation	1.3	5.9	15.6	28.2	35.5	15.8	19.2
Iron removal	5.8	16.4	10.3	31.4	20.5	10.5	19.2
Manganese removal	16.1	3.7	14.4	36.8	28.1	15.8	21.4
Taste/odor control	5.2	9.9	16.7	44.5	45.1	52.6	27.1
TOC removal	11.0	9.3	21.4	38.3	54.7	26.3	27.6
Particulate/turbidity removal	77.3	81.5	89.6	92.2	95.1	78.9	88.8
Softening (hardness removal)	1.3	4.5	4.1	9.7	9.0	15.8	6.5
Recarbonation	0.0	0.0	0.0	3.7	5.0	10.5	1.8
Organic chemical contaminant removal (e.g., VOCs, pesticides)	1.2	0.9	4.1	11.3	13.0	10.5	6.7
Inorganic chemical contaminant removal (e.g., arsenic)	1.2	0.0	3.3	6.7	4.7	0.0	3.8
Radionuclides contaminant removal	0.0	0.0	0.0	1.7	1.9	0.0	0.8
Security	0.0	0.0	0.8	0.3	0.8	0.0	0.4
Mussel control	0.0	0.9	3.3	4.5	6.9	5.3	3.4
Fluoridation	1.4	1.1	30.8	58.7	64.4	89.5	36.7
Other	1.2	0.9	2.4	4.3	5.9	5.3	3.1
Observations	50	77	113	230	231	19	720

(Continued)

Table 22 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source and Plant Average Daily Production

Water Source	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Mixed Plants							
Algae control	0.0	0.0	5.8	0.0	7.6	*	3.1
Corrosion control	0.0	7.4	23.8	67.2	58.1	*	31.3
Primary disinfection	100.0	100.0	97.2	93.3	79.1	*	96.3
Secondary disinfection	0.0	6.1	32.5	69.5	73.3	*	36.2
Disinfectant byproduct control	0.0	0.0	5.8	30.3	41.3	*	11.4
Dechlorination	0.0	0.0	0.0	0.0	0.0	*	0.0
Oxidation	0.0	7.4	15.4	27.3	36.7	*	16.9
Iron removal	0.0	11.1	6.7	18.0	27.3	*	11.0
Manganese removal	0.0	7.4	6.7	18.0	21.5	*	10.0
Taste/odor control	0.0	0.0	7.5	30.6	44.8	*	12.4
TOC removal	0.0	0.0	7.5	47.3	43.6	*	16.4
Particulate/turbidity removal	0.0	20.9	19.0	89.7	78.5	*	38.0
Softening (hardness removal)	0.0	0.0	25.5	11.4	21.5	*	15.9
Recarbonation	0.0	0.0	2.9	13.6	21.5	*	5.4
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.0	0.0	12.6	22.1	*	3.7
Inorganic chemical contaminant removal (e.g., arsenic)	0.0	0.0	0.0	5.7	22.1	*	2.1
Radionuclides contaminant removal	0.0	0.0	0.0	0.0	5.8	*	0.2
Security	0.0	0.0	0.0	5.7	0.0	*	1.4
Mussel control	0.0	0.0	0.0	34.7	7.0	*	8.5
Fluoridation	0.0	0.0	15.4	57.8	66.3	*	23.5
Other	0.0	0.0	0.0	3.2	7.0	*	1.0
Observations	2	9	15	21	13	*	60

(Continued)

Table 22 (Cont.)
Treatment Objectives
Percentage of Plants Having Each Treatment Objective
By Water Source and Plant Average Daily Production

Water Source	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
All Plants							
Algae control	0.0	1.5	2.3	6.6	12.6	4.8	2.1
Corrosion control	12.6	12.5	26.8	40.8	54.2	66.7	20.2
Primary disinfection	89.4	91.3	91.9	92.1	95.9	90.4	91.2
Secondary disinfection	13.4	14.5	12.7	21.7	46.0	67.0	15.0
Disinfectant byproduct control	0.3	1.7	6.3	18.5	30.6	52.4	4.9
Dechlorination	0.0	0.0	0.6	0.5	0.0	0.0	0.2
Oxidation	6.9	8.7	8.5	15.8	29.6	14.4	9.3
Iron removal	26.1	21.1	23.9	20.9	33.9	14.1	23.2
Manganese removal	13.7	9.4	16.5	20.2	37.4	18.9	14.0
Taste/odor control	2.5	5.3	11.6	27.3	38.4	47.8	9.3
TOC removal	0.3	0.4	3.9	15.5	38.7	28.5	3.6
Particulate/turbidity removal	9.3	7.6	15.3	38.7	77.8	80.9	14.5
Softening (hardness removal)	7.2	3.1	5.7	5.9	14.2	23.4	5.2
Recarbonation	0.0	0.0	1.4	2.0	6.7	18.7	0.7
Organic chemical contaminant removal (e.g., VOCs, pesticides)	0.0	0.4	3.4	8.9	13.2	14.1	2.3
Inorganic chemical contaminant removal (e.g., arsenic)	8.1	4.1	1.7	3.4	5.4	0.0	4.2
Radionuclides contaminant removal	1.2	0.0	1.5	2.9	2.7	0.0	1.0
Security	0.0	0.3	1.0	0.3	0.5	0.0	0.4
Mussel control	0.0	0.0	0.4	2.9	4.7	4.8	0.5
Fluoridation	0.5	13.0	20.5	34.7	60.8	85.9	15.3
Other	1.3	0.7	2.4	3.5	6.1	4.8	1.7
Observations	173	425	924	882	304	21	2,729

Data: Q.8

Notes:

Excludes plants that treat purchased water.

Table 23
Treatment Schemes
Percentage of Plants Using Each Treatment Scheme
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Ground Water Plants									
Disinfection with no additional treatment	53.9	49.6	51.8	47.8	40.7	18.5	42.2	26.8	47.9
Other chemical addition	11.1	15.6	25.4	26.9	24.6	61.8	37.4	52.5	23.0
Ion exchange, activated alumina, aeration	16.6	9.5	7.6	7.3	16.6	4.8	4.3	8.5	10.4
Other filtration (not direct or conventional)	16.5	16.7	10.7	12.8	12.7	11.6	7.3	8.3	13.4
Direct filtration	0.0	0.0	0.6	1.0	2.5	0.8	0.8	0.0	0.7
Conventional filtration (with and without softening)	0.0	1.2	1.3	4.2	0.1	1.3	1.8	1.4	1.2
Membranes	0.0	1.2	0.6	0.0	0.1	0.3	0.6	0.2	0.5
Other	1.9	6.3	1.9	0.0	2.7	0.7	5.6	2.3	2.9
Observations	62	89	161	108	230	197	658	444	1,949
Surface Water Plants									
Disinfection with no additional treatment	17.6	32.0	2.3	0.0	0.0	8.4	2.4	0.9	6.1
Other chemical addition	0.0	1.3	4.7	8.3	8.1	1.3	6.7	11.7	5.7
Ion exchange, activated alumina, aeration	0.0	0.0	0.0	1.4	1.2	0.0	0.4	0.0	0.6
Other filtration (not direct or conventional)	61.6	26.0	33.8	9.9	5.8	1.3	3.8	0.0	17.0
Direct filtration	7.4	11.5	15.9	19.7	16.6	20.4	12.4	9.9	15.7
Conventional filtration (with and without softening)	11.7	22.4	33.6	56.4	68.4	62.6	73.9	74.8	50.5
Membranes	1.7	6.9	9.7	4.2	0.0	4.5	0.5	2.7	4.4
Other	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.1
Observations	43	62	70	68	89	80	197	111	720
Mixed Plants									
Disinfection with no additional treatment	24.7	83.1	56.6	29.1	14.2	0.0	6.5	0.0	44.9
Ion exchange, activated alumina, aeration	0.0	0.0	5.5	0.0	26.1	0.0	34.3	0.0	8.1
Ion exchange, Activated Alumina, Aeration	0.0	0.0	16.1	19.2	0.0	27.4	0.0	0.0	9.8
Other filtration (not direct or conventional)	51.8	4.2	4.1	0.0	0.0	0.0	20.1	0.0	3.8
Direct filtration	0.0	4.2	0.0	0.0	21.4	24.2	0.0	0.0	5.5
Conventional filtration (with and without softening)	0.0	4.2	17.7	51.6	31.2	48.4	39.1	51.3	25.3
Membranes	23.5	0.0	0.0	0.0	7.1	0.0	0.0	48.7	1.9
Other	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Observations	3	7	10	6	13	4	15	2	60
All Plants									
Disinfection with no additional treatment	52.8	49.2	48.1	39.9	33.5	16.4	32.6	21.4	43.8
Other chemical addition	10.8	14.6	23.4	23.3	22.0	49.9	30.4	43.9	21.1
Ion exchange, activated alumina, aeration	16.1	8.8	7.2	6.7	13.7	4.2	3.4	6.7	9.4
Other filtration (not direct or conventional)	17.9	17.0	12.3	11.9	11.3	9.6	6.7	6.5	13.6
Direct filtration	0.2	0.7	1.8	3.9	5.2	4.7	3.4	2.0	2.2
Conventional filtration (with and without softening)	0.3	2.3	4.1	13.6	11.9	13.3	18.7	16.7	6.5
Membranes	0.1	1.5	1.3	0.7	0.3	1.1	0.5	0.9	0.9
Other	1.9	5.9	1.7	0.0	2.2	0.8	4.3	1.8	2.6
Observations	108	158	241	182	332	281	870	557	2,729

Data: Q.8A

Notes:

Excludes plants that treat purchased water. See treatment scheme description in Volume I.

Table 24
Treatment Schemes
Percentage of Plants Using Each Treatment Scheme
By Water Source

Water Source	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Ground Water Plants							
Disinfection with no additional treatment	48.2	57.3	36.9	41.2	4.3	0.0	47.9
Other chemical addition	14.0	19.9	35.4	23.2	6.5	0.0	23.0
Ion exchange, activated alumina, aeration	15.9	5.6	10.5	17.8	7.2	0.0	10.4
Other filtration (not direct or conventional)	18.1	12.1	10.9	10.7	62.0	0.0	13.4
Direct filtration	0.0	0.0	1.5	3.2	3.0	0.0	0.7
Conventional filtration (with and without softening)	0.0	1.2	2.3	0.9	11.4	100.0	1.2
Membranes	1.2	0.0	0.7	0.5	0.0	0.0	0.5
Other	2.6	3.9	1.9	2.5	5.5	0.0	2.9
Observations	121	339	796	631	60	2	1,949
Surface Water Plants							
Disinfection with no additional treatment	22.7	18.5	2.0	1.9	0.9	5.3	6.1
Other chemical addition	0.0	0.9	11.4	3.3	6.6	21.1	5.7
Ion exchange, activated alumina, aeration	0.0	0.0	0.8	0.9	0.0	0.0	0.6
Other filtration (not direct or conventional)	45.0	33.3	20.0	5.3	2.0	0.0	17.0
Direct filtration	19.0	10.6	17.5	17.8	10.1	15.8	15.7
Conventional filtration (with and without softening)	12.0	26.6	43.2	68.4	79.3	57.9	50.5
Membranes	1.3	10.0	4.9	2.4	1.1	0.0	4.4
Other	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Observations	50	77	113	230	231	19	720
Mixed Plants							
Disinfection with no additional treatment	100.0	75.4	50.9	5.7	7.0	*	44.9
Ion exchange, activated alumina, aeration	0.0	0.0	11.3	7.8	21.5	*	8.1
Ion exchange, Activated Alumina, Aeration	0.0	0.0	18.8	2.5	0.0	*	9.8
Other filtration (not direct or conventional)	0.0	13.5	0.0	0.9	14.6	*	3.8
Direct filtration	0.0	3.7	0.0	19.4	0.0	*	5.5
Conventional filtration (with and without softening)	0.0	3.7	18.2	57.2	56.9	*	25.3
Membranes	0.0	0.0	0.8	6.5	0.0	*	1.9
Other	0.0	3.7	0.0	0.0	0.0	*	0.8
Observations	2	9	15	21	13	*	60
All Plants							
Disinfection with no additional treatment	47.6	55.7	33.5	27.3	2.2	4.8	43.8
Other chemical addition	13.6	18.8	32.0	16.3	7.1	19.1	21.1
Ion exchange, activated alumina, aeration	15.5	5.3	9.7	11.8	2.3	0.0	9.4
Other filtration (not direct or conventional)	18.8	13.2	11.6	8.6	21.5	0.0	13.6
Direct filtration	0.5	0.5	3.1	8.5	7.5	14.4	2.2
Conventional filtration (with and without softening)	0.3	2.4	7.2	24.5	56.9	61.7	6.5
Membranes	1.2	0.5	1.1	1.4	0.7	0.0	0.9
Other	2.5	3.7	1.7	1.6	1.7	0.0	2.6
Observations	173	425	924	882	304	21	2,729

Data:

Q.8

Notes:

Excludes plants that treat purchased water. See treatment scheme description in Volume I.

Table 25
Treatment Practices for Surface Water Plants
Percentage of Plants Performing Each Treatment

Surface Water Treatment Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Disinfection									
Chlorine	98.4	79.0	97.4	80.8	80.5	75.1	78.9	78.0	84.4
Chlorine dioxide	0.0	0.0	0.0	11.0	8.7	18.5	14.0	2.5	6.6
Chloramines only	0.0	1.2	2.2	13.7	14.8	17.1	32.4	35.6	11.9
Chloramines with a free chlorine period (based on need in the distribution system and not routinely done)	0.0	0.0	1.1	1.4	5.8	3.9	9.3	1.7	2.9
Chloramines with seasonal (routine) free chlorine use	0.0	0.0	0.0	8.2	1.2	9.2	0.9	4.2	2.7
Ozone	0.0	1.4	1.5	1.4	1.2	11.8	15.8	14.4	3.8
Ultraviolet light	3.1	1.7	2.2	1.4	1.3	2.6	4.7	1.7	2.1
Mixed oxidant	0.0	19.4	1.5	4.1	2.3	0.6	0.0	0.0	4.1
Filtration Processes									
Coagulant addition/rapid mix	17.6	33.3	44.2	71.3	78.1	81.5	88.4	83.9	62.0
Polymer addition	16.8	22.4	31.1	54.9	46.4	35.8	56.7	56.8	40.6
Flocculation	7.3	20.8	36.4	60.3	68.7	70.4	75.8	74.6	51.9
Settling/sedimentation	20.8	24.5	33.3	61.7	70.7	64.5	77.2	73.8	52.6
Lime/soda ash softening	0.0	2.5	3.4	19.2	16.9	5.2	11.8	21.2	10.5
Recarbonation	0.0	0.0	0.0	2.7	3.5	2.6	4.2	6.8	2.1
Filtration									
Micro strainer	12.5	2.8	1.1	2.7	1.2	0.0	2.8	0.8	2.2
Slow sand filter	6.2	5.0	17.6	9.6	6.9	1.9	2.8	0.0	8.6
Bag or cartridge	33.8	6.0	0.0	0.0	0.0	0.0	0.0	0.8	2.4
Diatomaceous earth	1.6	0.6	6.7	0.0	2.3	1.3	0.5	0.0	2.3
Pressure filtration	19.5	18.2	12.5	2.7	1.2	1.3	0.0	0.0	6.9
Green sand	0.0	0.0	1.1	0.0	0.0	0.0	0.9	0.8	0.4
Rapid sand filter	3.1	7.3	12.3	24.6	30.7	22.1	15.5	6.8	18.3
Deep bed mono-media	0.0	1.2	0.0	2.7	1.6	0.0	5.6	7.6	1.8
Dual/multi media	15.3	19.8	31.8	57.6	51.5	61.6	67.3	65.3	45.1

(Continued)

Table 25 (Cont.)
Treatment Practices for Surface Water Plants
Percentage of Plants Performing Each Treatment

Surface Water Treatment Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Membranes									
Reverse osmosis	1.5	1.7	0.0	1.4	1.2	0.0	0.9	0.0	0.9
Microfiltration	8.7	7.9	11.6	5.5	0.0	4.5	0.9	0.8	5.5
Ultrafiltration	5.3	1.2	0.0	0.0	1.2	0.0	2.8	1.7	1.0
Nanofiltration	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other									
Aeration	0.0	0.0	1.1	6.9	9.7	6.6	4.6	3.4	4.6
Potassium permanganate	1.6	9.2	7.8	24.7	32.9	26.8	26.3	21.2	19.8
Corrosion control	8.1	11.8	26.0	34.2	46.6	42.0	63.6	62.7	35.2
Ion exchange	1.6	2.4	0.0	0.0	0.0	0.0	0.5	0.0	0.4
Activated alumina	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.8	0.1
Iron-based adsorptive media	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sequestration	0.0	1.3	0.0	4.1	5.8	9.7	3.8	5.9	3.4
Fluoride addition	0.0	2.4	15.5	39.8	58.1	63.5	66.0	73.7	37.0
Dissolved air flotation	0.0	0.0	1.5	0.0	0.0	0.0	1.4	0.8	0.5
Granular activated carbon	7.2	3.1	3.0	11.0	14.2	14.4	15.2	17.8	9.6
Centrally managed POU/POE	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Clearwell and/or contact vessel (e.g., basin, pipeline)	45.3	41.6	40.6	52.2	53.0	49.5	59.9	42.3	48.1
Other	10.8	7.3	14.5	9.6	18.3	22.3	36.3	25.2	16.2
Observations	43	62	70	68	89	80	197	111	720

Data: Q.8

Notes:

Represents treatment practices for plants treating water that comes entirely or partly from surface sources.

Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 26
Treatment Practices for Surface Water Plants
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Surface Water Treatment Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Disinfection							
Chlorine	87.2	83.4	90.3	81.2	79.6	57.9	84.6
Chlorine dioxide	0.0	0.0	4.4	11.2	12.4	0.0	6.4
Chloramines only	11.6	2.3	8.6	15.1	30.5	36.8	12.2
Chloramines with a free chlorine period (based on need in the distribution system and not routinely done)	0.0	0.0	1.6	5.4	5.3	0.0	2.9
Chloramines with seasonal (routine) free chlorine use	0.0	0.0	3.3	4.6	1.7	5.3	2.8
Ozone	0.0	1.9	1.1	3.2	17.0	31.6	3.8
Ultraviolet light	6.5	1.4	0.8	2.9	2.7	0.0	2.1
Mixed oxidant	0.0	13.9	3.6	1.5	0.4	0.0	4.2
Filtration Processes							
Coagulant addition/rapid mix	31.0	35.9	56.8	80.6	93.2	78.9	63.3
Polymer addition	18.7	24.1	42.2	46.8	58.8	63.2	40.9
Flocculation	19.9	26.3	49.2	68.7	80.2	73.7	53.1
Settling/sedimentation	20.1	29.1	47.3	69.7	82.3	63.2	53.5
Lime/soda ash softening	11.6	3.4	8.2	15.2	14.8	15.8	10.6
Recarbonation	0.0	0.0	0.0	4.5	5.7	10.5	2.1
Filtration							
Micro strainer	13.3	1.0	1.6	1.8	1.9	0.0	2.3
Slow sand filter	7.7	4.4	15.4	7.6	1.6	0.0	8.8
Bag or cartridge	26.4	4.2	0.0	0.1	0.0	0.0	2.4
Diatomaceous earth	1.3	3.5	4.1	1.1	0.0	0.0	2.4
Pressure filtration	15.9	26.3	2.5	1.1	0.0	0.0	6.9
Green sand	0.0	0.0	0.0	0.0	1.1	0.0	0.1
Rapid sand filter	18.2	4.4	21.8	24.6	15.0	10.5	18.6
Deep bed mono-media	0.0	0.9	1.0	2.1	6.0	10.5	1.9
Dual/multi media	5.6	28.0	40.9	59.2	71.8	52.6	45.8

(Continued)

Table 26 (Cont.)
Treatment Practices for Surface Water Plants
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Surface Water Treatment Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Membranes							
Reverse osmosis	2.4	0.9	0.8	0.9	0.4	0.0	0.9
Microfiltration	7.1	11.0	6.5	2.6	0.3	0.0	5.4
Ultrafiltration	4.3	0.9	0.0	1.0	2.3	0.0	1.0
Nanofiltration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other							
Aeration	0.0	0.2	4.9	8.5	3.1	5.3	4.8
Potassium permanganate	1.3	11.6	18.2	30.1	22.7	5.3	20.3
Corrosion control	8.0	24.7	28.0	46.9	59.2	68.4	36.0
Ion exchange	1.3	1.7	0.0	0.0	0.4	0.0	0.4
Activated alumina	0.0	0.0	0.0	0.1	0.4	5.3	0.1
Iron-based adsorptive media	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sequestration	0.0	0.9	1.7	6.1	5.3	5.3	3.3
Fluoride addition	1.4	1.1	31.6	60.4	65.9	89.5	37.7
Dissolved air flotation	0.0	1.9	0.0	0.3	0.7	0.0	0.5
Granular activated carbon	7.1	2.1	6.3	15.8	16.9	15.8	9.9
Centrally managed POU/POE	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Clearwell and/or contact vessel (e.g., basin, pipeline)	55.8	31.4	49.9	56.0	53.2	26.3	49.1
Other	7.5	11.5	12.8	19.0	32.4	26.3	16.4
Observations	50	77	113	230	231	19	720

Data: Q.8

Notes:

Represents treatment practices for plants treating water that comes entirely or partly from surface sources.

Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 27
Treatment Practices for Ground Water Plants
Percentage of Plants Performing Each Treatment

Ground Water Treatment Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Disinfection									
Chlorine	84.7	94.3	92.2	91.8	92.9	96.3	91.3	100.0	91.7
Chlorine dioxide	0.0	1.1	0.0	1.0	0.0	0.3	0.0	0.0	0.4
Chloramines only	0.0	0.0	1.2	2.3	0.4	2.1	5.9	0.4	0.9
Chloramines with a free chlorine period (based on need in the distribution system and not routinely done)	0.0	0.0	0.0	1.7	0.8	0.0	1.4	0.0	0.3
Chloramines with seasonal (routine) free chlorine use	0.0	0.0	0.0	0.0	0.0	2.0	1.5	1.2	0.1
Ozone	0.0	0.0	0.0	0.0	0.6	0.7	0.3	0.0	0.1
Ultraviolet light	1.7	0.0	0.0	1.0	0.7	0.0	0.4	0.0	0.5
Mixed oxidant	0.0	0.0	1.1	0.0	2.4	0.0	0.0	0.0	0.6
Filtration Processes									
Coagulant addition/rapid mix	0.0	2.4	2.4	3.1	5.5	2.9	1.6	1.2	2.4
Polymer addition	0.0	0.1	0.0	3.0	2.4	2.9	1.0	1.0	0.8
Flocculation	0.0	1.1	1.2	4.1	0.7	2.3	1.9	1.4	1.3
Settling/sedimentation	0.0	2.3	1.8	7.2	0.7	2.3	2.1	1.7	2.1
Lime/soda ash softening	0.0	0.0	1.0	1.0	8.7	7.4	2.7	1.7	1.8
Recarbonation	0.0	0.0	0.6	1.0	0.0	0.6	1.7	0.7	0.4
Filtration									
Micro strainer	0.0	1.1	0.6	0.0	0.0	0.3	0.3	0.0	0.5
Slow sand filter	0.0	0.0	0.0	1.0	0.0	0.3	0.9	0.0	0.1
Bag or cartridge	8.6	0.0	0.6	1.0	0.1	1.0	1.2	0.2	1.8
Diatomaceous earth	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.2
Pressure filtration	1.7	4.5	1.2	4.0	7.0	1.7	2.9	0.2	3.1
Green sand	6.2	9.2	5.9	5.8	2.9	7.2	0.9	5.4	6.2
Rapid sand filter	0.0	2.3	1.2	1.0	3.7	1.3	0.9	1.1	1.5
Deep bed mono-media	0.0	0.0	0.6	0.0	0.0	0.0	0.4	0.0	0.2
Dual/multi media	0.0	2.5	1.8	5.8	4.2	2.4	3.4	3.5	2.4

(Continued)

Table 27 (Cont.)
Treatment Practices for Ground Water Plants
Percentage of Plants Performing Each Treatment

Ground Water Treatment Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Membranes									
Reverse osmosis	1.7	2.3	1.2	1.0	0.2	0.3	1.8	0.4	1.4
Microfiltration	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ultrafiltration	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Nanofiltration	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.0	0.0
Other									
Aeration	4.7	4.7	12.6	15.4	22.3	15.1	8.4	10.8	10.8
Potassium permanganate	3.1	2.5	6.6	5.4	4.9	7.6	1.8	0.0	4.5
Corrosion control	11.5	11.5	13.0	13.0	22.8	58.5	27.9	53.4	16.2
Ion exchange	18.6	7.9	3.6	3.1	1.8	0.3	2.0	0.7	6.7
Activated alumina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iron-based adsorptive media	3.4	1.2	0.6	0.0	0.0	0.0	1.7	1.7	1.1
Sequestration	8.6	3.6	13.7	6.2	8.3	5.4	5.3	12.2	8.5
Fluoride addition	1.7	8.0	14.5	32.4	14.6	61.7	29.9	12.9	14.8
Dissolved air flotation	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0
Granular activated carbon	0.0	1.1	0.0	1.0	0.9	1.5	4.7	11.4	0.9
Centrally managed POU/POE	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Clearwell and/or contact vessel (e.g., basin, pipeline)	31.4	24.6	17.6	9.1	2.1	3.5	5.2	3.9	17.8
Other	3.3	7.1	2.4	8.5	6.1	1.6	11.7	1.1	5.0
Observations	62	89	161	108	230	197	658	444	1,949

Data: Q.8

Notes:

Represents treatment practices for plants treating water that comes entirely or partly from ground sources.
Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 28
Treatment Practices for Ground Water Plants
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Ground Water Treatment Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Disinfection							
Chlorine	90.4	93.6	93.4	90.9	91.7	100.0	92.5
Chlorine dioxide	0.0	0.7	0.4	0.2	0.0	0.0	0.4
Chloramines only	0.0	0.5	1.7	3.0	3.5	0.0	0.9
Chloramines with a free chlorine period (based on need in the distribution system and not routinely done)	0.0	0.0	0.7	1.8	0.0	0.0	0.3
Chloramines with seasonal (routine) free chlorine use	0.0	0.0	0.0	0.9	10.0	100.0	0.1
Ozone	0.0	0.0	0.0	1.4	0.0	0.0	0.1
Ultraviolet light	0.0	0.1	0.6	0.1	0.0	0.0	0.2
Mixed oxidant	0.0	0.5	0.5	2.0	0.0	0.0	0.5
Filtration Processes							
Coagulant addition/rapid mix	1.3	1.6	4.3	3.6	16.3	100.0	2.5
Polymer addition	0.0	0.1	1.7	2.8	11.9	0.0	0.8
Flocculation	0.0	1.6	1.7	2.2	13.6	100.0	1.4
Settling/sedimentation	0.0	2.3	3.1	3.7	15.4	100.0	2.2
Lime/soda ash softening	0.1	0.4	5.0	2.5	18.8	100.0	1.9
Recarbonation	0.0	0.0	1.1	0.3	7.3	100.0	0.4
Filtration							
Micro strainer	0.0	0.7	0.7	0.3	0.0	0.0	0.5
Slow sand filter	0.0	0.0	0.4	0.5	0.9	0.0	0.2
Bag or cartridge	5.1	0.5	0.4	0.6	7.9	0.0	1.6
Diatomaceous earth	0.0	0.5	0.0	0.0	0.0	0.0	0.2
Pressure filtration	2.6	2.8	4.2	3.3	0.0	0.0	3.2
Green sand	10.5	4.8	4.9	2.5	39.5	0.0	6.2
Rapid sand filter	0.0	2.3	1.0	3.5	8.2	100.0	1.5
Deep bed mono-media	0.0	0.5	0.0	0.0	0.0	0.0	0.2
Dual/multi media	0.0	2.4	3.8	5.6	20.9	100.0	2.6

(Continued)

Table 28 (Cont.)
Treatment Practices for Ground Water Plants
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Ground Water Treatment Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Membranes							
Reverse osmosis	1.2	0.7	1.8	0.9	4.4	0.0	1.1
Microfiltration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ultrafiltration	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Nanofiltration	0.0	0.0	0.0	0.3	3.9	0.0	0.0
Other							
Aeration	3.8	8.4	17.6	19.6	68.5	0.0	11.0
Potassium permanganate	3.5	3.7	5.3	5.1	43.2	0.0	4.4
Corrosion control	11.0	10.5	24.1	24.0	60.0	50.0	15.7
Ion exchange	15.8	3.8	2.9	3.7	4.8	0.0	6.4
Activated alumina	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iron-based adsorptive media	2.6	1.2	0.2	0.4	0.0	0.0	1.2
Sequestration	8.7	6.6	10.9	8.0	7.4	0.0	8.4
Fluoride addition	0.5	13.9	25.0	22.9	68.3	50.0	14.8
Dissolved air flotation	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Granular activated carbon	1.2	0.1	1.0	3.9	5.2	0.0	0.9
Centrally managed POU/POE	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Clearwell and/or contact vessel (e.g., basin, pipeline)	28.7	17.2	9.8	6.6	25.0	0.0	17.1
Other	4.9	3.8	6.9	7.1	7.2	100.0	5.2
Observations	121	339	796	631	60	2	1,949

Data: Q.8

Notes:

Represents treatment practices for plants treating water that comes entirely or partly from ground sources.

Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 29
Disinfection Practices and Objectives
Percentage of Plants Performing Each Treatment

Primary disinfection method	Secondary disinfection method	System Service Population Category								
		100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Ground Water Plants										
Chlorine	Chlorine	11.2	10.2	10.1	2.0	3.4	3.6	1.2	1.9	8.0
	Chloramines	*	*	*	1.0	*	*	0.6	1.0	0.1
	Other	*	3.4	3.6	1.0	*	*	1.3	2.2	2.0
	None	71.9	77.0	74.9	82.0	82.8	89.8	79.0	87.7	77.4
Chlorine dioxide	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	1.0	*	*	*	*	0.1
Chloramines	Chlorine	*	*	*	*	*	0.3	0.2	*	0.0
	Chloramines	*	*	0.6	*	*	0.7	*	*	0.2
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	0.6	2.7	0.4	2.0	6.8	*	0.8
Ozone	Chlorine	*	*	*	*	*	*	0.1	*	0.0
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Ultraviolet light	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Mixed oxidant	Chlorine	1.7	*	*	*	0.7	*	*	*	0.4
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	1.1	*	1.8	*	*	*	0.5
Other	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	0.3	0.3	*	0.0
	Other	1.7	*	*	*	*	0.3	*	*	0.3
	None	*	*	*	1.3	2.4	*	0.4	0.4	0.4
None	Chlorine	*	*	*	*	2.2	1.8	2.8	6.1	0.5
	Chloramines	*	*	*	*	*	*	0.1	*	0.0
	Other	*	*	*	1.0	*	*	*	*	0.1
	None	13.4	9.4	9.2	7.9	6.4	1.0	7.1	0.7	9.0

(Continued)

Table 29 (Cont.)
Disinfection Practices and Objectives
Percentage of Plants Performing Each Treatment

Primary disinfection method	Secondary disinfection method	System Service Population Category								
		100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Surface Water Plants										
Chlorine	Chlorine	14.0	14.4	43.3	5.5	24.0	9.2	13.0	26.9	21.3
	Chloramines	*	*	*	4.1	1.2	9.2	14.3	12.6	3.4
	Other	*	*	1.1	12.4	5.9	2.6	5.2	5.0	4.7
	None	82.9	60.4	47.0	42.3	40.9	37.1	30.9	16.8	44.9
Chlorine dioxide	Chlorine	*	*	*	1.4	1.6	2.8	0.5	*	0.8
	Chloramines	*	*	*	1.4	0.2	1.3	2.3	*	0.6
	Other	*	*	*	*	*	*	2.8	*	0.2
	None	*	*	*	1.4	*	1.3	0.9	*	0.4
Chloramines	Chlorine	*	*	*	1.4	*	*	*	*	0.3
	Chloramines	*	*	*	*	4.2	2.6	2.5	*	1.3
	Other	*	*	*	*	1.2	*	2.8	1.7	0.6
	None	*	*	*	5.4	5.8	6.6	2.8	10.1	3.4
Ozone	Chlorine	*	*	1.5	*	*	*	2.8	2.5	0.7
	Chloramines	*	*	*	*	1.2	2.6	4.2	5.9	1.1
	Other	*	*	*	*	*	7.9	1.4	1.7	0.8
	None	*	*	*	*	*	*	0.5	*	0.0
Ultraviolet light	Chlorine	*	1.2	2.2	*	*	1.3	*	*	0.8
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Mixed oxidant	Chlorine	1.6	*	*	*	*	*	*	*	0.1
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	19.4	*	1.4	*	*	*	*	2.7
	None	*	*	1.5	1.4	*	*	*	*	0.6
Other	Chlorine	1.6	*	*	1.4	1.2	*	0.5	*	0.6
	Chloramines	*	*	*	2.7	1.2	*	2.8	2.5	1.1
	Other	*	1.2	*	4.1	*	3.9	1.9	0.8	1.4
	None	*	0.5	2.2	6.9	2.3	2.6	2.8	2.5	2.9
None	Chlorine	*	1.2	*	4.1	2.3	5.1	0.9	3.4	2.0
	Chloramines	*	*	*	*	1.2	*	2.8	0.8	0.5
	Other	*	*	*	*	*	2.6	0.9	*	0.3
	None	*	1.6	1.1	2.7	5.8	1.3	0.4	6.7	2.6

(Continued)

Table 29 (Cont.)
Disinfection Practices and Objectives
Percentage of Plants Performing Each Treatment

Primary disinfection method	Secondary disinfection method	System Service Population Category								
		100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Mixed Plants										
Chlorine	Chlorine	*	*	35.8	7.0	33.2	24.2	*	*	20.3
	Chloramines	*	*	*	*	*	*	34.3	*	1.2
	Other	*	*	*	27.1	14.2	*	6.5	*	8.4
	None	100.0	100.0	64.2	58.9	21.4	75.8	6.5	48.7	60.9
Chlorine dioxide	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Chloramines	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	6.5	*	0.2
	Other	*	*	*	*	7.1	*	*	*	1.3
	None	*	*	*	*	*	*	6.5	*	0.2
Ozone	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	6.5	*	0.2
	Other	*	*	*	*	*	*	6.5	*	0.2
	None	*	*	*	*	*	*	*	*	*
Ultraviolet light	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Mixed oxidant	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*	*	*
Other	Chlorine	*	*	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	7.0	2.7	*	*	*	1.9
	None	*	*	*	*	7.1	*	*	51.3	1.5
None	Chlorine	*	*	*	*	14.2	*	13.0	*	3.1
	Chloramines	*	*	*	*	*	*	7.1	*	0.2
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	6.5	*	0.2

(Continued)

Table 29 (Cont.)
Disinfection Practices and Objectives
Percentage of Plants Performing Each Treatment

Primary disinfection method	Secondary disinfection method	System Service Population Category								
		100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Plants										
Chlorine	Chlorine	11.3	10.3	13.1	2.7	7.3	4.8	3.9	7.3	9.5
	Chloramines	*	*	*	1.5	0.2	1.7	4.3	3.5	0.5
	Other	*	3.1	3.3	3.6	1.3	0.5	2.2	2.8	2.4
	None	72.3	76.5	72.6	75.1	74.7	79.9	66.8	72.2	74.0
Chlorine dioxide	Chlorine	*	*	*	0.2	0.2	0.5	0.1	*	0.1
	Chloramines	*	*	*	0.2	0.0	0.2	0.5	*	0.1
	Other	*	*	*	*	*	*	0.6	*	0.0
	None	*	*	*	1.0	*	0.2	0.2	*	0.1
Chloramines	Chlorine	*	*	*	0.2	*	0.3	0.1	*	0.0
	Chloramines	*	*	0.5	*	0.7	1.0	0.7	*	0.3
	Other	*	*	*	*	0.4	*	0.6	0.4	0.1
	None	*	*	0.5	3.1	1.2	2.9	5.9	2.2	1.0
Ozone	Chlorine	*	*	0.1	*	*	*	0.7	0.5	0.1
	Chloramines	*	*	*	*	0.2	0.5	1.1	1.3	0.1
	Other	*	*	*	*	*	1.5	0.4	0.4	0.1
	None	*	*	*	*	*	*	0.1	*	0.0
Ultraviolet light	Chlorine	*	0.1	0.2	*	*	0.2	*	*	0.1
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*	*	*
	None	*	*	*	**	*	*	*	*	*
Mixed oxidant	Chlorine	1.7	*	*	*	0.5	*	*	*	0.3
	Chloramines	*	*	*	*	*	*	*	*	*
	Other	*	1.0	*	0.2	*	*	*	*	0.3
	None	*	*	1.1	0.2	1.4	*	*	*	0.5
Other	Chlorine	0.0	*	*	0.2	0.2	*	0.1	*	0.1
	Chloramines	*	*	*	0.4	0.2	0.3	0.9	0.5	0.1
	Other	1.7	0.1	*	0.9	0.1	1.0	0.4	0.2	0.4
	None	*	0.0	0.2	2.1	2.5	0.5	1.0	1.1	0.7
None	Chlorine	*	0.1	*	0.6	2.5	2.4	2.6	5.5	0.7
	Chloramines	*	*	*	*	0.2	*	0.9	0.2	0.1
	Other	*	*	*	0.8	*	0.5	0.2	*	0.1
	None	13.0	8.8	8.4	6.8	6.1	1.0	5.6	2.0	8.2

Data: Q.8

Notes: Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 30
Disinfection Practice and Objectives
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Primary disinfection method	Secondary disinfection method	Plant Average Daily Production (MGD)						
		0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Ground Water Plants								
Chlorine	Chlorine	10.6	8.7	5.8	4.1	1.8	*	8.0
	Chloramines	*	*	0.4	0.2	3.0	*	0.1
	Other	1.2	3.7	0.4	0.3	8.4	*	1.9
	None	76.1	77.4	80.5	81.3	71.7	*	78.2
Chlorine dioxide	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	0.4	*	*	*	0.1
Chloramines	Chlorine	*	*	*	0.2	*	*	0.0
	Chloramines	*	0.5	*	0.3	*	*	0.2
	Other	*	*	*	*	*	*	*
	None	*	0.1	2.0	2.9	6.6	*	0.8
Ozone	Chlorine	*	*	0.0	*	*	*	0.0
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*
Ultraviolet light	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	0.1	0.2	*	*	*	0.1
Mixed oxidant	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	0.5	0.5	1.0	*	*	0.4
Other	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	0.2	0.9	*	0.0
	Other	1.3	*	*	*	2.2	*	0.3
	None	*	*	0.9	2.6	*	100.0	0.4
None	Chlorine	*	0.1	1.3	1.5	3.0	*	0.5
	Chloramines	*	*	*	0.1	*	*	0.0
	Other	*	*	0.4	*	*	*	0.1
	None	10.9	9.1	7.2	5.3	2.5	*	8.7

(Continued)

Table 30 (Cont.)
Disinfection Practice and Objectives
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Primary disinfection method	Secondary disinfection method	Plant Average Daily Production (MGD)						
		0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Surface Water Plants								
Chlorine	Chlorine	12.9	27.7	22.1	18.3	21.3	26.3	21.3
	Chloramines	*	*	2.0	5.4	10.5	5.3	3.5
	Other	*	1.4	5.8	7.0	4.1	*	4.8
	None	69.1	49.2	49.0	40.6	27.5	15.8	45.0
Chlorine dioxide	Chlorine	*	*	0.8	1.4	1.5	*	0.9
	Chloramines	*	*	0.8	0.7	*	*	0.5
	Other	*	*	*	0.1	2.0	*	0.3
	None	*	*	0.8	0.1	1.3	*	0.4
Chloramines	Chlorine	*	*	0.8	*	*	*	0.3
	Chloramines	11.6	*	*	1.7	1.2	*	1.4
	Other	*	*	*	1.3	1.1	5.3	0.6
	None	*	1.4	1.7	5.6	7.9	5.3	3.5
Ozone	Chlorine	*	1.9	*	0.1	2.3	10.5	0.7
	Chloramines	*	*	0.8	0.3	5.9	15.8	1.1
	Other	*	*	0.3	1.5	1.9	*	0.8
	None	*	*	*	*	0.4	*	0.0
Ultraviolet light	Chlorine	2.7	1.4	0.8	0.3	*	*	0.8
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	1.3	*	*	*	*	*	0.1
Mixed oxidant	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	13.9	0.8	*	*	*	2.8
	None	*	*	1.9	*	*	*	0.6
Other	Chlorine	1.3	*	0.8	0.9	*	*	0.6
	Chloramines	*	*	1.7	0.8	3.4	*	1.1
	Other	*	0.9	1.7	1.0	1.2	5.3	1.2
	None	1.2	*	4.1	2.8	4.0	*	2.7
None	Chlorine	*	0.9	2.5	2.7	0.4	*	1.9
	Chloramines	*	*	*	1.4	0.4	5.3	0.5
	Other	*	*	*	0.7	0.4	*	0.3
	None	*	1.2	0.8	5.3	1.3	5.3	2.4

(Continued)

Table 30 (Cont.)
Disinfection Practice and Objectives
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Primary disinfection method	Secondary disinfection method	Plant Average Daily Production (MGD)						
		0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Mixed Plants								
Chlorine	Chlorine	*	6.1	28.9	17.4	16.3	*	20.3
	Chloramines	*	*	*	1.0	29.1	*	1.2
	Other	*	*	*	35.5	*	*	8.4
	None	100.0	93.9	65.6	24.8	7.0	*	60.9
Chlorine dioxide	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*
Chloramines	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	0.9	*	*	0.2
	Other	*	*	*	5.7	*	*	1.3
	None	*	*	*	*	7.0	*	0.2
Ozone	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	7.0	*	0.2
	Other	*	*	*	*	7.0	*	0.2
	None	*	*	*	*	*	*	*
Ultraviolet light	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*
Mixed oxidant	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*
Other	Chlorine	*	*	*	*	*	*	*
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	2.8	2.2	*	*	1.9
	None	*	*	*	5.7	5.8	*	1.5
None	Chlorine	*	*	2.7	5.7	13.9	*	3.1
	Chloramines	*	*	*	1.0	*	*	0.2
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	7.0	*	0.2

(Continued)

Table 30 (Cont.)
Disinfection Practice and Objectives
Percentage of Plants Performing Each Treatment
By Plant Average Daily Production

Primary disinfection method	Secondary disinfection method	Plant Average Daily Production (MGD)						
		0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
All Plants								
Chlorine	Chlorine	10.6	9.6	8.3	9.1	15.0	23.9	9.5
	Chloramines	*	*	0.6	1.9	8.8	4.8	0.5
	Other	1.1	3.5	1.0	3.9	5.3	*	2.3
	None	75.9	76.3	76.6	66.1	40.8	14.4	74.7
Chlorine dioxide	Chlorine	*	*	0.1	0.4	0.9	*	0.1
	Chloramines	*	*	0.1	0.2	*	*	0.0
	Other	*	*	*	0.0	1.3	*	0.0
	None	*	*	0.4	0.0	0.9	*	0.1
Chloramines	Chlorine	*	*	0.1	0.1	*	*	0.0
	Chloramines	0.3	0.4	*	0.8	0.8	*	0.3
	Other	*	*	*	0.6	0.7	4.8	0.1
	None	*	0.1	1.9	3.6	7.5	4.8	1.1
Ozone	Chlorine	*	0.1	0.0	0.0	1.5	9.6	0.1
	Chloramines	*	*	0.1	0.1	4.1	14.4	0.1
	Other	*	*	0.0	0.5	1.5	*	0.1
	None	*	*	*	*	0.3	*	0.0
Ultraviolet light	Chlorine	0.1	0.1	0.1	0.1	*	*	0.1
	Chloramines	*	*	*	*	*	*	*
	Other	*	*	*	*	*	*	*
	None	*	*	*	*	*	*	*
Mixed oxidant	Chlorine	0.0	0.1	0.1	*	*	*	0.1
	Chloramines	*	*	*	*	*	*	*
	Other	*	0.7	0.1	*	*	*	0.3
	None	*	0.4	0.7	0.6	*	*	0.4
Other	Chlorine	0.0	*	0.1	0.3	*	*	0.1
	Chloramines	*	*	0.2	0.4	2.5	*	0.1
	Other	1.2	0.0	0.3	0.4	1.5	4.8	0.4
	None	0.0	*	1.2	2.8	2.8	9.1	0.7
None	Chlorine	*	0.1	1.5	2.1	1.7	*	0.7
	Chloramines	*	*	*	0.5	0.3	4.8	0.1
	Other	*	*	0.3	0.2	0.3	*	0.1
	None	10.6	8.6	6.3	5.0	1.9	4.8	7.9

Data: Q.8

Notes: Percentages may not add to 100 percent because systems may perform more than one treatment.

Table 31
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Surface Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Disinfection with no additional treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Non-mechanical dewatering	0.0	0.0	0.0	*	*	0.0	0.0	50.0	0.5
Disposal									
Land application	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Deep well injection	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Direct discharge to surface water	0.0	7.7	0.0	*	*	33.3	0.0	0.0	7.3
Septic system	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Recycle filter backwash	0.0	7.7	0.0	*	*	0.0	0.0	0.0	2.4
Observations	12	13	3	*	*	6	5	2	41
Treatment Scheme: Disinfection, Other Chemical Addition									
Dewatering									
Mechanical dewatering	*	0.0	0.0	0.0	0.0	0.0	21.3	14.3	3.4
Non-mechanical dewatering	*	0.0	25.0	33.9	0.0	100.0	35.5	21.4	21.0
Disposal									
Land application	*	0.0	0.0	0.0	0.0	0.0	35.5	21.4	5.5
On-site storage	*	0.0	50.0	0.0	0.0	100.0	14.2	7.1	12.9
Deep well injection	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	0.0	0.0	0.0	7.1	2.4
Non-hazardous waste landfill	*	0.0	25.0	0.0	0.0	100.0	20.0	7.1	14.3
Direct discharge to surface water	*	0.0	25.0	0.0	0.0	0.0	6.7	14.3	9.5
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	*	0.0	25.0	33.3	25.0	0.0	13.3	7.1	14.3
Recycle filter backwash	*	100.0	25.0	0.0	0.0	100.0	40.0	7.1	23.8
Observations	*	1	4	3	4	1	15	14	42
Treatment Scheme: Ion exchange, activated alumina, aeration									
Dewatering									
Mechanical dewatering	*	*	*	0.0	100.0	*	0.0	*	46.0
Non-mechanical dewatering	*	*	*	0.0	0.0	*	0.0	*	0.0
Disposal									
Land application	*	*	*	0.0	100.0	*	0.0	*	46.0
On-site storage	*	*	*	0.0	100.0	*	0.0	*	46.0
Deep well injection	*	*	*	0.0	0.0	*	0.0	*	0.0
Hazardous waste landfill	*	*	*	0.0	0.0	*	0.0	*	0.0
Non-hazardous waste landfill	*	*	*	0.0	0.0	*	0.0	*	0.0
Direct discharge to surface water	*	*	*	0.0	100.0	*	0.0	*	33.3
Septic system	*	*	*	0.0	0.0	*	0.0	*	0.0
Sanitary Sewer	*	*	*	0.0	0.0	*	0.0	*	0.0
Recycle filter backwash	*	*	*	0.0	0.0	*	0.0	*	0.0
Observations	*	*	*	1	1	*	1	*	3

(Continued)

Table 31 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Surface Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)									
Dewatering									
Mechanical dewatering	0.0	0.0	3.2	14.3	0.0	0.0	50.0	*	3.9
Non-mechanical dewatering	25.1	34.4	34.2	42.9	40.0	0.0	50.0	*	34.2
Disposal									
Land application	10.6	28.7	30.4	0.0	40.0	0.0	37.5	*	24.4
On-site storage	19.9	38.0	37.4	42.9	20.0	0.0	12.5	*	33.4
Deep well injection	0.0	0.0	0.0	0.0	20.0	0.0	0.0	*	1.4
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	3.7	0.0	0.0	14.3	0.0	100.0	37.5	*	6.8
Direct discharge to surface water	3.7	27.3	22.2	57.1	40.0	0.0	50.0	*	23.9
Septic system	7.4	0.0	5.6	0.0	0.0	0.0	0.0	*	3.4
Sanitary Sewer	7.4	0.0	27.8	14.3	20.0	100.0	25.0	*	13.6
Recycle filter backwash	0.0	0.0	5.6	57.1	20.0	0.0	62.5	*	12.5
Observations	27	22	18	7	5	1	8	*	88
Treatment Scheme: Direct filtration									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	7.2	0.0	0.0	23.0	18.2	3.7
Non-mechanical dewatering	0.0	36.6	39.0	49.9	85.9	77.1	61.7	54.5	57.0
Disposal									
Land application	100.0	17.8	7.3	7.2	20.8	19.3	26.8	9.1	15.9
On-site storage	0.0	57.8	53.7	57.3	55.5	25.7	38.3	9.1	49.4
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	1.0
Non-hazardous waste landfill	0.0	0.0	15.4	28.6	30.8	37.5	38.5	36.4	28.6
Direct discharge to surface water	0.0	0.0	15.4	42.9	38.5	31.3	23.1	18.2	24.8
Septic system	0.0	22.2	0.0	14.3	7.7	0.0	0.0	0.0	4.8
Sanitary Sewer	0.0	11.1	46.2	14.3	23.1	37.5	30.8	0.0	24.8
Recycle filter backwash	0.0	0.0	38.5	35.7	38.5	68.8	69.2	81.8	50.5
Observations	3	9	13	14	13	16	26	11	105
Treatment Scheme: Conventional filtration (with and without softening)									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	7.3	13.8	20.3	29.9	36.1	13.4
Non-mechanical dewatering	14.5	70.9	61.1	48.9	64.0	56.1	59.9	41.0	57.6
Disposal									
Land application	14.5	17.0	25.5	29.3	40.2	34.8	30.5	15.7	30.9
On-site storage	14.5	45.5	67.8	56.2	43.0	45.2	31.3	24.1	47.0
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	3.7	0.0	7.9	4.3	2.1	3.6	3.3
Non-hazardous waste landfill	20.0	11.8	11.1	22.0	19.0	27.7	45.1	41.0	32.5
Direct discharge to surface water	0.0	23.5	25.9	36.6	38.1	38.3	23.9	26.5	29.2
Septic system	20.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.5
Sanitary Sewer	20.0	35.3	33.3	14.6	22.2	23.4	23.9	33.7	25.6
Recycle filter backwash	20.0	0.0	29.6	39.0	30.2	46.8	57.0	68.7	48.0
Observations	5	17	27	41	63	47	142	83	425

(Continued)

Table 31 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Surface Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Membranes									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	0.0	*	0.0	0.0	33.9	0.8
Non-mechanical dewatering	0.0	19.4	21.5	33.3	*	41.7	100.0	33.9	25.2
Disposal									
Land application	0.0	0.0	0.0	0.0	*	41.7	100.0	33.9	4.7
On-site storage	0.0	37.8	46.4	0.0	*	41.7	0.0	0.0	34.3
Deep well injection	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	11.1	0.0	*	0.0	0.0	0.0	3.8
Direct discharge to surface water	0.0	40.0	33.3	33.3	*	25.0	0.0	0.0	26.9
Septic system	0.0	0.0	11.1	0.0	*	0.0	0.0	0.0	3.8
Sanitary Sewer	0.0	0.0	66.7	66.7	*	0.0	0.0	66.7	38.5
Recycle filter backwash	0.0	20.0	0.0	66.7	*	50.0	100.0	66.7	30.8
Observations	1	5	9	3	*	4	1	3	26
Treatment Scheme: Other Treatment									
Dewatering									
Mechanical dewatering	*	*	*	*	*	0.0	*	0.0	0.0
Non-mechanical dewatering	*	*	*	*	*	0.0	*	0.0	0.0
Disposal									
Land application	*	*	*	*	*	0.0	*	0.0	0.0
On-site storage	*	*	*	*	*	0.0	*	0.0	0.0
Deep well injection	*	*	*	*	*	0.0	*	0.0	0.0
Hazardous waste landfill	*	*	*	*	*	0.0	*	0.0	0.0
Non-hazardous waste landfill	*	*	*	*	*	0.0	*	0.0	0.0
Direct discharge to surface water	*	*	*	*	*	0.0	*	0.0	0.0
Septic system	*	*	*	*	*	0.0	*	0.0	0.0
Sanitary Sewer	*	*	*	*	*	0.0	*	0.0	0.0
Recycle filter backwash	*	*	*	*	*	0.0	*	0.0	0.0
Observations	*	*	*	*	*	1	*	5	6

Data: Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 32
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Ground Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Disinfection with no additional treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.1
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Disposal									
Land application	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
On-site storage	0.0	0.0	0.7	24.5	5.3	0.0	1.2	0.0	2.9
Deep well injection	0.0	0.0	0.0	7.7	0.0	0.0	0.4	0.0	0.7
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Direct discharge to surface water	0.0	0.0	1.1	6.4	8.5	0.0	0.8	0.0	1.5
Septic system	0.0	4.4	0.0	0.0	0.0	0.0	1.2	0.0	0.7
Sanitary Sewer	0.0	0.0	0.0	8.5	6.4	0.0	0.8	0.0	1.3
Recycle filter backwash	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Observations	41	45	88	47	47	56	241	119	684
Treatment Scheme: Disinfection, Other Chemical Addition									
Dewatering									
Mechanical dewatering	0.0	7.5	0.0	0.0	0.4	0.0	0.4	0.9	1.3
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.9	0.1
Disposal									
Land application	0.0	0.0	0.0	0.0	0.0	0.0	8.6	0.0	0.4
On-site storage	0.0	0.0	1.3	9.1	3.0	0.0	12.1	0.0	2.3
Deep well injection	0.0	0.0	1.3	4.6	0.0	0.6	0.0	0.0	1.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.1
Direct discharge to surface water	0.0	0.0	0.0	0.0	1.6	0.0	8.1	0.0	2.9
Septic system	0.0	0.0	0.0	3.8	1.6	0.0	0.4	0.0	0.4
Sanitary Sewer	12.5	0.0	0.0	0.0	6.3	2.6	4.7	0.0	2.6
Recycle filter backwash	12.5	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Observations	8	16	48	26	63	78	236	225	700
Treatment Scheme: Ion exchange, activated alumina, aeration									
Dewatering									
Mechanical dewatering	10.4	12.3	0.0	0.0	0.0	0.0	0.0	0.0	5.4
Non-mechanical dewatering	0.0	0.0	18.2	0.0	0.0	0.0	0.0	0.0	3.7
Disposal									
Land application	40.7	23.9	0.0	0.0	0.0	0.0	4.0	0.0	16.0
On-site storage	20.8	0.0	18.2	28.6	3.4	0.0	11.7	0.0	12.2
Deep well injection	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	2.1
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.7
Non-hazardous waste landfill	10.0	0.0	0.0	0.0	6.7	20.0	3.8	0.0	4.8
Direct discharge to surface water	0.0	0.0	0.0	0.0	0.0	0.0	30.8	0.0	5.5
Septic system	20.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Sanitary Sewer	20.0	25.0	8.3	14.3	16.7	6.7	3.8	0.0	8.9
Recycle filter backwash	0.0	0.0	0.0	0.0	0.0	6.7	7.7	0.0	2.1
Observations	10	8	12	7	30	15	26	38	146

(Continued)

Table 32 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Ground Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	8.0	6.2	3.0	10.4	0.0	1.8
Non-mechanical dewatering	0.0	0.0	30.8	23.9	8.5	14.0	32.0	46.0	11.5
Disposal									
Land application	10.5	7.1	13.0	8.0	1.6	11.6	21.6	0.0	8.8
On-site storage	28.0	0.0	36.7	31.9	8.5	63.3	34.0	2.8	20.3
Deep well injection	0.0	0.0	0.0	8.0	0.7	6.0	13.2	0.0	1.3
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	4.3	4.3	0.0	1.5
Non-hazardous waste landfill	10.0	0.0	5.3	7.7	20.6	0.0	10.6	0.0	7.5
Direct discharge to surface water	0.0	6.3	15.8	30.8	14.7	21.7	21.3	13.5	16.6
Septic system	30.0	18.8	0.0	15.4	0.0	8.7	2.1	0.0	5.5
Sanitary Sewer	20.0	50.0	52.6	30.8	67.6	34.8	42.6	32.4	43.7
Recycle filter backwash	0.0	0.0	0.0	7.7	17.6	60.9	27.7	21.6	21.1
Observations	10	16	19	13	34	23	47	37	199
Treatment Scheme: Direct filtration									
Dewatering									
Mechanical dewatering	*	*	0.0	100.0	0.0	42.1	36.7	*	20.5
Non-mechanical dewatering	*	*	0.0	100.0	66.7	57.9	46.4	*	52.6
Disposal									
Land application	*	*	0.0	0.0	18.2	57.9	36.7	*	12.5
On-site storage	*	*	100.0	100.0	9.1	84.1	64.8	*	55.5
Deep well injection	*	*	0.0	0.0	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	*	*	0.0	0.0	33.3	66.7	33.3	*	35.3
Direct discharge to surface water	*	*	0.0	0.0	16.7	33.3	50.0	*	29.4
Septic system	*	*	0.0	100.0	0.0	0.0	33.3	*	17.6
Sanitary Sewer	*	*	100.0	0.0	50.0	0.0	50.0	*	41.2
Recycle filter backwash	*	*	0.0	100.0	16.7	33.3	50.0	*	35.3
Observations	*	*	1	1	6	3	6	*	17
Treatment Scheme: Conventional filtration (with and without softening)									
Dewatering									
Mechanical dewatering	*	0.0	0.0	0.0	100.0	48.5	35.2	0.0	4.5
Non-mechanical dewatering	*	0.0	50.0	25.0	100.0	48.5	56.7	100.0	31.3
Disposal									
Land application	*	0.0	50.0	0.0	100.0	48.5	51.4	52.4	21.0
On-site storage	*	100.0	50.0	50.0	100.0	74.2	56.7	84.4	63.6
Deep well injection	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	*	0.0	0.0	0.0	0.0	25.0	58.3	50.0	35.7
Direct discharge to surface water	*	0.0	50.0	0.0	0.0	25.0	16.7	25.0	17.9
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	*	100.0	0.0	75.0	0.0	0.0	0.0	25.0	17.9
Recycle filter backwash	*	0.0	0.0	25.0	100.0	25.0	50.0	100.0	46.4
Observations	*	1	2	4	1	4	12	4	28

(Continued)

Table 32 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Ground Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Membranes									
Dewatering									
Mechanical dewatering	*	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Non-mechanical dewatering	*	0.0	100.0	*	*	0.0	0.0	0.0	37.0
Disposal									
Land application	*	0.0	100.0	*	*	0.0	0.0	0.0	37.0
On-site storage	*	0.0	100.0	*	*	0.0	24.5	0.0	37.9
Deep well injection	*	0.0	0.0	*	*	0.0	24.5	0.0	0.9
Hazardous waste landfill	*	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	*	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Direct discharge to surface water	*	0.0	0.0	*	*	100.0	50.0	0.0	37.5
Septic system	*	100.0	0.0	*	*	0.0	0.0	0.0	12.5
Sanitary Sewer	*	0.0	0.0	*	*	0.0	25.0	0.0	12.5
Recycle filter backwash	*	0.0	0.0	*	*	0.0	0.0	0.0	0.0
Observations	*	1	1	*	*	1	4	1	8
Treatment Scheme: Other Treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	*	50.0	100.0	3.8	0.0	1.6
Non-mechanical dewatering	0.0	0.0	0.0	*	50.0	0.0	0.0	0.0	0.5
Disposal									
Land application	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	*	50.0	0.0	0.0	0.0	0.5
Deep well injection	0.0	0.0	0.0	*	0.0	0.0	3.5	0.0	0.2
Hazardous waste landfill	0.0	0.0	0.0	*	0.0	100.0	0.0	0.0	4.0
Non-hazardous waste landfill	0.0	0.0	0.0	*	0.0	0.0	25.9	0.0	14.0
Direct discharge to surface water	100.0	0.0	0.0	*	0.0	0.0	14.8	0.0	10.0
Septic system	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	20.0	0.0	*	50.0	0.0	25.9	0.0	18.0
Recycle filter backwash	0.0	0.0	0.0	*	50.0	0.0	3.7	0.0	4.0
Observations	1	5	3	*	2	2	27	10	50

Data: Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 33
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Mixed Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Disinfection with no additional treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Disposal									
Land application	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
On-site storage	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Deep well injection	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Direct discharge to surface water	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Septic system	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Sanitary Sewer	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Recycle filter backwash	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Observations	1	3	3	1	2	*	1	*	11
Treatment Scheme: Disinfection, Other Chemical Addition									
Dewatering									
Mechanical dewatering	*	*	0.0	*	27.3	*	0.0	*	17.0
Non-mechanical dewatering	*	*	0.0	*	0.0	*	19.0	*	2.8
Disposal									
Land application	*	*	0.0	*	0.0	*	0.0	*	0.0
On-site storage	*	*	0.0	*	0.0	*	0.0	*	0.0
Deep well injection	*	*	0.0	*	0.0	*	0.0	*	0.0
Hazardous waste landfill	*	*	0.0	*	0.0	*	0.0	*	0.0
Non-hazardous waste landfill	*	*	0.0	*	50.0	*	20.0	*	25.0
Direct discharge to surface water	*	*	0.0	*	50.0	*	20.0	*	25.0
Septic system	*	*	0.0	*	0.0	*	0.0	*	0.0
Sanitary Sewer	*	*	0.0	*	0.0	*	20.0	*	12.5
Recycle filter backwash	*	*	0.0	*	50.0	*	0.0	*	12.5
Observations	*	*	1	*	2	*	5	*	8
Treatment Scheme: Ion exchange, activated alumina, aeration									
Dewatering									
Mechanical dewatering	*	*	0.0	0.0	*	0.0	*	*	0.0
Non-mechanical dewatering	*	*	0.0	0.0	*	0.0	*	*	0.0
Disposal									
Land application	*	*	0.0	0.0	*	0.0	*	*	0.0
On-site storage	*	*	0.0	0.0	*	0.0	*	*	0.0
Deep well injection	*	*	0.0	0.0	*	0.0	*	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	*	0.0	*	*	0.0
Non-hazardous waste landfill	*	*	0.0	0.0	*	0.0	*	*	0.0
Direct discharge to surface water	*	*	0.0	0.0	*	0.0	*	*	0.0
Septic system	*	*	0.0	0.0	*	0.0	*	*	0.0
Sanitary Sewer	*	*	0.0	0.0	*	0.0	*	*	0.0
Recycle filter backwash	*	*	0.0	0.0	*	0.0	*	*	0.0
Observations	*	*	1	1	*	1	*	*	3

(Continued)

Table 33 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Mixed Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	*	*	*	32.4	*	5.9
Non-mechanical dewatering	0.0	100.0	0.0	*	*	*	67.6	*	34.7
Disposal									
Land application	0.0	0.0	100.0	*	*	*	67.6	*	49.5
On-site storage	0.0	100.0	100.0	*	*	*	64.7	*	71.2
Deep well injection	0.0	0.0	0.0	*	*	*	0.0	*	0.0
Hazardous waste landfill	0.0	0.0	0.0	*	*	*	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	*	*	*	33.3	*	16.7
Direct discharge to surface water	0.0	100.0	0.0	*	*	*	0.0	*	16.7
Septic system	0.0	0.0	0.0	*	*	*	0.0	*	0.0
Sanitary Sewer	0.0	0.0	0.0	*	*	*	33.3	*	16.7
Recycle filter backwash	0.0	0.0	0.0	*	*	*	66.7	*	33.3
Observations	1	1	1	*	*	*	3	*	6
Treatment Scheme: Direct filtration									
Dewatering									
Mechanical dewatering	*	0.0	*	*	0.0	100.0	*	*	12.8
Non-mechanical dewatering	*	100.0	*	*	100.0	0.0	*	*	87.2
Disposal									
Land application	*	0.0	*	*	100.0	0.0	*	*	66.6
On-site storage	*	0.0	*	*	50.0	0.0	*	*	33.3
Deep well injection	*	0.0	*	*	0.0	0.0	*	*	0.0
Hazardous waste landfill	*	0.0	*	*	0.0	0.0	*	*	0.0
Non-hazardous waste landfill	*	0.0	*	*	0.0	100.0	*	*	25.0
Direct discharge to surface water	*	100.0	*	*	0.0	100.0	*	*	50.0
Septic system	*	0.0	*	*	0.0	0.0	*	*	0.0
Sanitary Sewer	*	0.0	*	*	0.0	0.0	*	*	0.0
Recycle filter backwash	*	0.0	*	*	100.0	0.0	*	*	50.0
Observations	*	1	*	*	2	1	*	*	4
Treatment Scheme: Conventional filtration (with and without softening)									
Dewatering									
Mechanical dewatering	*	0.0	0.0	0.0	22.8	50.0	16.7	0.0	8.4
Non-mechanical dewatering	*	100.0	53.8	100.0	68.4	50.0	100.0	0.0	78.6
Disposal									
Land application	*	0.0	30.8	29.0	68.4	50.0	33.3	0.0	38.7
On-site storage	*	0.0	46.2	14.5	22.8	0.0	50.0	0.0	24.8
Deep well injection	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	0.0	50.0	0.0	0.0	4.3
Non-hazardous waste landfill	*	0.0	0.0	0.0	40.0	0.0	50.0	0.0	21.7
Direct discharge to surface water	*	0.0	50.0	75.0	20.0	0.0	0.0	0.0	26.1
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	*	100.0	25.0	25.0	40.0	50.0	16.7	0.0	30.4
Recycle filter backwash	*	0.0	25.0	50.0	80.0	100.0	100.0	100.0	69.6
Observations	*	1	4	4	5	2	6	1	23

(Continued)

Table 33 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

Mixed Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Membranes									
Dewatering									
Mechanical dewatering	0.0	*	*	*	0.0	*	*	0.0	0.0
Non-mechanical dewatering	0.0	*	*	*	100.0	*	*	0.0	70.9
Disposal									
Land application	0.0	*	*	*	100.0	*	*	0.0	70.9
On-site storage	0.0	*	*	*	100.0	*	*	0.0	70.9
Deep well injection	0.0	*	*	*	0.0	*	*	0.0	0.0
Hazardous waste landfill	0.0	*	*	*	0.0	*	*	0.0	0.0
Non-hazardous waste landfill	0.0	*	*	*	0.0	*	*	0.0	0.0
Direct discharge to surface water	0.0	*	*	*	0.0	*	*	0.0	0.0
Septic system	0.0	*	*	*	0.0	*	*	0.0	0.0
Sanitary Sewer	100.0	*	*	*	0.0	*	*	100.0	66.7
Recycle filter backwash	0.0	*	*	*	100.0	*	*	0.0	33.3
Observations	1	*	*	*	1	*	*	1	3
Treatment Scheme: Other Treatment									
Dewatering									
Mechanical dewatering	*	0.0	*	*	*	*	*	*	0.0
Non-mechanical dewatering	*	0.0	*	*	*	*	*	*	0.0
Disposal									
Land application	*	0.0	*	*	*	*	*	*	0.0
On-site storage	*	0.0	*	*	*	*	*	*	0.0
Deep well injection	*	0.0	*	*	*	*	*	*	0.0
Hazardous waste landfill	*	0.0	*	*	*	*	*	*	0.0
Non-hazardous waste landfill	*	0.0	*	*	*	*	*	*	0.0
Direct discharge to surface water	*	0.0	*	*	*	*	*	*	0.0
Septic system	*	0.0	*	*	*	*	*	*	0.0
Sanitary Sewer	*	0.0	*	*	*	*	*	*	0.0
Recycle filter backwash	*	0.0	*	*	*	*	*	*	0.0
Observations	*	1	*	*	*	*	*	*	1

Data: Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 34
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

All Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Disinfection with no additional treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.1
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.9	0.0
Disposal									
Land application	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
On-site storage	0.0	0.0	0.7	23.9	5.2	0.0	1.2	0.0	2.8
Deep well injection	0.0	0.0	0.0	7.5	0.0	0.0	0.4	0.0	0.7
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Direct discharge to surface water	0.0	1.6	1.1	6.3	8.2	3.2	0.8	0.0	1.8
Septic system	0.0	3.3	0.0	0.0	0.0	0.0	1.2	0.0	0.7
Sanitary Sewer	0.0	0.0	0.0	8.3	6.1	0.0	0.8	0.0	1.2
Recycle filter backwash	0.0	1.6	0.0	0.0	0.0	0.0	0.4	0.0	0.3
Observations	54	61	94	48	49	62	247	121	736
Treatment Scheme: Disinfection, Other Chemical Addition									
Dewatering									
Mechanical dewatering	0.0	7.4	0.0	0.0	1.2	0.0	1.5	1.7	1.4
Non-mechanical dewatering	0.0	0.0	0.3	2.2	0.4	0.5	2.6	2.1	0.6
Disposal									
Land application	0.0	0.0	0.0	0.0	0.0	0.0	9.9	1.3	0.5
On-site storage	0.0	0.0	1.9	8.5	2.7	0.5	12.0	0.4	2.6
Deep well injection	0.0	0.0	1.3	4.3	0.0	0.6	0.0	0.0	1.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
Non-hazardous waste landfill	0.0	0.0	1.9	0.0	1.4	2.5	1.6	0.4	1.2
Direct discharge to surface water	0.0	0.0	1.9	0.0	2.9	0.0	8.2	0.8	3.5
Septic system	0.0	0.0	0.0	3.4	1.4	0.0	0.4	0.0	0.4
Sanitary Sewer	12.5	0.0	1.9	3.4	7.2	2.5	5.5	0.4	3.3
Recycle filter backwash	12.5	11.8	1.9	0.0	1.4	1.3	2.3	0.4	1.7
Observations	8	17	53	29	69	79	256	239	750
Treatment Scheme: Ion exchange, activated alumina, aeration									
Dewatering									
Mechanical dewatering	10.4	12.3	0.0	0.0	1.3	0.0	0.0	0.0	5.5
Non-mechanical dewatering	0.0	0.0	17.3	0.0	0.0	0.0	0.0	0.0	3.6
Disposal									
Land application	40.7	23.9	0.0	0.0	1.3	0.0	3.9	0.0	15.9
On-site storage	20.8	0.0	17.3	25.3	4.6	0.0	11.4	0.0	12.2
Deep well injection	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0	2.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.7
Non-hazardous waste landfill	10.0	0.0	0.0	0.0	6.5	18.8	3.7	0.0	4.6
Direct discharge to surface water	0.0	0.0	0.0	0.0	3.2	0.0	29.6	0.0	5.9
Septic system	20.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Sanitary Sewer	20.0	25.0	7.7	11.1	16.1	6.3	3.7	0.0	8.6
Recycle filter backwash	0.0	0.0	0.0	0.0	0.0	6.3	7.4	0.0	2.0
Observations	10	8	13	9	31	16	27	38	152

(Continued)

Table 34 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

All Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)									
Dewatering									
Mechanical dewatering	0.0	0.0	0.7	8.8	5.7	2.9	16.8	0.0	2.1
Non-mechanical dewatering	2.4	3.0	31.3	26.3	10.9	13.7	36.2	46.0	14.3
Disposal									
Land application	10.4	8.7	17.4	7.0	4.5	11.3	26.1	0.0	10.8
On-site storage	27.1	3.2	37.3	33.3	9.4	61.7	32.7	2.8	22.1
Deep well injection	0.0	0.0	0.0	7.0	2.1	5.8	10.7	0.0	1.3
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	4.2	3.4	0.0	1.0
Non-hazardous waste landfill	5.3	0.0	2.6	10.0	17.9	4.2	15.5	0.0	7.5
Direct discharge to surface water	2.6	20.5	18.4	40.0	17.9	20.8	24.1	13.5	18.8
Septic system	13.2	7.7	2.6	10.0	0.0	8.3	1.7	0.0	4.8
Sanitary Sewer	10.5	20.5	39.5	25.0	61.5	37.5	39.7	32.4	34.1
Recycle filter backwash	0.0	0.0	2.6	25.0	17.9	58.3	34.5	21.6	18.8
Observations	38	39	38	20	39	24	58	37	293
Treatment Scheme: Direct filtration									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	27.4	0.0	11.1	25.5	18.2	8.5
Non-mechanical dewatering	0.0	42.2	26.6	60.8	79.2	70.4	58.8	54.5	56.8
Disposal									
Land application	100.0	16.2	5.0	5.6	25.5	23.7	28.7	9.1	16.7
On-site storage	0.0	52.6	68.5	66.6	36.5	32.5	43.2	9.1	50.5
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.8
Non-hazardous waste landfill	0.0	0.0	14.3	26.7	28.6	45.0	37.5	36.4	29.4
Direct discharge to surface water	0.0	10.0	14.3	40.0	28.6	35.0	28.1	18.2	26.2
Septic system	0.0	20.0	0.0	20.0	4.8	0.0	6.3	0.0	6.3
Sanitary Sewer	0.0	10.0	50.0	13.3	28.6	30.0	34.4	0.0	26.2
Recycle filter backwash	0.0	0.0	35.7	40.0	38.1	60.0	65.6	81.8	48.4
Observations	3	10	14	15	21	20	32	11	126
Treatment Scheme: Conventional filtration (with and without softening)									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	4.7	15.0	23.9	29.8	33.3	11.5
Non-mechanical dewatering	14.5	38.8	57.3	48.6	64.5	55.2	61.1	44.5	54.6
Disposal									
Land application	14.5	8.6	32.8	22.1	42.6	36.6	32.1	18.0	29.8
On-site storage	14.5	69.5	60.8	50.1	41.9	45.9	33.8	27.9	48.3
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	3.0	0.0	7.2	5.7	1.9	3.4	3.2
Non-hazardous waste landfill	20.0	10.5	9.1	18.4	20.3	26.4	46.3	40.9	32.1
Direct discharge to surface water	0.0	21.1	30.3	36.7	36.2	35.8	22.5	26.1	28.4
Septic system	20.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.4
Sanitary Sewer	20.0	42.1	30.3	20.4	23.2	22.6	21.9	33.0	25.4
Recycle filter backwash	20.0	0.0	27.3	38.8	34.8	47.2	58.1	70.5	48.9
Observations	5	19	33	49	69	53	160	88	476

(Continued)

Table 34 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source

All Water Plant Treatment Schemes and Residual Management Practice	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Treatment Scheme: Membranes									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	0.4
Non-mechanical dewatering	0.0	4.9	53.5	33.3	100.0	31.3	19.6	20.6	32.5
Disposal									
Land application	0.0	0.0	40.8	0.0	100.0	31.3	19.6	20.6	22.5
On-site storage	0.0	9.5	68.2	0.0	100.0	31.3	19.6	0.0	37.4
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	19.6	0.0	0.4
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	2.7
Direct discharge to surface water	0.0	33.3	30.0	33.3	0.0	40.0	40.0	0.0	27.0
Septic system	0.0	16.7	10.0	0.0	0.0	0.0	0.0	0.0	5.4
Sanitary Sewer	50.0	0.0	60.0	66.7	0.0	0.0	20.0	60.0	35.1
Recycle filter backwash	0.0	16.7	0.0	66.7	100.0	40.0	20.0	40.0	24.3
Observations	2	6	10	3	1	5	5	5	37
Treatment Scheme: Other Treatment									
Dewatering									
Mechanical dewatering	0.0	0.0	0.0	*	50.0	66.7	3.8	0.0	1.6
Non-mechanical dewatering	0.0	0.0	0.0	*	50.0	0.0	0.0	0.0	0.5
Disposal									
Land application	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	*	50.0	0.0	0.0	0.0	0.5
Deep well injection	0.0	0.0	0.0	*	0.0	0.0	3.5	0.0	0.2
Hazardous waste landfill	0.0	0.0	0.0	*	0.0	66.7	0.0	0.0	3.5
Non-hazardous waste landfill	0.0	0.0	0.0	*	0.0	0.0	25.9	0.0	12.3
Direct discharge to surface water	100.0	0.0	0.0	*	0.0	0.0	14.8	0.0	8.8
Septic system	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	16.7	0.0	*	50.0	0.0	25.9	0.0	15.8
Recycle filter backwash	0.0	0.0	0.0	*	50.0	0.0	3.7	0.0	3.5
Observations	1	6	3	*	2	3	27	15	57

Data: Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 35
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Surface Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Disinfection with no additional treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.0	100.0	0.6
Disposal							
Land application	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Direct discharge to surface water	0.0	16.7	33.3	11.1	0.0	0.0	9.7
Septic system	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recycle filter backwash	0.0	16.7	0.0	0.0	0.0	0.0	3.2
Observations	11	6	3	9	1	1	31
Treatment Scheme: Disinfection, Other Chemical Addition							
Dewatering							
Mechanical dewatering	*	0.0	0.0	0.0	29.5	0.0	3.4
Non-mechanical dewatering	*	0.0	14.5	28.4	50.6	25.0	21.2
Disposal							
Land application	*	0.0	0.0	3.9	41.0	0.0	5.5
On-site storage	*	0.0	14.4	0.0	32.7	0.0	13.0
Deep well injection	*	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	0.0	25.0	2.5
Non-hazardous waste landfill	*	0.0	12.5	9.1	18.8	25.0	15.0
Direct discharge to surface water	*	0.0	12.5	0.0	18.8	0.0	10.0
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	*	0.0	12.5	18.2	18.8	0.0	15.0
Recycle filter backwash	*	100.0	12.5	9.1	43.8	0.0	25.0
Observations	*	1	8	11	16	4	40
Treatment Scheme: Ion exchange, activated alumina, aeration							
Dewatering							
Mechanical dewatering	*	*	0.0	88.0	*	*	46.0
Non-mechanical dewatering	*	*	0.0	0.0	*	*	0.0
Disposal							
Land application	*	*	0.0	88.0	*	*	46.0
On-site storage	*	*	0.0	88.0	*	*	46.0
Deep well injection	*	*	0.0	0.0	*	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Non-hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Direct discharge to surface water	*	*	0.0	50.0	*	*	33.3
Septic system	*	*	0.0	0.0	*	*	0.0
Sanitary Sewer	*	*	0.0	0.0	*	*	0.0
Recycle filter backwash	*	*	0.0	0.0	*	*	0.0
Observations	*	*	1	2	*	*	3

(Continued)

Table 35 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Surface Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)							
Dewatering							
Mechanical dewatering	0.0	0.7	0.0	17.7	40.0	*	2.5
Non-mechanical dewatering	17.3	59.0	20.6	34.3	40.0	*	35.4
Disposal							
Land application	14.5	18.0	34.5	31.9	40.0	*	25.3
On-site storage	14.5	64.0	12.4	32.4	0.0	*	33.0
Deep well injection	0.0	0.0	0.0	14.7	0.0	*	1.5
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	3.8	3.7	5.6	22.2	20.0	*	7.1
Direct discharge to surface water	11.5	18.5	33.3	33.3	60.0	*	23.5
Septic system	0.0	3.7	5.6	0.0	0.0	*	2.4
Sanitary Sewer	7.7	7.4	22.2	22.2	20.0	*	12.9
Recycle filter backwash	0.0	3.7	22.2	33.3	60.0	*	12.9
Observations	26	27	18	9	5	*	85
Treatment Scheme: Direct filtration							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	5.9	22.4	0.0	3.7
Non-mechanical dewatering	60.9	39.6	45.5	72.6	67.0	66.7	57.6
Disposal							
Land application	6.4	27.7	9.4	19.5	23.1	0.0	16.1
On-site storage	0.0	53.0	56.0	57.6	28.4	0.0	50.0
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	2.5	0.0	0.0	1.0
Non-hazardous waste landfill	25.0	0.0	13.6	37.5	36.0	66.7	28.8
Direct discharge to surface water	0.0	0.0	27.3	32.5	28.0	0.0	25.0
Septic system	50.0	0.0	9.1	2.5	0.0	0.0	4.8
Sanitary Sewer	0.0	20.0	27.3	37.5	12.0	0.0	25.0
Recycle filter backwash	25.0	10.0	36.4	55.0	72.0	100.0	51.0
Observations	4	10	22	40	25	3	104
Treatment Scheme: Conventional filtration (with and without softening)							
Dewatering							
Mechanical dewatering	0.0	0.0	5.9	13.0	34.8	36.4	13.5
Non-mechanical dewatering	39.0	68.1	55.7	58.6	55.1	18.2	57.5
Disposal							
Land application	16.6	29.1	31.0	35.1	25.4	0.0	31.2
On-site storage	33.0	48.5	65.8	44.4	28.0	18.2	47.6
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	1.9	3.4	4.5	0.0	3.3
Non-hazardous waste landfill	12.5	16.7	21.2	26.9	42.5	36.4	32.2
Direct discharge to surface water	12.5	29.2	25.0	34.5	26.8	27.3	29.1
Septic system	12.5	0.0	0.0	0.7	0.0	0.0	0.5
Sanitary Sewer	37.5	25.0	25.0	20.7	29.6	36.4	26.0
Recycle filter backwash	12.5	8.3	36.5	40.0	63.7	63.6	48.0
Observations	8	24	52	145	179	11	419

(Continued)

Table 35 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Surface Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Surface Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Membranes							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	0.0	31.2	*	0.8
Non-mechanical dewatering	0.0	9.1	50.2	17.6	68.8	*	26.7
Disposal							
Land application	0.0	0.0	0.0	17.6	68.8	*	5.0
On-site storage	0.0	50.9	33.3	17.6	0.0	*	36.4
Deep well injection	0.0	0.0	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	12.5	0.0	0.0	0.0	*	4.0
Direct discharge to surface water	0.0	12.5	57.1	16.7	0.0	*	24.0
Septic system	0.0	12.5	0.0	0.0	0.0	*	4.0
Sanitary Sewer	0.0	25.0	42.9	50.0	33.3	*	36.0
Recycle filter backwash	0.0	12.5	14.3	50.0	100.0	*	32.0
Observations	1	8	7	6	3	*	25
Treatment Scheme: Other Treatment							
Dewatering							
Mechanical dewatering	*	*	0.0	*	*	*	0.0
Non-mechanical dewatering	*	*	0.0	*	*	*	0.0
Disposal							
Land application	*	*	0.0	*	*	*	0.0
On-site storage	*	*	0.0	*	*	*	0.0
Deep well injection	*	*	0.0	*	*	*	0.0
Hazardous waste landfill	*	*	0.0	*	*	*	0.0
Non-hazardous waste landfill	*	*	0.0	*	*	*	0.0
Direct discharge to surface water	*	*	0.0	*	*	*	0.0
Septic system	*	*	0.0	*	*	*	0.0
Sanitary Sewer	*	*	0.0	*	*	*	0.0
Recycle filter backwash	*	*	0.0	*	*	*	0.0
Observations	*	*	1	*	*	*	1

Data:

Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 36
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Ground Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Disinfection with no additional treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	2.8	0.0	*	0.1
Non-mechanical dewatering	0.0	0.0	0.0	0.0	22.5	*	0.0
Disposal							
Land application	0.0	0.0	0.1	0.0	0.0	*	0.0
On-site storage	0.0	1.1	9.3	10.6	0.0	*	2.8
Deep well injection	0.0	0.5	2.7	0.0	0.0	*	0.8
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	20.0	*	0.1
Direct discharge to surface water	0.0	0.0	2.9	1.4	0.0	*	1.5
Septic system	3.9	0.0	0.4	0.9	0.0	*	0.7
Sanitary Sewer	0.0	0.6	2.5	0.5	20.0	*	1.3
Recycle filter backwash	0.0	0.0	0.0	0.5	0.0	*	0.1
Observations	51	158	239	216	5	*	669
Treatment Scheme: Disinfection, Other Chemical Addition							
Dewatering							
Mechanical dewatering	0.0	3.6	0.2	0.0	27.4	*	1.4
Non-mechanical dewatering	0.0	0.0	0.2	0.2	27.4	*	0.1
Disposal							
Land application	0.0	0.0	0.8	1.8	0.0	*	0.4
On-site storage	0.0	0.0	2.5	13.2	0.0	*	2.0
Deep well injection	0.0	0.0	1.2	0.7	0.0	*	0.6
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.5	0.0	*	0.1
Direct discharge to surface water	0.0	0.0	4.0	3.1	0.0	*	2.9
Septic system	0.0	0.0	0.3	0.5	50.0	*	0.4
Sanitary Sewer	3.1	0.0	3.7	2.1	0.0	*	2.6
Recycle filter backwash	3.1	0.9	0.0	0.0	0.0	*	0.3
Observations	32	115	349	191	2	*	689
Treatment Scheme: Ion exchange, activated alumina, aeration							
Dewatering							
Mechanical dewatering	15.3	0.0	0.0	0.0	0.0	*	5.7
Non-mechanical dewatering	0.0	17.9	0.0	0.0	0.0	*	3.9
Disposal							
Land application	37.5	0.0	0.0	0.4	0.0	*	13.9
On-site storage	15.9	17.9	10.6	0.4	11.3	*	12.9
Deep well injection	0.0	0.0	0.0	17.2	0.0	*	2.2
Hazardous waste landfill	0.0	0.0	0.0	1.6	0.0	*	0.7
Non-hazardous waste landfill	7.7	0.0	2.3	7.9	0.0	*	5.0
Direct discharge to surface water	0.0	0.0	2.3	11.1	0.0	*	5.7
Septic system	23.1	0.0	0.0	0.0	0.0	*	2.1
Sanitary Sewer	23.1	6.3	7.0	9.5	0.0	*	9.2
Recycle filter backwash	0.0	0.0	0.0	3.2	16.7	*	2.1
Observations	13	16	43	63	6	*	141

(Continued)

Table 36 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Ground Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)							
Dewatering							
Mechanical dewatering	0.0	0.0	3.8	13.8	9.1	*	1.9
Non-mechanical dewatering	0.0	12.1	28.8	16.9	8.1	*	12.2
Disposal							
Land application	7.0	10.7	10.0	11.5	7.0	*	9.3
On-site storage	18.8	12.0	37.9	10.0	71.9	*	21.6
Deep well injection	0.0	0.0	3.9	5.0	6.3	*	1.3
Hazardous waste landfill	0.0	0.0	1.6	1.7	3.7	*	1.6
Non-hazardous waste landfill	6.3	3.6	9.5	8.6	7.4	*	7.8
Direct discharge to surface water	0.0	14.3	9.5	22.4	29.6	*	16.1
Septic system	37.5	0.0	3.2	1.7	7.4	*	5.7
Sanitary Sewer	25.0	57.1	50.8	36.2	44.4	*	44.3
Recycle filter backwash	6.3	0.0	15.9	24.1	63.0	*	21.9
Observations	16	28	63	58	27	*	192
Treatment Scheme: Direct filtration							
Dewatering							
Mechanical dewatering	*	*	27.7	2.1	100.0	*	20.5
Non-mechanical dewatering	*	*	36.6	84.0	0.0	*	52.6
Disposal							
Land application	*	*	8.0	14.0	100.0	*	12.5
On-site storage	*	*	80.6	8.9	100.0	*	55.5
Deep well injection	*	*	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	*	*	16.7	44.4	50.0	*	35.3
Direct discharge to surface water	*	*	0.0	55.6	0.0	*	29.4
Septic system	*	*	16.7	11.1	50.0	*	17.6
Sanitary Sewer	*	*	33.3	44.4	50.0	*	41.2
Recycle filter backwash	*	*	33.3	22.2	100.0	*	35.3
Observations	*	*	6	9	2	*	17
Treatment Scheme: Conventional filtration (with and without softening)							
Dewatering							
Mechanical dewatering	*	0.0	0.0	66.6	15.5	0.0	4.5
Non-mechanical dewatering	*	39.7	17.8	60.4	65.6	100.0	31.3
Disposal							
Land application	*	39.7	0.0	80.2	34.4	0.0	21.0
On-site storage	*	100.0	35.5	60.4	84.5	50.0	63.6
Deep well injection	*	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	*	0.0	0.0	40.0	44.4	100.0	35.7
Direct discharge to surface water	*	0.0	20.0	0.0	44.4	0.0	17.9
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	*	50.0	60.0	0.0	0.0	50.0	17.9
Recycle filter backwash	*	0.0	20.0	60.0	44.4	100.0	46.4
Observations	*	2	5	10	9	2	28

(Continued)

Table 36 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Ground Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Ground Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Membranes							
Dewatering							
Mechanical dewatering	0.0	*	0.0	0.0	*	*	0.0
Non-mechanical dewatering	0.0	*	97.3	0.0	*	*	37.0
Disposal							
Land application	0.0	*	97.3	0.0	*	*	37.0
On-site storage	0.0	*	97.3	17.7	*	*	37.9
Deep well injection	0.0	*	0.0	17.7	*	*	0.9
Hazardous waste landfill	0.0	*	0.0	0.0	*	*	0.0
Non-hazardous waste landfill	0.0	*	0.0	0.0	*	*	0.0
Direct discharge to surface water	0.0	*	0.0	75.0	*	*	37.5
Septic system	50.0	*	0.0	0.0	*	*	12.5
Sanitary Sewer	0.0	*	50.0	0.0	*	*	12.5
Recycle filter backwash	0.0	*	0.0	0.0	*	*	0.0
Observations	2	*	2	4	*	*	8
Treatment Scheme: Other Treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	20.4	39.3	100.0	1.6
Non-mechanical dewatering	0.0	0.0	0.0	8.4	0.0	0.0	0.5
Disposal							
Land application	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	8.4	0.0	0.0	0.5
Deep well injection	0.0	0.0	0.0	3.2	0.0	0.0	0.2
Hazardous waste landfill	0.0	0.0	0.0	3.6	20.0	100.0	4.0
Non-hazardous waste landfill	0.0	0.0	12.5	21.4	0.0	0.0	14.0
Direct discharge to surface water	33.3	0.0	0.0	7.1	40.0	0.0	10.0
Septic system	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	16.7	25.0	17.9	20.0	0.0	18.0
Recycle filter backwash	0.0	0.0	0.0	7.1	0.0	0.0	4.0
Observations	3	6	8	28	5	1	50

Data:

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Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 37
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Mixed Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Disinfection with no additional treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-mechanical dewatering	0.0	0.0	0.0	0.0	0.0	*	0.0
Disposal							
Land application	0.0	0.0	0.0	0.0	0.0	*	0.0
On-site storage	0.0	0.0	0.0	0.0	0.0	*	0.0
Deep well injection	0.0	0.0	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Direct discharge to surface water	0.0	0.0	0.0	0.0	0.0	*	0.0
Septic system	0.0	0.0	0.0	0.0	0.0	*	0.0
Sanitary Sewer	0.0	0.0	0.0	0.0	0.0	*	0.0
Recycle filter backwash	0.0	0.0	0.0	0.0	0.0	*	0.0
Observations	2	3	4	1	1	*	11
Treatment Scheme: Disinfection, Other Chemical Addition							
Dewatering							
Mechanical dewatering	*	*	0.0	73.6	0.0	*	17.0
Non-mechanical dewatering	*	*	0.0	0.0	32.4	*	2.8
Disposal							
Land application	*	*	0.0	0.0	0.0	*	0.0
On-site storage	*	*	0.0	0.0	0.0	*	0.0
Deep well injection	*	*	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	*	*	0.0	33.3	33.3	*	25.0
Direct discharge to surface water	*	*	50.0	0.0	33.3	*	25.0
Septic system	*	*	0.0	0.0	0.0	*	0.0
Sanitary Sewer	*	*	0.0	33.3	0.0	*	12.5
Recycle filter backwash	*	*	0.0	33.3	0.0	*	12.5
Observations	*	*	2	3	3	*	8
Treatment Scheme: Ion exchange, activated alumina, aeration							
Dewatering							
Mechanical dewatering	*	*	0.0	0.0	*	*	0.0
Non-mechanical dewatering	*	*	0.0	0.0	*	*	0.0
Disposal							
Land application	*	*	0.0	0.0	*	*	0.0
On-site storage	*	*	0.0	0.0	*	*	0.0
Deep well injection	*	*	0.0	0.0	*	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Non-hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Direct discharge to surface water	*	*	0.0	0.0	*	*	0.0
Septic system	*	*	0.0	0.0	*	*	0.0
Sanitary Sewer	*	*	0.0	0.0	*	*	0.0
Recycle filter backwash	*	*	0.0	0.0	*	*	0.0
Observations	*	*	2	1	*	*	3

(Continued)

Table 37 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Mixed Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Other filtration (not direct or conventional)							
Dewatering							
Mechanical dewatering	0.0	0.0	*	0.0	47.9	*	5.9
Non-mechanical dewatering	0.0	27.3	*	100.0	52.1	*	34.7
Disposal							
Land application	0.0	45.4	*	100.0	52.1	*	49.5
On-site storage	0.0	72.7	*	100.0	47.9	*	71.2
Deep well injection	0.0	0.0	*	0.0	0.0	*	0.0
Hazardous waste landfill	0.0	0.0	*	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	0.0	*	0.0	50.0	*	16.7
Direct discharge to surface water	0.0	33.3	*	0.0	0.0	*	16.7
Septic system	0.0	0.0	*	0.0	0.0	*	0.0
Sanitary Sewer	0.0	0.0	*	0.0	50.0	*	16.7
Recycle filter backwash	0.0	0.0	*	100.0	50.0	*	33.3
Observations	1	3	*	1	2	*	6
Treatment Scheme: Direct filtration							
Dewatering							
Mechanical dewatering	*	0.0	*	16.1	*	*	12.8
Non-mechanical dewatering	*	100.0	*	83.9	*	*	87.2
Disposal							
Land application	*	0.0	*	83.9	*	*	66.6
On-site storage	*	0.0	*	41.9	*	*	33.3
Deep well injection	*	0.0	*	0.0	*	*	0.0
Hazardous waste landfill	*	0.0	*	0.0	*	*	0.0
Non-hazardous waste landfill	*	0.0	*	33.3	*	*	25.0
Direct discharge to surface water	*	100.0	*	33.3	*	*	50.0
Septic system	*	0.0	*	0.0	*	*	0.0
Sanitary Sewer	*	0.0	*	0.0	*	*	0.0
Recycle filter backwash	*	0.0	*	66.7	*	*	50.0
Observations	*	1	*	3	*	*	4
Treatment Scheme: Conventional filtration (with and without softening)							
Dewatering							
Mechanical dewatering	*	0.0	0.0	10.0	40.9	*	8.4
Non-mechanical dewatering	*	100.0	68.5	82.3	89.8	*	78.6
Disposal							
Land application	*	0.0	36.9	40.3	53.1	*	38.7
On-site storage	*	0.0	31.5	20.4	36.7	*	24.8
Deep well injection	*	0.0	0.0	0.0	0.0	*	0.0
Hazardous waste landfill	*	0.0	0.0	0.0	14.3	*	4.3
Non-hazardous waste landfill	*	0.0	0.0	33.3	28.6	*	21.7
Direct discharge to surface water	*	0.0	50.0	33.3	0.0	*	26.1
Septic system	*	0.0	0.0	0.0	0.0	*	0.0
Sanitary Sewer	*	100.0	16.7	44.4	14.3	*	30.4
Recycle filter backwash	*	0.0	33.3	77.8	100.0	*	69.6
Observations	*	1	6	9	7	*	23

(Continued)

Table 37 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of Mixed Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

Mixed Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Treatment Scheme: Membranes							
Dewatering							
Mechanical dewatering	*	*	0.0	0.0	*	*	0.0
Non-mechanical dewatering	*	*	0.0	88.5	*	*	70.9
Disposal							
Land application	*	*	0.0	88.5	*	*	70.9
On-site storage	*	*	0.0	88.5	*	*	70.9
Deep well injection	*	*	0.0	0.0	*	*	0.0
Hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Non-hazardous waste landfill	*	*	0.0	0.0	*	*	0.0
Direct discharge to surface water	*	*	0.0	0.0	*	*	0.0
Septic system	*	*	0.0	0.0	*	*	0.0
Sanitary Sewer	*	*	100.0	50.0	*	*	66.7
Recycle filter backwash	*	*	0.0	50.0	*	*	33.3
Observations	*	*	1	2	*	*	3
Treatment Scheme: Other Treatment							
Dewatering							
Mechanical dewatering	*	0.0	*	*	*	*	0.0
Non-mechanical dewatering	*	0.0	*	*	*	*	0.0
Disposal							
Land application	*	0.0	*	*	*	*	0.0
On-site storage	*	0.0	*	*	*	*	0.0
Deep well injection	*	0.0	*	*	*	*	0.0
Hazardous waste landfill	*	0.0	*	*	*	*	0.0
Non-hazardous waste landfill	*	0.0	*	*	*	*	0.0
Direct discharge to surface water	*	0.0	*	*	*	*	0.0
Septic system	*	0.0	*	*	*	*	0.0
Sanitary Sewer	*	0.0	*	*	*	*	0.0
Recycle filter backwash	*	0.0	*	*	*	*	0.0
Observations	*	1	*	*	*	*	1

Data:

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Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 38
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

All Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						All Sizes
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	
Treatment Scheme: Disinfection with no additional treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	2.7	0.0	0.0	0.1
Non-mechanical dewatering	0.0	0.0	0.0	0.0	12.8	100.0	0.0
Disposal							
Land application	0.0	0.0	0.1	0.0	0.0	0.0	0.0
On-site storage	0.0	1.0	8.7	10.1	0.0	0.0	2.7
Deep well injection	0.0	0.5	2.6	0.0	0.0	0.0	0.7
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-hazardous waste landfill	0.0	0.0	0.0	0.0	14.3	0.0	0.1
Direct discharge to surface water	0.0	0.6	3.3	1.8	0.0	0.0	1.8
Septic system	3.1	0.0	0.4	0.9	0.0	0.0	0.7
Sanitary Sewer	0.0	0.6	2.4	0.4	14.3	0.0	1.3
Recycle filter backwash	0.0	0.6	0.0	0.4	0.0	0.0	0.3
Observations	64	167	246	226	7	1	711
Treatment Scheme: Disinfection, Other Chemical Addition							
Dewatering							
Mechanical dewatering	0.0	3.6	0.2	1.6	25.1	0.0	1.5
Non-mechanical dewatering	0.0	0.0	0.8	2.1	44.3	25.0	0.7
Disposal							
Land application	0.0	0.0	0.7	1.9	28.8	0.0	0.6
On-site storage	0.0	0.0	3.0	12.1	22.9	0.0	2.3
Deep well injection	0.0	0.0	1.2	0.7	0.0	0.0	0.5
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	25.0	0.1
Non-hazardous waste landfill	0.0	0.0	0.3	1.5	19.0	25.0	1.2
Direct discharge to surface water	0.0	0.0	4.5	2.9	19.0	0.0	3.5
Septic system	0.0	0.0	0.3	0.5	4.8	0.0	0.4
Sanitary Sewer	3.1	0.0	3.9	3.4	14.3	0.0	3.4
Recycle filter backwash	3.1	1.7	0.3	1.0	33.3	0.0	1.8
Observations	32	116	359	205	21	4	737
Treatment Scheme: Ion exchange, activated alumina, aeration							
Dewatering							
Mechanical dewatering	15.3	0.0	0.0	2.1	0.0	*	5.8
Non-mechanical dewatering	0.0	17.9	0.0	0.0	0.0	*	3.8
Disposal							
Land application	37.5	0.0	0.0	2.4	0.0	*	13.8
On-site storage	15.9	17.9	9.8	2.4	11.3	*	12.8
Deep well injection	0.0	0.0	0.0	16.6	0.0	*	2.1
Hazardous waste landfill	0.0	0.0	0.0	1.5	0.0	*	0.7
Non-hazardous waste landfill	7.7	0.0	2.2	7.6	0.0	*	4.8
Direct discharge to surface water	0.0	0.0	2.2	12.1	0.0	*	6.1
Septic system	23.1	0.0	0.0	0.0	0.0	*	2.0
Sanitary Sewer	23.1	6.3	6.5	9.1	0.0	*	8.8
Recycle filter backwash	0.0	0.0	0.0	3.0	16.7	*	2.0
Observations	13	16	46	66	6	*	147

(Continued)

Table 38 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

All Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						All Sizes
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	
Treatment Scheme: Other filtration (not direct or conventional)							
Dewatering							
Mechanical dewatering	0.0	0.1	3.1	14.5	11.9	*	2.0
Non-mechanical dewatering	1.1	17.8	27.3	20.7	11.1	*	15.1
Disposal							
Land application	7.5	12.0	14.6	15.9	10.1	*	11.5
On-site storage	18.5	18.9	33.2	14.8	67.0	*	23.2
Deep well injection	0.0	0.0	3.1	6.9	5.8	*	1.3
Hazardous waste landfill	0.0	0.0	1.2	1.5	2.9	*	1.1
Non-hazardous waste landfill	4.8	3.4	8.6	10.3	11.8	*	7.8
Direct discharge to surface water	7.1	17.2	14.8	23.5	32.4	*	18.4
Septic system	14.3	1.7	3.7	1.5	5.9	*	4.6
Sanitary Sewer	14.3	31.0	44.4	33.8	41.2	*	34.3
Recycle filter backwash	2.4	1.7	17.3	26.5	61.8	*	19.4
Observations	42	58	81	68	34	*	283
Treatment Scheme: Direct filtration							
Dewatering							
Mechanical dewatering	0.0	0.0	11.1	5.7	32.4	0.0	8.5
Non-mechanical dewatering	60.9	44.1	41.9	76.3	58.4	66.7	57.3
Disposal							
Land application	6.4	25.6	8.8	22.6	33.0	0.0	16.9
On-site storage	0.0	49.1	65.8	44.4	37.6	0.0	50.9
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	0.0	1.9	0.0	0.0	0.8
Non-hazardous waste landfill	25.0	0.0	14.3	38.5	37.0	66.7	29.6
Direct discharge to surface water	0.0	9.1	21.4	36.5	25.9	0.0	26.4
Septic system	50.0	0.0	10.7	3.8	3.7	0.0	6.4
Sanitary Sewer	0.0	18.2	28.6	36.5	14.8	0.0	26.4
Recycle filter backwash	25.0	9.1	35.7	50.0	74.1	100.0	48.8
Observations	4	11	28	52	27	3	125
Treatment Scheme: Conventional filtration (with and without softening)							
Dewatering							
Mechanical dewatering	0.0	0.0	3.8	14.0	33.8	31.0	11.5
Non-mechanical dewatering	39.0	55.3	46.3	61.1	57.0	30.2	54.5
Disposal							
Land application	16.6	33.6	22.9	36.7	27.0	0.0	30.0
On-site storage	33.0	71.8	54.7	42.4	31.9	22.9	48.7
Deep well injection	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous waste landfill	0.0	0.0	1.6	3.0	4.6	0.0	3.2
Non-hazardous waste landfill	12.5	14.8	17.5	28.0	42.1	46.2	31.9
Direct discharge to surface water	12.5	25.9	27.0	32.3	26.7	23.1	28.3
Septic system	12.5	0.0	0.0	0.6	0.0	0.0	0.4
Sanitary Sewer	37.5	29.6	27.0	20.7	27.7	38.5	25.7
Recycle filter backwash	12.5	7.4	34.9	43.3	64.1	69.2	48.9
Observations	8	27	63	164	195	13	470

(Continued)

Table 38 (Cont.)
Residual Management Practices For Each Treatment Scheme
Percentage of All Water Plants Using Each Residual Management Practice by Treatment Scheme
By Water Source and Plant Average Daily Production

All Water Plant Treatment Schemes and Residual Management Practice	Plant Average Daily Production (MGD)						All Sizes
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	
Treatment Scheme: Membranes							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	0.0	31.2	*	0.4
Non-mechanical dewatering	0.0	9.1	73.3	29.9	68.8	*	33.4
Disposal							
Land application	0.0	0.0	49.9	29.9	68.8	*	23.2
On-site storage	0.0	50.9	65.4	33.0	0.0	*	38.5
Deep well injection	0.0	0.0	0.0	3.2	0.0	*	0.5
Hazardous waste landfill	0.0	0.0	0.0	0.0	0.0	*	0.0
Non-hazardous waste landfill	0.0	12.5	0.0	0.0	0.0	*	2.8
Direct discharge to surface water	0.0	12.5	40.0	33.3	0.0	*	25.0
Septic system	33.3	12.5	0.0	0.0	0.0	*	5.6
Sanitary Sewer	0.0	25.0	50.0	33.3	33.3	*	33.3
Recycle filter backwash	0.0	12.5	10.0	33.3	100.0	*	25.0
Observations	3	8	10	12	3	*	36
Treatment Scheme: Other Treatment							
Dewatering							
Mechanical dewatering	0.0	0.0	0.0	20.4	39.3	100.0	1.6
Non-mechanical dewatering	0.0	0.0	0.0	8.4	0.0	0.0	0.5
Disposal							
Land application	0.0	0.0	0.0	0.0	0.0	0.0	0.0
On-site storage	0.0	0.0	0.0	8.4	0.0	0.0	0.5
Deep well injection	0.0	0.0	0.0	3.2	0.0	0.0	0.2
Hazardous waste landfill	0.0	0.0	0.0	3.6	20.0	100.0	3.8
Non-hazardous waste landfill	0.0	0.0	11.1	21.4	0.0	0.0	13.5
Direct discharge to surface water	33.3	0.0	0.0	7.1	40.0	0.0	9.6
Septic system	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary Sewer	0.0	14.3	22.2	17.9	20.0	0.0	17.3
Recycle filter backwash	0.0	0.0	0.0	7.1	0.0	0.0	3.8
Observations	3	7	9	28	5	1	52

Data:

Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

Table 39
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source and Treatment Scheme

Water Source and Treatment Scheme	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Ground Water Plants									
Treatment Scheme: Disinfection with no additional treatment									
Direct Discharge to Surface Water	*	*	0.7	1.0	1.0	0.0	0.7	0.0	0.7
Septic system	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary sewer	*	*	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Observations	*	*	3.0	3.0	4.0	2.0	3.0	49.0	64.0
Treatment Scheme: Other chemical addition									
Direct Discharge to Surface Water	*	*	*	*	1.0	*	0.7	*	0.8
Septic system	*	*	*	*	0.0	*	0.0	*	0.0
Sanitary sewer	*	*	*	*	0.0	*	0.0	*	0.0
Observations	*	*	*	*	1.0	*	27.0	*	28.0
Treatment Scheme: Ion exchange, activated alumina, aeration									
Direct Discharge to Surface Water	*	*	*	*	1.0	*	1.0	*	1.0
Septic system	*	*	*	*	0.0	*	0.0	*	0.0
Sanitary sewer	*	*	*	*	0.0	*	0.0	*	0.0
Observations	*	*	*	*	8.0	*	8.0	*	8.0
Treatment Scheme: Other filtration (not direct or conventional)									
Direct Discharge to Surface Water	*	1.0	1.0	0.7	1.0	0.2	0.9	1.0	0.8
Septic system	*	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Sanitary sewer	*	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Observations	*	1.0	3.0	5.0	5.0	9.0	11.0	5.0	39.0
Treatment Scheme: Direct filtration									
Direct Discharge to Surface Water	*	*	*	*	0.7	0.7	1.0	*	0.8
Septic system	*	*	*	*	0.0	0.0	0.3	*	0.0
Sanitary sewer	*	*	*	*	0.0	0.0	0.7	*	0.1
Observations	*	*	*	*	2.0	2.0	3.0	*	7.0
Treatment Scheme: Conventional filtration (with and without softening)									
Direct Discharge to Surface Water	*	*	1.0	*	*	1.0	1.0	1.0	1.0
Septic system	*	*	0.0	*	*	0.0	0.0	0.0	0.0
Sanitary sewer	*	*	0.0	*	*	0.0	0.0	0.0	0.0
Observations	*	*	1.0	*	*	1.0	2.0	1.0	5.0
Treatment Scheme: Membranes									
Direct Discharge to Surface Water	*	*	*	*	*	1.0	0.6	*	0.8
Septic system	*	*	*	*	*	0.0	0.0	*	0.0
Sanitary sewer	*	*	*	*	*	0.0	0.4	*	0.2
Observations	*	*	*	*	*	1.0	3.0	*	4.0
Treatment Scheme: Other									
Direct Discharge to Surface Water	1.0	*	*	*	*	0.0	0.5	*	0.9
Septic system	0.0	*	*	*	*	0.0	0.0	*	0.0
Sanitary sewer	0.0	*	*	*	*	0.0	0.1	*	0.0
Observations	1	*	*	*	*	2	8	*	11

(Continued)

Table 39 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source and Treatment Scheme

Water Source and Treatment Scheme	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Surface Water Plants									
Treatment Scheme: Disinfection with no additional treatment									
Direct Discharge to Surface Water	*	1.0	*	*	*	1.0	*	*	1.0
Septic system	*	0.0	*	*	*	0.0	*	*	0.0
Sanitary sewer	*	0.0	*	*	*	0.0	*	*	0.0
Observations	*	1.0	*	*	*	2.0	*	*	3.0
Treatment Scheme: Other chemical addition									
Direct Discharge to Surface Water	*	0.0	1.0	*	*	*	0.5	0.7	0.6
Septic system	*	0.0	0.0	*	*	*	0.0	0.0	0.0
Sanitary sewer	*	0.0	0.0	*	*	*	0.5	0.3	0.1
Observations	*	1.0	1.0	*	*	*	2.0	3.0	7.0
Treatment Scheme: Ion exchange, activated alumina, aeration									
Direct Discharge to Surface Water	*	*	*	*	1.0	*	*	*	1.0
Septic system	*	*	*	*	0.0	*	*	*	0.0
Sanitary sewer	*	*	*	*	0.0	*	*	*	0.0
Observations	*	*	*	*	1.0	*	*	*	1.0
Treatment Scheme: Other filtration (not direct or conventional)									
Direct Discharge to Surface Water	1.0	1.0	1.0	1.0	1.0	*	1.0	*	1.0
Septic system	0.0	0.0	0.0	0.0	0.0	*	0.0	*	0.0
Sanitary sewer	0.0	0.0	0.2	0.3	0.0	*	0.3	*	0.2
Observations	1.0	6.0	4.0	4.0	2.0	*	4.0	*	21.0
Treatment Scheme: Direct filtration									
Direct Discharge to Surface Water	*	*	1.0	0.9	1.0	1.0	0.8	1.0	0.9
Septic system	*	*	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Sanitary sewer	*	*	0.0	0.0	0.0	0.2	0.3	0.0	0.0
Observations	*	*	2.0	7.0	5.0	5.0	9.0	2.0	30.0
Treatment Scheme: Conventional filtration (with and without softening)									
Direct Discharge to Surface Water	*	0.8	0.7	0.8	1.0	0.9	1.0	0.7	0.8
Septic system	*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Sanitary sewer	*	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.1
Observations	*	5.0	10.0	20.0	25.0	19.0	35.0	31.0	145.0
Treatment Scheme: Membranes									
Direct Discharge to Surface Water	*	1.0	1.0	1.0	*	1.0	1.0	*	1.0
Septic system	*	0.0	0.0	0.0	*	0.0	0.0	*	0.0
Sanitary sewer	*	0.0	0.7	0.0	*	0.0	0.0	*	0.4
Observations	*	2.0	3.0	1.0	*	1.0	1.0	*	7.0
Treatment Scheme: Other									
Direct Discharge to Surface Water	*	*	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	*	*	

(Continued)

Table 39 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source and Treatment Scheme

Water Source and Treatment Scheme	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	
Mixed Plants									
Treatment Scheme: Disinfection with no additional treatment									
Direct Discharge to Surface Water	*	*	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	*	*	
Treatment Scheme: Other chemical addition									
Direct Discharge to Surface Water	*	*	*	*	1.0	*	1.0	*	1.0
Septic system	*	*	*	*	0.0	*	0.0	*	0.0
Sanitary sewer	*	*	*	*	0.0	*	0.0	*	0.0
Observations	*	*	*	*	1.0	*	1.0	*	2.0
Treatment Scheme: Ion exchange, activated alumina, aeration									
Direct Discharge to Surface Water	*	*	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	*	*	
Treatment Scheme: Other filtration (not direct or conventional)									
Direct Discharge to Surface Water	*	1.0	*	*	*	*	*	*	1.0
Septic system	*	0.0	*	*	*	*	*	*	0.0
Sanitary sewer	*	0.0	*	*	*	*	*	*	0.0
Observations	*	1.0	*	*	*	*	*	*	1.0
Treatment Scheme: Direct filtration									
Direct Discharge to Surface Water	*	1.0	*	*	*	1.0	*	*	1.0
Septic system	*	0.0	*	*	*	0.0	*	*	0.0
Sanitary sewer	*	0.0	*	*	*	0.0	*	*	0.0
Observations	*	1.0	*	*	*	1.0	*	*	2.0
Treatment Scheme: Conventional filtration (with and without softening)									
Direct Discharge to Surface Water	*	*	0.7	1.0	0.7	*	*	0.0	0.9
Septic system	*	*	0.0	0.0	0.0	*	*	0.0	0.0
Sanitary sewer	*	*	0.3	0.7	0.3	*	*	0.0	0.5
Observations	*	*	3.0	3.0	2.0	*	*	1.0	9.0
Treatment Scheme: Membranes									
Direct Discharge to Surface Water	*	*	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	*	*	
Treatment Scheme: Other									
Direct Discharge to Surface Water	*	*	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	*	*	

(Continued)

Table 39 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source and Treatment Scheme

Water Source and Treatment Scheme	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Plants									
Treatment Scheme: Disinfection with no additional treatment									
Direct Discharge to Surface Water	*	1.0	0.7	1.0	1.0	0.7	0.7	0.0	0.7
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary sewer	*	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Observations	*	1.0	3.0	3.0	4.0	4.0	3.0	49.0	67.0
Treatment Scheme: Other chemical addition									
Direct Discharge to Surface Water	*	0.0	1.0	*	1.0	*	0.7	0.7	0.8
Septic system	*	0.0	0.0	*	0.0	*	0.0	0.0	0.0
Sanitary sewer	*	0.0	0.0	*	0.0	*	0.0	0.3	0.0
Observations	*	1.0	1.0	*	2.0	*	32.0	3.0	39.0
Treatment Scheme: Ion exchange, activated alumina, aeration									
Direct Discharge to Surface Water	*	*	*	*	1.0	*	1.0	*	1.0
Septic system	*	*	*	*	0.0	*	0.0	*	0.0
Sanitary sewer	*	*	*	*	0.0	*	0.0	*	0.0
Observations	*	*	*	*	1.0	*	8.0	*	9.0
Treatment Scheme: Other filtration (not direct or conventional)									
Direct Discharge to Surface Water	1.0	1.0	1.0	0.8	1.0	0.2	0.9	1.0	0.8
Septic system	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1
Sanitary sewer	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Observations	1.0	8.0	7.0	9.0	7.0	9.0	15.0	5.0	61.0
Treatment Scheme: Direct filtration									
Direct Discharge to Surface Water	*	1.0	1.0	0.9	0.9	0.9	0.8	1.0	0.9
Septic system	*	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1
Sanitary sewer	*	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.1
Observations	*	1.0	2.0	7.0	7.0	8.0	12.0	2.0	39.0
Treatment Scheme: Conventional filtration (with and without softening)									
Direct Discharge to Surface Water	*	0.8	0.8	0.8	1.0	0.9	1.0	0.7	0.9
Septic system	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sanitary sewer	*	0.0	0.1	0.2	0.2	0.3	0.2	0.1	0.2
Observations	*	5.0	14.0	23.0	28.0	20.0	37.0	33.0	160.0
Treatment Scheme: Membranes									
Direct Discharge to Surface Water	*	1.0	1.0	1.0	*	1.0	0.6	*	1.0
Septic system	*	0.0	0.0	0.0	*	0.0	0.0	*	0.0
Sanitary sewer	*	0.0	0.7	0.0	*	0.0	0.4	*	0.3
Observations	*	2.0	3.0	1.0	*	2.0	3.0	*	11.0
Treatment Scheme: Other									
Direct Discharge to Surface Water	1.0	*	*	*	*	0.0	0.5	*	0.9
Septic system	0.0	*	*	*	*	0.0	0.0	*	0.0
Sanitary sewer	0.0	*	*	*	*	0.0	0.1	*	0.0
Observations	1	*	*	*	*	2	8	*	11

Data: Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

These are the systems with the option to discharge to surface water, septic systems, or sanitary sewers, and make use of these options.

Table 40
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source, Treatment Scheme, and Plant Average Daily Production

Water Source and Treatment Scheme	Plant Average Daily Production (MGD)						
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	All Sizes
Ground Water Plants							
Treatment Scheme: Disinfection with no additional treatment							
Direct Discharge to Surface Water	*	0.00	0.88	0.66	0.00	*	0.73
Septic system	*	0.00	0.00	0.00	0.00	*	0.00
Sanitary sewer	*	0.00	0.14	0.00	0.00	*	0.08
Observations	*	5	24	34	1	*	64
Treatment Scheme: Other chemical addition							
Direct Discharge to Surface Water	*	*	0.64	1.00	*	*	0.81
Septic system	*	*	0.00	0.00	*	*	0.00
Sanitary sewer	*	*	0.00	0.00	*	*	0.00
Observations	*	*	22	6	*	*	28
Treatment Scheme: Ion exchange, activated alumina, aeration							
Direct Discharge to Surface Water	*	*	1.00	1.00	*	*	1.00
Septic system	*	*	0.00	0.00	*	*	0.00
Sanitary sewer	*	*	0.00	0.00	*	*	0.00
Observations	*	*	1	7	*	*	8
Treatment Scheme: Other filtration (not direct or conventional)							
Direct Discharge to Surface Water	*	1.00	0.80	0.97	0.15	*	0.80
Septic system	*	0.00	0.20	0.08	0.00	*	0.07
Sanitary sewer	*	0.00	0.00	0.06	0.04	*	0.01
Observations	*	4	7	14	12	*	37
Treatment Scheme: Direct filtration							
Direct Discharge to Surface Water	*	*	0.00	1.00	*	*	0.76
Septic system	*	*	0.00	0.05	*	*	0.04
Sanitary sewer	*	*	0.00	0.09	*	*	0.07
Observations	*	*	2	5	*	*	7
Treatment Scheme: Conventional filtration (with and without softening)							
Direct Discharge to Surface Water	*	*	1.00	*	1.00	*	1.00
Septic system	*	*	0.00	*	0.00	*	0.00
Sanitary sewer	*	*	0.00	*	0.00	*	0.00
Observations	*	*	1	*	4	*	5
Treatment Scheme: Membranes							
Direct Discharge to Surface Water	*	*	0.00	1.00	*	*	0.81
Septic system	*	*	0.00	0.00	*	*	0.00
Sanitary sewer	*	*	1.00	0.00	*	*	0.19
Observations	*	*	1	3	*	*	4
Treatment Scheme: Other							
Direct Discharge to Surface Water	1.00	*	0.00	0.26	0.43	0.00	0.88
Septic system	0.00	*	0.00	0.00	0.00	0.00	0.00
Sanitary sewer	0.00	*	0.00	0.00	0.21	0.00	0.01
Observations	1	*	1	6	3	1	11

(Continued)

Table 40 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source, Treatment Scheme, and Plant Average Daily Production

Water Source and Treatment Scheme	Plant Average Daily Production (MGD)						
	0 -	0.01 -	0.1 -	1.0 -	10.0 -	Over	All Sizes
	0.01	0.1	1.0	10.0	100.0	100	
Surface Water Plants							
Treatment Scheme: Disinfection with no additional treatment							
Direct Discharge to Surface Water	*	1.00	1.00	1.00	*	*	1.00
Septic system	*	0.00	0.00	0.00	*	*	0.00
Sanitary sewer	*	0.00	0.00	0.00	*	*	0.00
Observations	*	1	1	1	*	*	3
Treatment Scheme: Other chemical addition							
Direct Discharge to Surface Water	*	0.00	1.00	*	0.59	*	0.61
Septic system	*	0.00	0.00	*	0.00	*	0.00
Sanitary sewer	*	0.00	0.00	*	0.41	*	0.13
Observations	*	1	1	*	5	*	7
Treatment Scheme: Ion exchange, activated alumina, aeration							
Direct Discharge to Surface Water	*	*	*	1.00	*	*	1.00
Septic system	*	*	*	0.00	*	*	0.00
Sanitary sewer	*	*	*	0.00	*	*	0.00
Observations	*	*	*	1	*	*	1
Treatment Scheme: Other filtration (not direct or conventional)							
Direct Discharge to Surface Water	1.00	1.00	1.00	1.00	1.00	*	1.00
Septic system	0.00	0.00	0.00	0.00	0.00	*	0.00
Sanitary sewer	0.00	0.07	0.16	0.34	0.00	*	0.17
Observations	3.0	5	6	3	3	*	20
Treatment Scheme: Direct filtration							
Direct Discharge to Surface Water	*	*	0.86	0.98	0.89	*	0.92
Septic system	*	*	0.14	0.00	0.00	*	0.06
Sanitary sewer	*	*	0.00	0.04	0.22	*	0.04
Observations	*	*	7	14	8	*	29
Treatment Scheme: Conventional filtration (with and without softening)							
Direct Discharge to Surface Water	1.00	0.91	0.68	0.93	0.83	0.50	0.84
Septic system	0.00	0.00	0.00	0.03	0.00	0.00	0.01
Sanitary sewer	0.00	0.00	0.05	0.19	0.20	0.17	0.13
Observations	1.0	8	19	52	57	6	143
Treatment Scheme: Membranes							
Direct Discharge to Surface Water	*	1.00	1.00	1.00	*	*	1.00
Septic system	*	0.00	0.00	0.00	*	*	0.00
Sanitary sewer	*	0.00	0.28	0.00	*	*	0.23
Observations	*	1	4	1	*	*	6
Treatment Scheme: Other							
Direct Discharge to Surface Water	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	

(Continued)

Table 40 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source, Treatment Scheme, and Plant Average Daily Production

Water Source and Treatment Scheme	Plant Average Daily Production (MGD)						
	0 -	0.01 -	0.1 -	1.0 -	10.0 -	Over	All Sizes
	0.01	0.1	1.0	10.0	100.0	100	
Mixed Plants							
Treatment Scheme: Disinfection with no additional treatment							
Direct Discharge to Surface Water	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	
Treatment Scheme: Other chemical addition							
Direct Discharge to Surface Water	*	*	1.00	*	1.00	*	1.00
Septic system	*	*	0.00	*	0.00	*	0.00
Sanitary sewer	*	*	0.00	*	0.00	*	0.00
Observations	*	*	1	*	1	*	2
Treatment Scheme: Ion exchange, activated alumina, aeration							
Direct Discharge to Surface Water	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	
Treatment Scheme: Other filtration (not direct or conventional)							
Direct Discharge to Surface Water	*	1.00	*	*	*	*	1.00
Septic system	*	0.00	*	*	*	*	0.00
Sanitary sewer	*	0.00	*	*	*	*	0.00
Observations	*	1	*	*	*	*	1
Treatment Scheme: Direct filtration							
Direct Discharge to Surface Water	*	1.00	*	1.00	*	*	1.00
Septic system	*	0.00	*	0.00	*	*	0.00
Sanitary sewer	*	0.00	*	0.00	*	*	0.00
Observations	*	1	*	1	*	*	2
Treatment Scheme: Conventional filtration (with and without softening)							
Direct Discharge to Surface Water	*	*	0.75	0.94	0.00	*	0.86
Septic system	*	*	0.00	0.00	0.00	*	0.00
Sanitary sewer	*	*	0.25	0.68	0.00	*	0.51
Observations	*	*	4	4	1	*	9
Treatment Scheme: Membranes							
Direct Discharge to Surface Water	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	
Treatment Scheme: Other							
Direct Discharge to Surface Water	*	*	*	*	*	*	
Septic system	*	*	*	*	*	*	
Sanitary sewer	*	*	*	*	*	*	
Observations	*	*	*	*	*	*	

(Continued)

Table 40 (Cont.)
Percentage of Water Treatment Plants Allowed to Discharge to
Surface Water, Septic Systems, or Sanitary Sewers that Use that Option
By Water Source, Treatment Scheme, and Plant Average Daily Production

Water Source and Treatment Scheme	Plant Average Daily Production (MGD)						All Sizes
	0 - 0.01	0.01 - 0.1	0.1 - 1.0	1.0 - 10.0	10.0 - 100.0	Over 100	
All Plants							
Treatment Scheme: Disinfection with no additional treatment							
Direct Discharge to Surface Water	*	0.26	0.88	0.67	0.00	*	0.74
Septic system	*	0.00	0.00	0.00	0.00	*	0.00
Sanitary sewer	*	0.00	0.14	0.00	0.00	*	0.08
Observations	*	6	25	35	1	*	67
Treatment Scheme: Other chemical addition							
Direct Discharge to Surface Water	*	0.00	0.81	1.00	0.67	*	0.81
Septic system	*	0.00	0.00	0.00	0.00	*	0.00
Sanitary sewer	*	0.00	0.00	0.00	0.33	*	0.02
Observations	*	1	24	6	6	*	37
Treatment Scheme: Ion exchange, activated alumina, aeration							
Direct Discharge to Surface Water	*	*	1.00	1.00	*	*	1.00
Septic system	*	*	0.00	0.00	*	*	0.00
Sanitary sewer	*	*	0.00	0.00	*	*	0.00
Observations	*	*	1	8	*	*	9
Treatment Scheme: Other filtration (not direct or conventional)							
Direct Discharge to Surface Water	1	1.00	0.85	0.98	0.19	*	0.84
Septic system	0	0.00	0.15	0.05	0.00	*	0.06
Sanitary sewer	0	0.01	0.04	0.16	0.04	*	0.04
Observations	3	10	13	17	15	*	58
Treatment Scheme: Direct filtration							
Direct Discharge to Surface Water	*	1.00	0.75	0.99	0.89	*	0.89
Septic system	*	0.00	0.12	0.01	0.00	*	0.05
Sanitary sewer	*	0.00	0.00	0.06	0.22	*	0.04
Observations	*	1	9	20	8	*	38
Treatment Scheme: Conventional filtration (with and without softening)							
Direct Discharge to Surface Water	1	0.91	0.76	0.94	0.84	0.50	0.86
Septic system	0	0.00	0.00	0.03	0.00	0.00	0.01
Sanitary sewer	0	0.00	0.07	0.27	0.18	0.17	0.17
Observations	1	8	24	57	62	6	158
Treatment Scheme: Membranes							
Direct Discharge to Surface Water	*	1.00	0.95	1.00	*	*	0.97
Septic system	*	0.00	0.00	0.00	*	*	0.00
Sanitary sewer	*	0.00	0.31	0.00	*	*	0.22
Observations	*	1	5	4	*	*	10
Treatment Scheme: Other							
Direct Discharge to Surface Water	1.00	*	0.00	0.26	0.43	0.00	0.88
Septic system	0.00	*	0.00	0.00	0.00	0.00	0.00
Sanitary sewer	0.00	*	0.00	0.00	0.21	0.00	0.01
Observations	1	*	1	6	3	1	11

Data:

Q.9

Notes:

Treatment schemes listed are based on the categorization presented by Table 23 and Table 24.

These are the systems with the option to discharge to surface water, septic systems, or sanitary sewers, and make use of these options.

Table 41
Raw Water Concentration of Various Contaminants in Very Large Ground Water and Surface Water Systems
(Concentration in Parts per Billion)

Contaminant	% Not Reporting/ Testing	% Reporting No Detect	Mean Concentration	Median Concentration	90th Percentile Concentration	Observations	Systems Reporting
All Plants							
1,1-Dichloroethane	98.2	0.0	0.066	0.066	0.066	1	1
1,2-Dichloroethylene	98.2	0.0	0.066	0.066	0.066	1	1
1,4 Dioxane	59.0	0.0	0.956	0.900	1.300	25	1
Alachlor ESA	89.7	0.0	0.937	0.280	4.190	6	1
Alachlor OA	98.2	0.0	1.850	1.850	1.850	1	1
Chlorodibromomethane	98.2	0.0	2.923	2.923	2.923	1	1
Chloroform	98.2	0.0	59.030	59.030	59.030	1	1
Cryptosporidium	98.2	0.0	0.000	0.000	0.000	1	1
DCPA diacid	65.1	0.0	18.205	13.950	43.400	22	1
Dichlorobromomethane	98.2	0.0	16.051	16.051	16.051	1	1
MTBE	66.1	10.0	2.098	1.050	5.200	20	1
Metalaxyl	93.0	0.0	0.810	0.845	1.310	4	1
Methylene Chloride	98.2	0.0	0.066	0.066	0.066	1	1
Metolachlor	96.4	0.0	0.290	0.290	0.340	2	1
Metolachlor ESA	75.0	0.0	2.558	1.550	6.010	16	1
Metolachlor OA	76.2	0.0	1.918	1.080	5.140	15	1
Perchlorate	2.4	0.0	1.217	0.880	2.430	80	2
THM's	98.2	0.0	78.009	78.009	78.009	1	1
Trichloroethylene	98.2	0.0	0.066	0.066	0.066	1	1
VOC's	98.2	0.0	0.379	0.379	0.379	1	1
Vinyl Chloride	98.2	0.0	0.0659	0.066	0.066	1	1

Data: Q.10

Notes: The data presented in this table were requested only of systems serving populations of more than 500,000. These systems were asked to provide data on their unregulated contaminants. This is a listing of the most prevalent responses.

Unweighted data. Data are for contaminant test points reported by systems in the survey. The percent not reporting or testing includes all test points for systems reporting at least one raw water contaminant. The percent reporting no detect only includes points where the contaminant is tested. Mean, median, and 90th percentile are for test points with positive concentrations. The number of observations and systems reporting are for those with no detect or positive concentrations.

Table 42
Finished Water Concentration of Various Contaminants in Very Large Ground Water and Surface Water Systems
By Water Source
(Concentration in Parts per Billion, Unless Otherwise Noted)

Water Source and Contaminant	% Not Reporting/ Testing	% Reporting No Detect	Mean Concentration	Median Concentration	90th Percentile Concentration	Observations	Systems Reporting
All Plants							
1,1-Dichloroethane	99.2	100.0	*	*	*	1	1
1,2,3-Trichloropropane	99.2	0.0	400.000	400.000	400.000	1	1
1,2-Dichloroethylene	99.2	100.0	*	*	*	1	1
1,4 Dioxane	81.1	32.0	0.953	0.800	1.400	25	1
Acetaminophen	99.2	0.0	0.018	0.018	0.018	1	1
Alachlor ESA	95.3	83.3	0.350	0.350	0.350	6	1
Alachlor OA	99.2	100.0	*	*	*	1	1
Aluminum	85.0	52.6	52.346	65.000	79.000	19	7
Bicarbonate	99.2	0.0	163000.000	163000.000	163000.000	1	1
Boron	86.6	23.5	135.385	140.000	200.000	17	5
Bromide	95.3	66.7	59.500	59.500	110.000	6	3
Bromobenzene	99.2	100.0	*	*	*	1	1
Bromochloroacetic acid	97.6	0.0	13.000	13.000	13.000	3	1
Bromodichloromethane	88.2	6.7	8.492	4.450	21.000	15	9
Bromoform	94.5	28.6	3.332	2.600	6.850	7	4
Caffeine	99.2	0.0	0.017	0.017	0.017	1	1
Calcium	77.2	0.0	40055.172	30000.000	95000.000	29	11
Carbon Dioxide	98.4	0.0	58500.000	58500.000	112000.000	2	2
Chloral Hydrate	99.2	0.0	2.100	2.100	2.100	1	1
Chlorate	97.6	33.3	42.500	42.500	51.000	3	2
Chloride	80.3	0.0	64227.199	49990.000	140000.000	25	10
Chlorodibromomethane	97.6	0.0	2.240	1.800	4.400	3	3
Chloroform	87.4	6.3	23.479	10.000	89.000	16	10
Chromium	96.1	20.0	2.880	1.570	8.260	5	3
Cobalt	99.2	100.0	*	*	*	1	1
DCPA acid metabolites	99.2	0.0	9.500	9.500	9.500	1	1
DCPA diacid	83.6	81.8	5.625	5.000	10.700	22	1
Dibromoacetic acid	97.6	0.0	1.900	1.900	1.900	3	1
Dibromochloromethane	91.3	27.3	6.409	6.400	14.000	11	6
Dichloroacetic acid	96.1	0.0	37.360	50.000	50.000	5	3
Dichlorobromomethane	99.2	0.0	1.364	1.364	1.364	1	1
Foaming Agents	98.4	100.0	*	*	*	2	1
Ibuprofen	99.2	0.0	0.002	0.002	0.002	1	1
Iodide	99.2	0.0	5.900	5.900	5.900	1	1
Iron	88.2	80.0	70522.336	539.000	211000.000	15	5
Lithium	99.2	0.0	2.700	2.700	2.700	1	1
MTBE	84.6	65.0	1.200	0.500	5.000	20	1
Magnesium	76.4	0.0	11272.333	9950.000	24000.000	30	12
Manganese	99.2	0.0	0.003	0.003	0.003	1	1
Metalaxyl	96.9	100.0	*	*	*	4	1
Methylene Chloride	99.2	100.0	*	*	*	1	1

(Continued)

Table 42 (Cont.)
(Table 28 in the 2000 Report, Table 33 from draft 1)
Finished Water Concentration of Various Contaminants in Very Large Ground Water and Surface Water Systems
By Water Source
(Concentration in Parts per Billion, Unless Otherwise Noted)

Water Source and Contaminant	% Reporting N/A	% Reporting No Detect	Mean Concentration	Median Concentration	90th Percentile Concentration	Observations	Systems Reporting
Metolachlor	94.5	71.4	1.400	1.400	1.400	7	3
Metolachlor ESA	88.1	93.8	2.350	2.350	2.350	16	1
Metolachlor OA	88.8	93.3	1.770	1.770	1.770	15	1
Molybdenum	98.4	0.0	16.000	16.000	31.000	2	2
Monobromoacetic acid	97.6	0.0	2.400	2.400	2.400	3	1
Monochloroacetic acid	97.6	0.0	4.300	4.300	4.300	3	1
NDMA	93.7	75.0	0.001	0.001	0.001	8	6
Nickel	95.3	0.0	668.833	3.450	4000.000	6	4
Orthophosphates	99.2	0.0	3.000	3.000	3.000	1	1
Perchlorate	39.9	35.9	1.382	0.880	3.000	92	5
Phosphates	99.2	0.0	700.000	700.000	700.000	1	1
Phosphorus	99.2	0.0	380.000	380.000	380.000	1	1
Potassium	78.7	0.0	2505.185	2510.000	4100.000	27	10
Radon (pCi/L)	97.6	33.3	350.335	350.335	407.670	3	2
Silica	92.1	0.0	9560.000	11150.000	12400.000	10	5
Silicon	99.2	0.0	5280.000	5280.000	5280.000	1	1
Silver	96.1	100.0	*	*	*	5	2
Sodium	62.2	0.0	36281.043	19500.000	83000.000	48	27
Strontium	99.2	0.0	330.000	330.000	330.000	1	1
Sulfamethoxazole	99.2	0.0	0.002	0.002	0.002	1	1
Sulfate	88.2	0.0	105820.000	50000.000	255000.000	15	10
Surfactants	99.2	0.0	100.000	100.000	100.000	1	1
THM's	99.2	0.0	7.668	7.668	7.668	1	1
Total Dissolved Solids	78.0	0.0	378829.281	288000.000	770000.000	28	13
Total Organic Carbon	83.5	19.0	2091.765	2200.000	3330.000	21	9
Trichloroacetic acid	96.1	0.0	13.800	16.000	16.000	5	3
Trichloroethylene	99.2	100.0	*	*	*	1	1
VOC's	99.2	100.0	*	*	*	1	1
Vanadium	96.1	20.0	2.363	2.225	4.100	5	3
Vinyl Chloride	99.2	100.0	*	*	*	1	1
Zinc	99.2	0.0	254.000	254.000	254.000	1	1
p-Isopropyltoluene	99.2	100.0	*	*	*	1	1
pH (pH)	78.7	0.0	8.187	8.200	9.100	27	9

Data: Q10 and CCR

Notes: The data presented in this table were requested only of systems serving populations of more than 500,000. These systems were asked to provide data on their unregulated contaminants. The data received by the CWS survey are supplemented with data from Consumer Confidence Reports (CCR) issued by the systems.

Unweighted data. Data are for contaminant test points reported by systems in the survey. The percent not reporting or testing includes all test points for systems reporting at least one finished water contaminant. The percent reporting no detect only includes points where the contaminant is tested. Mean, median, and 90th percentile are for test points with positive

**Please note that the unit of analysis changes for the following tables.
The remaining tables report data for water systems except where noted.**

Table 43
Treatment Schemes
Percentage of Systems Using Each Treatment Scheme
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
100% Ground Water System									
Disinfection with no additional treatment	52.2	52.9	47.8	49.2	36.7	6.9	33.4	31.5	49.9
Other chemical addition	12.0	12.9	27.6	28.1	29.9	53.9	29.8	0.0	19.1
Ion exchange, activated alumina, aeration	17.9	9.9	10.6	10.0	32.4	20.8	20.1	0.0	13.2
Other filtration (not direct or conventional)	17.8	16.9	15.3	20.9	28.2	41.0	43.2	15.7	17.7
Direct filtration	0.0	0.0	1.1	0.0	8.1	6.9	3.3	0.0	0.7
Conventional filtration (with and without softening)	0.0	1.4	2.1	5.5	0.4	6.9	10.0	68.5	1.6
Membranes	0.0	1.4	1.1	0.0	0.4	3.5	0.0	0.0	0.8
Other	2.1	5.9	1.1	0.0	3.1	0.0	10.0	0.0	3.0
Observations	87	103	107	45	50	28	33	4	457
Primarily Ground Water Systems									
Disinfection with no additional treatment	0.0	100.0	25.0	32.1	25.4	32.6	32.4	0.0	32.6
Other chemical addition	0.0	0.0	50.0	16.7	55.0	57.1	27.3	50.0	35.6
Ion exchange, activated alumina, aeration	0.0	0.0	0.0	0.0	10.0	11.7	22.1	100.0	4.0
Other filtration (not direct or conventional)	100.0	0.0	50.0	40.3	20.0	23.4	44.7	50.0	35.0
Direct filtration	0.0	0.0	0.0	13.8	7.5	16.1	9.1	0.0	7.7
Conventional filtration (with and without softening)	0.0	0.0	0.0	24.8	15.0	20.6	35.2	0.0	14.5
Membranes	0.0	0.0	0.0	0.0	0.0	0.0	4.4	50.0	0.3
Other	0.0	0.0	0.0	0.0	5.4	11.7	22.5	0.0	2.6
Observations	1	2	4	17	16	12	23	2	77
100% Surface Water System									
Disinfection with no additional treatment	15.4	27.9	4.9	0.0	0.0	9.7	0.0	0.0	7.6
Ion exchange, activated alumina, aeration	0.0	1.4	6.6	9.8	2.0	0.0	2.3	15.8	4.5
Ion exchange, Activated Alumina, Aeration	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.8
Other filtration (not direct or conventional)	62.0	27.8	27.9	12.0	6.0	0.0	3.5	0.0	19.5
Direct filtration	8.0	13.7	15.3	22.0	15.4	12.4	17.6	15.8	16.0
Conventional filtration (with and without softening)	10.9	24.2	39.9	52.1	76.5	84.1	85.9	84.2	50.2
Membranes	3.6	5.6	7.1	6.0	0.0	3.1	1.2	10.5	4.5
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	44	62	61	50	57	35	77	20	406
Primarily Surface Water System									
Disinfection with no additional treatment	100.0	54.3	60.9	6.3	11.3	5.4	19.3	15.8	27.4
Ion exchange, activated alumina, aeration	0.0	0.0	9.4	0.0	15.3	16.2	18.2	36.8	11.1
Ion exchange, Activated Alumina, Aeration	0.0	0.0	0.0	24.5	3.8	0.0	7.7	0.0	6.3
Other filtration (not direct or conventional)	36.0	31.4	30.7	6.3	19.0	5.4	12.5	15.8	18.9
Direct filtration	0.0	0.0	12.1	6.3	22.8	29.2	10.2	21.1	15.1
Conventional filtration (with and without softening)	0.0	22.9	35.6	62.8	65.7	65.4	85.4	78.9	56.5
Membranes	0.0	0.0	16.2	0.0	3.8	2.3	2.1	0.0	6.0
Other	0.0	22.9	0.0	0.0	0.0	0.0	2.1	5.3	1.0
Observations	5	5	17	15	28	19	47	19	155

(Continued)

Table 43 (Cont.)
Treatment Schemes
Percentage of Systems Using Each Treatment Scheme
By Water Source

Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water System									
Disinfection with no additional treatment	0.0	100.0	66.4	21.7	32.0	33.0	31.2	38.8	58.5
Other chemical addition	0.0	0.0	0.0	56.4	32.0	31.1	27.7	19.4	14.5
Ion exchange, activated alumina, aeration	0.0	0.0	0.0	0.0	0.0	16.5	18.6	19.4	2.5
Other filtration (not direct or conventional)	0.0	0.0	0.0	0.0	0.0	35.9	18.6	19.4	3.5
Direct filtration	0.0	0.0	0.0	0.0	24.0	0.0	13.4	20.4	5.2
Conventional filtration (with and without softening)	100.0	0.0	0.0	21.9	12.0	31.1	26.1	40.8	8.7
Membranes	0.0	0.0	0.0	0.0	0.0	0.0	9.1	19.4	0.9
Other	0.0	0.0	33.6	0.0	0.0	16.5	4.4	19.4	14.4
Observations	1	1	4	4	9	10	24	5	58

Data: Q.8A

Notes:

Excludes plants that only treat purchased water.

See treatment scheme description in Volume I.

Table 44
Treated-Water Storage Information
Percentage of Systems That Have Each Type of Treated-Water Storage
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Fully or partially buried	24.7	22.7	7.1	24.8	14.7	26.7	30.1	18.7	16.3
Confidence Interval	+/- 29.4	+/- 19.8	+/- 5.8	+/- 12.0	+/- 10.4	+/- 15.0	+/- 9.5	+/- 27.7	+/- 6.2
Ground level	40.1	26.4	30.2	30.0	36.6	54.8	73.8	81.3	31.7
Confidence Interval	+/- 31.1	+/- 19.3	+/- 12.4	+/- 12.6	+/- 13.5	+/- 22.0	+/- 9.3	+/- 27.7	+/- 7.8
Elevated	32.1	25.3	58.4	64.8	76.2	68.9	45.8	100.0	52.0
Confidence Interval	+/- 27.9	+/- 16.6	+/- 13.2	+/- 13.3	+/- 12.0	+/- 16.4	+/- 10.5	+/- 0.0	+/- 7.8
Hydropneumatic	26.9	13.2	7.1	0.0	5.8	16.7	13.1	18.7	9.2
Confidence Interval	+/- 27.3	+/- 13.6	+/- 6.3	+/- 0.0	+/- 6.0	+/- 12.1	+/- 7.1	+/- 27.7	+/- 4.5
Standpipes	25.6	12.4	15.1	22.4	32.1	7.5	10.7	100.0	18.6
Confidence Interval	+/- 26.2	+/- 13.1	+/- 8.1	+/- 11.5	+/- 13.1	+/- 7.1	+/- 6.4	+/- 0.0	+/- 5.9
Standpipes operated as surge tanks	0.0	0.0	0.0	4.1	2.1	2.8	2.0	0.0	1.0
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 5.6	+/- 4.1	+/- 5.0	+/- 2.7	+/- 0.0	+/- 1.0
Other	0.0	0.0	0.0	0.0	2.1	0.0	2.2	0.0	0.2
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 4.1	+/- 0.0	+/- 3.1	+/- 0.0	+/- 0.4
Primarily Surface Water Systems									
Fully or partially buried	19.3	12.7	11.0	17.6	25.9	28.9	37.7	61.1	20.9
Confidence Interval	+/- 17.9	+/- 12.6	+/- 7.4	+/- 12.0	+/- 9.4	+/- 11.5	+/- 8.9	+/- 10.0	+/- 4.5
Ground level	80.7	81.2	70.7	34.0	46.1	54.2	66.0	86.1	54.9
Confidence Interval	+/- 17.9	+/- 14.4	+/- 13.3	+/- 11.8	+/- 10.7	+/- 12.6	+/- 10.2	+/- 7.1	+/- 5.7
Elevated	7.0	7.7	21.9	70.6	58.6	78.8	71.5	66.7	50.5
Confidence Interval	+/- 13.9	+/- 9.2	+/- 9.4	+/- 11.2	+/- 10.6	+/- 10.2	+/- 6.7	+/- 9.6	+/- 5.2
Hydropneumatic	35.2	18.8	8.6	4.4	2.6	6.5	7.2	19.4	7.3
Confidence Interval	+/- 32.2	+/- 16.8	+/- 8.9	+/- 4.8	+/- 3.5	+/- 6.3	+/- 3.3	+/- 8.1	+/- 3.1
Standpipes	7.0	0.0	23.0	29.3	24.8	40.0	26.2	36.1	24.5
Confidence Interval	+/- 13.9	+/- 0.0	+/- 13.9	+/- 12.8	+/- 9.2	+/- 12.5	+/- 6.4	+/- 9.8	+/- 5.3
Standpipes operated as surge tanks	0.0	0.0	1.6	0.0	2.7	0.0	3.2	5.6	1.4
Confidence Interval	+/- 0.0	+/- 0.0	+/- 3.1	+/- 0.0	+/- 3.5	+/- 0.0	+/- 2.2	+/- 4.7	+/- 1.2
Other	0.0	0.0	0.0	0.0	2.6	0.0	1.6	0.0	0.8
Confidence Interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 3.5	+/- 0.0	+/- 1.6	+/- 0.0	+/- 0.9

(Continued)

Table 44 (Cont.)
Treated-Water Storage Information
Percentage of Systems That Have Each Type of Treated-Water Storage
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Fully or partially buried	0.0	39.0	3.9	10.5	12.4	53.1	60.3	32.7	13.1
<i>Confidence Interval</i>	+/- 0.0	+/- 42.6	+/- 7.7	+/- 12.4	+/- 15.9	+/- 19.9	+/- 12.5	+/- 21.7	+/- 8.1
Ground level	51.4	59.8	43.0	28.3	27.9	59.0	71.8	75.8	41.8
<i>Confidence Interval</i>	+/- 68.4	+/- 42.6	+/- 24.2	+/- 19.3	+/- 22.7	+/- 19.7	+/- 10.5	+/- 18.0	+/- 13.2
Elevated	0.0	19.8	51.6	70.3	28.1	43.2	61.8	51.2	46.0
<i>Confidence Interval</i>	+/- 0.0	+/- 33.8	+/- 21.0	+/- 19.8	+/- 21.1	+/- 19.7	+/- 11.6	+/- 27.4	+/- 12.1
Hydropneumatic	0.0	40.6	3.9	1.2	0.0	14.6	25.2	16.1	8.4
<i>Confidence Interval</i>	+/- 0.0	+/- 42.6	+/- 7.7	+/- 2.3	+/- 0.0	+/- 13.6	+/- 10.0	+/- 14.4	+/- 7.5
Standpipes	48.6	18.6	16.5	26.3	31.7	17.4	15.4	16.1	22.4
<i>Confidence Interval</i>	+/- 68.4	+/- 33.7	+/- 15.2	+/- 18.4	+/- 21.5	+/- 14.6	+/- 8.3	+/- 14.4	+/- 10.0
Standpipes operated as surge tanks	0.0	0.0	0.0	4.7	2.3	0.0	0.0	0.0	1.3
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 8.9	+/- 4.4	+/- 0.0	+/- 0.0	+/- 0.0	+/- 2.1
Other	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 3.2	+/- 0.0	+/- 0.1
All Systems									
Fully or partially buried	20.9	24.8	6.7	19.9	17.8	32.9	40.3	50.7	16.4
<i>Confidence Interval</i>	+/- 24.5	+/- 16.9	+/- 4.4	+/- 7.8	+/- 6.7	+/- 8.9	+/- 6.1	+/- 10.7	+/- 4.3
Ground level	43.7	35.6	37.1	30.4	38.0	55.4	68.9	83.4	37.4
<i>Confidence Interval</i>	+/- 26.9	+/- 17.5	+/- 10.4	+/- 8.7	+/- 8.6	+/- 10.7	+/- 6.8	+/- 6.4	+/- 5.9
Elevated	26.3	23.2	53.3	67.3	62.2	68.0	63.7	66.4	50.5
<i>Confidence Interval</i>	+/- 23.1	+/- 14.0	+/- 10.2	+/- 9.1	+/- 8.7	+/- 8.8	+/- 5.4	+/- 9.1	+/- 5.5
Hydropneumatic	23.5	18.2	6.5	1.2	3.8	11.9	12.0	18.6	8.8
<i>Confidence Interval</i>	+/- 22.6	+/- 13.5	+/- 4.7	+/- 1.1	+/- 3.3	+/- 5.8	+/- 3.3	+/- 6.9	+/- 3.4
Standpipes	28.0	12.7	16.2	24.7	29.7	23.4	20.6	37.8	20.3
<i>Confidence Interval</i>	+/- 23.3	+/- 11.6	+/- 6.9	+/- 8.2	+/- 8.2	+/- 7.3	+/- 4.1	+/- 10.9	+/- 4.4
Standpipes operated as surge tanks	0.0	0.0	0.1	3.4	2.3	1.0	2.3	3.8	1.1
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.3	+/- 3.8	+/- 2.5	+/- 1.8	+/- 1.4	+/- 3.2	+/- 0.8
Other	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.3
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 2.4	+/- 0.0	+/- 1.3	+/- 0.0	+/- 0.3

Data:

Q.11B

Notes:

Column totals do not equal 100.

Systems that use any surface water includes systems that use ground water under the direct influence of surface water and systems that purchase surface water.

100% ground water systems includes systems that purchase ground water.

Table 45
Storage Capacity past the First Residential Customer by Type of Vessel
By Primary Water Source
(In Millions of Gallons)

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Average storage capacity	0.2	0.2	0.6	1.2	4.4	9.2	24.1	22.3	1.3
Confidence Interval	+/- 0.2	+/- 0.3	+/- 0.6	+/- 0.3	+/- 1.6	+/- 2.9	+/- 5.8	+/- 14.2	+/- 0.3
Average Number of Vessels									
Fully or partially buried	1.0	0.3	0.2	1.0	0.3	1.0	1.9	0.4	0.4
Ground level	0.8	0.6	0.6	0.7	1.3	3.0	4.2	4.2	0.8
Elevated	0.3	0.3	0.7	1.1	2.0	3.5	2.1	11.1	0.8
Hydropneumatic	0.5	0.1	0.1	0.0	0.1	0.3	1.5	7.5	0.1
Standpipes	0.3	0.2	0.2	0.4	0.8	0.2	0.6	5.8	0.3
Standpipes operated as surge tanks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Observations	76	94	107	56	62	36	49	4	484
Primarily Surface Water Systems									
Average storage capacity	0.1	0.4	0.6	1.5	3.9	10.8	26.5	179.0	7.4
Confidence Interval	+/- 0.1	+/- 0.5	+/- 0.1	+/- 0.3	+/- 0.7	+/- 2.6	+/- 5.4	+/- 43.6	+/- 1.0
Average Number of Vessels									
Fully or partially buried	0.2	0.1	0.1	0.2	0.6	0.6	1.5	3.7	0.5
Ground level	1.1	1.9	1.1	0.9	2.2	3.1	4.1	19.0	2.1
Elevated	0.1	0.0	0.4	1.4	1.7	3.0	3.3	5.5	1.4
Hydropneumatic	0.4	0.3	0.1	0.1	0.1	0.1	0.8	1.6	0.2
Standpipes	0.1	0.0	0.3	0.6	0.8	1.1	2.1	3.3	0.7
Standpipes operated as surge tanks	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0
Other	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Observations	47	62	75	64	84	49	114	38	533

(Continued)

Table 45 (Cont.)
Storage Capacity past the First Residential Customer by Type of Vessel
By Primary Water Source
(In Millions of Gallons)

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Average storage capacity	1.4	0.8	1.2	0.8	3.7	19.3	40.7	111.4	3.0
Confidence Interval	+/- 1.9	+/- 1.2	+/- 1.5	+/- 0.2	+/- 2.0	+/- 9.2	+/- 9.9	+/- 90.4	+/- 1.0
Average Number of Vessels									
Fully or partially buried	0.0	0.3	0.3	0.1	0.7	1.8	3.3	3.7	0.4
Ground level	2.6	0.8	1.1	0.6	0.8	3.7	8.4	8.2	1.2
Elevated	0.0	0.0	0.6	1.1	0.8	2.0	3.5	1.9	0.7
Hydropneumatic	0.0	0.8	0.0	0.0	0.0	0.2	0.7	0.5	0.1
Standpipes	0.5	0.2	0.4	0.9	0.9	1.1	0.5	0.5	0.6
Standpipes operated as surge tanks	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	7	22	44	27	23	25	41	10	199
All Systems									
Average storage capacity	0.4	0.3	0.8	1.2	4.2	11.9	28.7	148.8	2.6
Confidence Interval	+/- 0.4	+/- 0.3	+/- 0.5	+/- 0.2	+/- 0.9	+/- 2.6	+/- 4.0	+/- 40.1	+/- 0.3
Average Number of Vessels									
Fully or partially buried	0.8	0.3	0.2	0.6	0.5	1.0	1.9	3.4	0.4
Ground level	1.1	0.7	0.7	0.7	1.5	3.2	5.0	15.2	1.1
Elevated	0.3	0.2	0.6	1.1	1.7	3.0	3.0	5.3	0.9
Hydropneumatic	0.4	0.2	0.1	0.0	0.1	0.2	0.9	1.9	0.1
Standpipes	0.3	0.2	0.3	0.5	0.8	0.8	1.4	2.9	0.4
Standpipes operated as surge tanks	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	130	178	226	147	169	110	204	52	1,216

Data: Q.11 A and B.

Notes: Average number of vessels is the average for systems that report a count for that storage unit.
The calculation includes zeros reported in the denominator, i.e., if a system reported a storage capacity, every record was used for the average number of vessels calculation, including zeros.

Table 46
Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Percentage of systems that:									
Modeling or other detention time evaluations	0.0	0.0	2.3	12.7	29.6	23.1	45.6	62.7	6.9
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 3.3	+/- 8.9	+/- 12.9	+/- 14.1	+/- 10.5	+/- 45.0	+/- 2.6
Longer fill/draw cycles to increase mixing	17.2	21.1	29.3	48.5	53.5	36.8	56.3	62.7	32.5
<i>Confidence Interval</i>	+/- 22.9	+/- 16.4	+/- 12.8	+/- 13.8	+/- 14.2	+/- 17.9	+/- 10.4	+/- 45.0	+/- 7.3
Inlet/outlet modifications	0.0	0.0	10.2	14.4	11.3	13.6	29.9	0.0	8.1
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 8.0	+/- 9.8	+/- 8.2	+/- 10.9	+/- 9.4	+/- 0.0	+/- 3.7
Mechanical mixing	0.0	4.1	2.8	6.2	3.4	0.0	12.6	0.0	3.5
<i>Confidence Interval</i>	+/- 0.0	+/- 8.2	+/- 4.0	+/- 6.7	+/- 4.4	+/- 0.0	+/- 6.6	+/- 0.0	+/- 2.6
Increase or switch disinfectant residual	17.4	0.0	2.3	22.9	20.3	22.3	36.7	62.7	9.3
<i>Confidence Interval</i>	+/- 22.9	+/- 0.0	+/- 3.2	+/- 11.5	+/- 11.3	+/- 14.0	+/- 10.1	+/- 45.0	+/- 3.6
Operational modifications to maintain disinfectant residual	0.2	8.3	8.6	37.8	48.4	26.3	60.5	37.3	17.5
<i>Confidence Interval</i>	+/- 0.2	+/- 11.4	+/- 6.3	+/- 13.3	+/- 14.2	+/- 15.0	+/- 10.3	+/- 45.0	+/- 4.7
Other	9.0	22.4	3.7	5.5	8.9	2.8	6.6	0.0	9.0
<i>Confidence Interval</i>	+/- 16.2	+/- 18.3	+/- 4.3	+/- 6.1	+/- 8.0	+/- 5.0	+/- 5.3	+/- 0.0	+/- 4.7
Average number of years between cleaning	9.5	5.9	6.5	5.8	7.4	5.6	5.2	6.5	6.5
<i>Confidence Interval</i>	+/- 4.4	+/- 2.4	+/- 1.2	+/- 1.1	+/- 1.5	+/- 1.1	+/- 0.6	+/- 4.1	+/- 0.8

(Continued)

Table 46 (Cont.)
Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Surface Water Systems									
Percentage of systems that:									
Modeling or other detention time evaluations	4.2	7.7	9.4	35.4	41.2	48.6	54.6	83.3	31.2
<i>Confidence Interval</i>	+/- 8.5	+/- 10.6	+/- 7.7	+/- 12.0	+/- 10.5	+/- 12.6	+/- 9.4	+/- 7.6	+/- 4.6
Longer fill/draw cycles to increase mixing	7.0	20.5	24.6	47.2	56.9	71.1	62.8	72.2	44.7
<i>Confidence Interval</i>	+/- 13.9	+/- 15.8	+/- 11.8	+/- 13.1	+/- 10.6	+/- 11.5	+/- 9.0	+/- 9.2	+/- 5.5
Inlet/outlet modifications	0.0	1.4	9.9	20.7	24.8	25.8	28.7	63.9	19.0
<i>Confidence Interval</i>	+/- 0.0	+/- 2.7	+/- 8.9	+/- 9.7	+/- 9.2	+/- 11.0	+/- 6.7	+/- 9.8	+/- 4.2
Mechanical mixing	0.0	1.5	0.0	5.9	8.1	4.6	10.5	22.2	5.2
<i>Confidence Interval</i>	+/- 0.0	+/- 2.9	+/- 0.0	+/- 5.4	+/- 5.9	+/- 5.6	+/- 8.7	+/- 8.5	+/- 2.2
Increase or switch disinfectant residual	7.0	0.0	2.2	39.7	38.5	26.8	32.3	47.2	25.8
<i>Confidence Interval</i>	+/- 13.9	+/- 0.0	+/- 3.3	+/- 13.3	+/- 10.4	+/- 11.2	+/- 7.3	+/- 10.2	+/- 4.7
Operational modifications to maintain disinfectant residual	21.1	17.3	14.1	38.3	53.4	55.7	53.7	72.2	37.6
<i>Confidence Interval</i>	+/- 27.7	+/- 17.7	+/- 8.8	+/- 12.3	+/- 10.7	+/- 12.6	+/- 9.0	+/- 9.2	+/- 5.1
Other	40.2	13.9	8.6	3.0	5.3	8.6	8.1	22.2	7.7
<i>Confidence Interval</i>	+/- 32.6	+/- 16.9	+/- 8.8	+/- 3.9	+/- 4.9	+/- 7.2	+/- 8.7	+/- 8.5	+/- 3.3
Average number of years between cleaning	5.9	8.1	5.9	7.1	6.5	6.6	6.4	7.3	6.7
<i>Confidence Interval</i>	+/- 4.0	+/- 2.4	+/- 1.6	+/- 1.5	+/- 1.1	+/- 1.6	+/- 0.8	+/- 1.3	+/- 0.6

(Continued)

Table 46 (Cont.)
Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Percentage of systems that:									
Modeling or other detention time evaluations	0.0	0.0	0.0	1.2	34.1	64.9	48.1	56.8	6.5
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 2.3	+/- 23.6	+/- 18.9	+/- 12.2	+/- 30.1	+/- 3.6
Longer fill/draw cycles to increase mixing	51.4	38.4	35.3	78.8	63.4	64.9	74.2	67.8	50.9
<i>Confidence Interval</i>	+/- 68.4	+/- 41.9	+/- 21.6	+/- 16.7	+/- 22.6	+/- 18.9	+/- 10.2	+/- 21.1	+/- 13.0
Inlet/outlet modifications	0.0	1.2	13.8	22.7	21.9	43.2	51.9	67.8	15.7
<i>Confidence Interval</i>	+/- 0.0	+/- 2.4	+/- 17.9	+/- 18.8	+/- 19.2	+/- 19.7	+/- 12.2	+/- 21.1	+/- 9.5
Mechanical mixing	0.0	0.0	0.0	4.7	2.3	4.7	20.6	8.1	1.8
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 8.9	+/- 4.4	+/- 7.9	+/- 9.4	+/- 10.0	+/- 2.1
Increase or switch disinfectant residual	0.0	18.6	2.4	14.8	17.0	32.0	42.5	32.7	10.4
<i>Confidence Interval</i>	+/- 0.0	+/- 33.7	+/- 4.7	+/- 13.7	+/- 16.8	+/- 18.0	+/- 11.8	+/- 21.7	+/- 6.6
Operational modifications to maintain disinfectant residual	51.4	0.0	6.3	37.3	73.6	77.3	74.4	40.7	25.1
<i>Confidence Interval</i>	+/- 68.4	+/- 0.0	+/- 9.0	+/- 20.1	+/- 21.6	+/- 16.4	+/- 10.2	+/- 24.7	+/- 9.5
Other	1.3	0.0	0.0	7.7	6.2	10.6	2.4	8.1	2.8
<i>Confidence Interval</i>	+/- 3.2	+/- 0.0	+/- 0.0	+/- 10.5	+/- 11.6	+/- 12.5	+/- 3.2	+/- 10.0	+/- 2.8
Average number of years between cleaning	3.6	8.1	7.3	5.6	6.8	4.2	4.5	3.6	6.5
<i>Confidence Interval</i>	+/- 2.1	+/- 2.0	+/- 3.4	+/- 1.5	+/- 2.0	+/- 0.8	+/- 0.7	+/- 0.9	+/- 1.3

(Continued)

Table 46 (Cont.)
Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Percentage of systems that:									
Modeling or other detention time evaluations	0.2	0.5	2.4	14.4	34.0	42.3	51.3	75.4	10.5
<i>Confidence Interval</i>	+/- 0.4	+/- 0.7	+/- 2.3	+/- 5.5	+/- 8.5	+/- 9.8	+/- 6.2	+/- 10.5	+/- 1.9
Longer fill/draw cycles to increase mixing	21.6	24.0	30.3	55.7	56.3	57.0	63.5	70.3	38.3
<i>Confidence Interval</i>	+/- 22.1	+/- 14.7	+/- 10.3	+/- 9.6	+/- 9.0	+/- 10.7	+/- 6.1	+/- 8.4	+/- 5.5
Inlet/outlet modifications	0.0	0.3	11.1	17.7	17.4	24.7	33.4	58.6	11.4
<i>Confidence Interval</i>	+/- 0.0	+/- 0.4	+/- 6.9	+/- 7.5	+/- 6.2	+/- 7.9	+/- 5.3	+/- 10.8	+/- 3.1
Mechanical mixing	0.0	3.3	1.9	5.7	4.7	2.9	12.9	16.9	3.4
<i>Confidence Interval</i>	+/- 0.0	+/- 6.3	+/- 2.6	+/- 4.5	+/- 3.0	+/- 2.9	+/- 5.5	+/- 6.7	+/- 1.8
Increase or switch disinfectant residual	14.4	3.2	2.3	24.3	25.4	26.1	35.3	45.5	12.1
<i>Confidence Interval</i>	+/- 18.7	+/- 6.3	+/- 2.4	+/- 7.8	+/- 7.3	+/- 8.1	+/- 5.4	+/- 10.9	+/- 2.8
Operational modifications to maintain disinfectant residual	8.5	7.5	8.6	37.8	54.4	49.0	59.3	61.8	22.2
<i>Confidence Interval</i>	+/- 14.6	+/- 8.9	+/- 4.8	+/- 9.2	+/- 9.0	+/- 10.3	+/- 6.2	+/- 11.6	+/- 3.5
Other	9.4	18.0	3.3	5.5	7.3	6.8	6.6	16.9	7.5
<i>Confidence Interval</i>	+/- 13.3	+/- 14.2	+/- 3.0	+/- 4.3	+/- 4.8	+/- 4.5	+/- 5.3	+/- 6.7	+/- 3.1
Average number of years between cleaning	7.6	6.5	6.6	6.0	7.0	5.8	5.7	6.4	6.5
<i>Confidence Interval</i>	+/- 3.6	+/- 1.8	+/- 1.1	+/- 0.8	+/- 0.9	+/- 0.8	+/- 0.5	+/- 1.1	+/- 0.6

Data:

Q.11D

Notes:

Table 47
Percentage of Systems that Want Additional Information about Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Modeling or other detention time evaluations	0.0	0.0	13.9	6.7	7.1	22.0	6.3	18.7	7.7
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 8.0	+/- 6.8	+/- 7.0	+/- 13.9	+/- 4.9	+/- 27.7	+/- 3.5
Longer fill/draw cycles to increase mixing	0.0	0.0	14.1	8.2	9.7	10.5	6.3	18.7	8.2
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 9.2	+/- 7.7	+/- 8.1	+/- 9.3	+/- 4.9	+/- 27.7	+/- 4.0
Inlet/outlet modifications	0.0	9.1	11.0	5.5	10.2	12.0	8.5	18.7	8.5
<i>Confidence Interval</i>	+/- 0.0	+/- 17.0	+/- 9.0	+/- 6.1	+/- 8.1	+/- 9.9	+/- 5.7	+/- 27.7	+/- 5.2
Mechanical mixing	0.0	0.0	9.6	3.4	5.6	13.6	4.2	18.7	5.2
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 8.6	+/- 4.7	+/- 6.0	+/- 10.9	+/- 4.1	+/- 27.7	+/- 3.6
Increase or switch disinfectant residual	0.0	0.0	7.9	4.6	6.7	5.3	6.3	18.7	4.8
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 6.7	+/- 5.6	+/- 7.0	+/- 6.6	+/- 4.9	+/- 27.7	+/- 2.9
Operational modifications to maintain disinfectant residual	0.0	0.0	9.6	6.7	10.5	16.4	8.5	18.7	6.3
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 8.6	+/- 6.8	+/- 8.2	+/- 11.9	+/- 5.7	+/- 27.7	+/- 3.7
Other	0.0	0.0	3.4	0.0	0.0	2.8	2.2	0.0	1.4
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 4.6	+/- 0.0	+/- 0.0	+/- 5.0	+/- 3.1	+/- 0.0	+/- 1.8
Primarily Surface Water Systems									
Modeling or other detention time evaluations	4.2	15.2	18.3	13.2	22.2	9.5	13.1	19.4	16.6
<i>Confidence Interval</i>	+/- 8.5	+/- 12.8	+/- 10.8	+/- 8.0	+/- 8.9	+/- 6.8	+/- 5.1	+/- 8.1	+/- 4.2
Longer fill/draw cycles to increase mixing	4.2	15.7	14.6	7.4	16.4	6.4	9.7	5.6	12.1
<i>Confidence Interval</i>	+/- 8.5	+/- 11.9	+/- 9.9	+/- 6.1	+/- 8.0	+/- 5.8	+/- 3.9	+/- 4.7	+/- 3.6
Inlet/outlet modifications	4.2	19.9	15.1	11.8	15.1	16.3	15.5	19.4	14.5
<i>Confidence Interval</i>	+/- 8.5	+/- 13.5	+/- 10.3	+/- 7.6	+/- 7.7	+/- 9.4	+/- 5.4	+/- 8.1	+/- 3.9
Mechanical mixing	4.2	9.1	14.6	10.3	13.7	14.1	13.1	19.4	12.6
<i>Confidence Interval</i>	+/- 8.5	+/- 10.0	+/- 10.0	+/- 7.1	+/- 7.4	+/- 8.8	+/- 5.1	+/- 8.1	+/- 3.7
Increase or switch disinfectant residual	4.2	9.1	16.7	11.8	11.6	7.7	4.8	5.6	11.6
<i>Confidence Interval</i>	+/- 8.5	+/- 10.0	+/- 10.6	+/- 7.6	+/- 6.8	+/- 6.7	+/- 2.7	+/- 4.7	+/- 3.7
Operational modifications to maintain disinfectant residual	4.2	16.5	16.7	8.9	20.4	5.5	8.1	13.9	14.0
<i>Confidence Interval</i>	+/- 8.5	+/- 13.8	+/- 10.7	+/- 6.6	+/- 8.7	+/- 5.7	+/- 3.5	+/- 7.1	+/- 4.0
Other	4.2	6.1	8.4	0.0	0.0	2.4	0.0	2.8	2.7
<i>Confidence Interval</i>	+/- 8.5	+/- 8.2	+/- 8.4	+/- 0.0	+/- 0.0	+/- 4.2	+/- 0.0	+/- 3.4	+/- 2.1

(Continued)

Table 47 (Cont.)
Percentage of Systems that Want Additional Information about Practices to Maintain Water Quality in Storage Vessels
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Modeling or other detention time evaluations	0.0	37.2	11.8	14.0	18.5	19.9	10.2	0.0	16.0
<i>Confidence Interval</i>	+/- 0.0	+/- 41.8	+/- 13.2	+/- 14.6	+/- 18.7	+/- 15.7	+/- 6.9	+/- 0.0	+/- 9.1
Longer fill/draw cycles to increase mixing	0.0	18.6	7.9	9.3	18.5	9.9	7.6	0.0	10.4
<i>Confidence Interval</i>	+/- 0.0	+/- 33.7	+/- 10.8	+/- 12.3	+/- 18.7	+/- 11.8	+/- 6.0	+/- 0.0	+/- 7.6
Inlet/outlet modifications	0.0	0.0	3.9	4.7	12.4	14.6	10.0	0.0	4.6
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 7.7	+/- 8.9	+/- 15.9	+/- 13.6	+/- 6.7	+/- 0.0	+/- 4.3
Mechanical mixing	0.0	0.0	4.7	4.7	2.3	15.2	5.0	0.0	3.7
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 7.9	+/- 8.9	+/- 4.4	+/- 14.3	+/- 4.9	+/- 0.0	+/- 4.0
Increase or switch disinfectant residual	0.0	0.0	3.9	5.8	8.5	15.2	5.0	0.0	4.3
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 7.7	+/- 9.2	+/- 12.4	+/- 14.3	+/- 4.9	+/- 0.0	+/- 4.2
Operational modifications to maintain disinfectant residual	0.0	0.0	3.9	10.5	14.7	12.1	16.5	0.0	6.2
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 7.7	+/- 12.5	+/- 16.4	+/- 12.1	+/- 11.6	+/- 0.0	+/- 4.9
Other	0.0	0.0	0.0	0.0	6.2	9.9	0.0	0.0	0.9
<i>Confidence Interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 11.6	+/- 11.8	+/- 0.0	+/- 0.0	+/- 1.4
All Systems									
Modeling or other detention time evaluations	0.2	7.3	13.8	9.8	13.8	16.2	11.0	15.0	10.8
<i>Confidence Interval</i>	+/- 0.4	+/- 8.8	+/- 6.6	+/- 5.5	+/- 5.7	+/- 6.6	+/- 3.4	+/- 6.3	+/- 3.2
Longer fill/draw cycles to increase mixing	0.2	4.2	12.7	8.3	13.3	8.7	8.5	5.6	9.3
<i>Confidence Interval</i>	+/- 0.4	+/- 6.4	+/- 7.1	+/- 5.4	+/- 5.9	+/- 4.9	+/- 2.7	+/- 3.9	+/- 3.2
Inlet/outlet modifications	0.2	8.2	9.7	6.5	12.1	14.3	12.9	15.0	8.6
<i>Confidence Interval</i>	+/- 0.4	+/- 13.2	+/- 6.4	+/- 4.3	+/- 5.6	+/- 6.2	+/- 3.6	+/- 6.3	+/- 3.5
Mechanical mixing	0.2	0.6	8.9	5.1	7.5	14.2	9.5	15.0	6.0
<i>Confidence Interval</i>	+/- 0.4	+/- 0.6	+/- 6.2	+/- 3.7	+/- 3.9	+/- 6.3	+/- 3.2	+/- 6.3	+/- 2.5
Increase or switch disinfectant residual	0.2	0.6	7.8	6.4	8.6	8.3	5.2	5.6	5.7
<i>Confidence Interval</i>	+/- 0.4	+/- 0.6	+/- 5.0	+/- 4.1	+/- 4.7	+/- 4.8	+/- 2.1	+/- 3.9	+/- 2.1
Operational modifications to maintain disinfectant residual	0.2	1.1	8.9	8.0	14.3	10.9	9.8	11.3	7.5
<i>Confidence Interval</i>	+/- 0.4	+/- 0.9	+/- 6.2	+/- 5.0	+/- 5.8	+/- 5.5	+/- 3.4	+/- 5.5	+/- 2.6
Other	0.2	0.4	3.0	0.0	1.1	4.1	0.5	1.9	1.5
<i>Confidence Interval</i>	+/- 0.4	+/- 0.5	+/- 3.2	+/- 0.0	+/- 2.1	+/- 3.5	+/- 0.7	+/- 2.3	+/- 1.2

Data:

Q.11D

Notes:

Table 48
Distribution System and Transmission Line Summary
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Distribution Mains									
Miles of Pipe in Place	4	4	20	46	152	415	682	2,778	52
<i>Confidence interval</i>	+/- 3	+/- 1	+/- 8	+/- 13	+/- 42	+/- 130	+/- 65	+/- 522	+/- 8
Service Connections per Mile	31	43	50	83	79	68	99	81	53
<i>Confidence interval</i>	+/- 12	+/- 10	+/- 10	+/- 39	+/- 21	+/- 22	+/- 38	+/- 18	+/- 6
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	1	1	2	2	7	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 2	+/- 0	+/- 1	+/- 0	+/- 3	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	1	3	6	8	15	1
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 1	+/- 2	+/- 2	+/- 1	+/- 6	+/- 0
Observations	27	80	172	120	141	99	193	48	880
Transmission Lines									
Miles of Pipe in Place	1	0	1	16	24	38	89	342	9
<i>Confidence interval</i>	+/- 1	+/- 0	+/- 1	+/- 14	+/- 17	+/- 20	+/- 22	+/- 163	+/- 3
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	0	0	0	0	0	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	0	0	1	1	1	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 1	+/- 0	+/- 0	+/- 0
Observations	27	81	172	121	144	101	194	48	888

(Continued)

Table 48 (Cont.)
Distribution System and Transmission Line Summary
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems									
Distribution Mains									
Miles of Pipe in Place	4	3	24	80	242	344	701	1,636	13
Confidence interval	+/- 6	+/- 2	+/- 12	+/- 39	+/- 167	+/- 151	+/- 391	+/- 1,341	+/- 4
Service Connections per Mile	263	81	67	49	80	246	1,136	447	148
Confidence interval	+/- 347	+/- 21	+/- 33	+/- 23	+/- 95	+/- 287	+/- 1,441	280	+/- 130
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	1	0	1	1	15	0
Confidence interval	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 1	+/- 1	+/- 15	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	0	1	2	10	7	0
Confidence interval	+/- 0	+/- 0	+/- 0	+/- 0	+/- 1	+/- 1	+/- 6	+/- 3	+/- 0
Observations	115	107	54	22	19	10	17	5	349
Transmission Lines									
Miles of Pipe in Place	0	0	1	14	70	54	94	461	2
Confidence interval	+/- 0	+/- 0	+/- 0	+/- 13	+/- 49	+/- 74	+/- 88	236	+/- 1
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	0	0	0	0	0	0
Confidence interval	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	0	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	0	0	0	3	1	0
Confidence interval	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 4	1	+/- 0
Observations	117	109	55	24	19	10	17	5	356

(Continued)

Table 48 (Cont.)
Distribution System and Transmission Line Summary
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems									
Distribution Mains									
Miles of Pipe in Place	4	4	21	53	159	411	684	2,643	32
<i>Confidence interval</i>	+/- 5	+/- 1	+/- 7	+/- 14	+/- 42	+/- 123	+/- 75	+/- 518	+/- 4
Service Connections per Mile	229	66	55	75	79	78	231	124	102
<i>Confidence interval</i>	+/- 296	+/- 15	+/- 12	+/- 31	+/- 21	+/- 29	+/- 245	+/- 74	+/- 67
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	1	1	2	2	8	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 1	+/- 0	+/- 1	+/- 0	+/- 3	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	1	3	6	8	14	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 1	+/- 2	+/- 2	+/- 1	+/- 5	+/- 0
Observations	142	187	226	142	160	109	210	53	1,229
Transmission Lines									
Miles of Pipe in Place	0	0	1	15	28	40	89	357	6
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 11	+/- 16	+/- 19	+/- 22	+/- 147	+/- 2
Average Pipe Replaced Annually in the Past 5 Years (miles)	0	0	0	0	0	0	0	0	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0
Average New Pipe Installed Annually in the Past 5 Years (miles)	0	0	0	0	0	1	1	1	0
<i>Confidence interval</i>	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 1	+/- 1	+/- 0	+/- 0
Observations	144	190	227	145	163	111	211	53	1,244

Data:

Q.12A

Notes:

Includes systems reporting zero miles of pipe.

Service connections include residential customers only.

Table 49
Average Size of Distribution Systems
By Diameter of Pipe and Ownership
(Length of Pipe in Miles)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Distribution Mains Less Than 6"									
Percentage of systems with this size pipe	91.1	80.2	84.3	72.6	76.2	76.4	82.5	63.6	80.9
Average length of pipe	3.6	2.3	12.4	70.6	51.2	42.3	103.1	335.1	23.9
Confidence interval	+/- 3.6	+/- 0.8	+/- 9.5	+/- 77.7	+/- 31.8	+/- 10.7	+/- 16.2	+/- 108.6	+/- 11.4
Distribution Mains 6" to 10"									
Percentage of systems with this size pipe	32.6	82.0	93.1	81.7	92.6	87.7	87.1	80.0	84.7
Average length of pipe	1.9	3.1	9.3	53.2	96.7	256.5	436.7	1,831.3	43.0
Confidence interval	+/- 1.6	+/- 1.2	+/- 2.1	+/- 23.3	+/- 16.3	+/- 95.0	+/- 40.1	+/- 304.1	+/- 6.2
Distribution Mains Greater Than 10" and Less Than 24"									
Percentage of systems with this size pipe	0.4	4.3	33.9	57.1	82.5	86.7	88.8	80.0	35.7
Average length of pipe	19.9	2.7	2.6	5.8	23.9	64.0	126.3	590.6	21.6
Confidence interval	+/- 24.9	+/- 0.3	+/- 0.7	+/- 1.4	+/- 5.7	+/- 8.9	+/- 11.5	+/- 132.9	+/- 3.2
Distribution Mains Greater Than 24"									
Percentage of systems with this size pipe	0.1	0.1	2.9	1.1	26.4	65.5	74.4	62.2	7.2
Average length of pipe	9.7	0.2	0.9	0.9	6.4	13.4	34.7	156.9	15.8
Confidence interval	+/- 0.0	+/- 0.0	+/- 1.2	+/- 0.9	+/- 4.1	+/- 3.4	+/- 4.0	+/- 40.6	+/- 3.7
Observations	27	80	172	118	142	100	189	48	876
Private Systems									
Distribution Mains Less Than 6"									
Percentage of systems with this size pipe	90.8	85.1	85.1	84.9	82.3	73.3	95.4	100.0	87.4
Average length of pipe	3.4	3.2	63.8	106.5	93.1	51.5	100.8	156.1	16.6
Confidence interval	+/- 5.4	+/- 1.7	+/- 89.3	+/- 130.2	+/- 97.8	+/- 33.6	+/- 53.6	+/- 39.1	+/- 14.6
Distribution Mains 6" to 10"									
Percentage of systems with this size pipe	19.2	28.0	86.7	91.6	87.1	84.5	95.4	100.0	36.3
Average length of pipe	1.2	2.4	10.1	56.3	137.9	197.1	446.6	1,435.1	17.7
Confidence interval	+/- 1.2	+/- 1.3	+/- 3.1	+/- 20.6	+/- 27.5	+/- 78.9	+/- 241.8	+/- 1,027.0	+/- 4.6
Distribution Mains Greater Than 10" and Less Than 24"									
Percentage of systems with this size pipe	0.0	2.3	17.3	37.0	86.9	73.3	95.4	100.0	6.0
Average length of pipe	*	3.3	2.1	16.8	38.6	47.8	121.3	325.1	18.2
Confidence interval	*	+/- 2.9	+/- 1.3	+/- 16.2	+/- 12.7	+/- 23.0	+/- 67.5	+/- 199.9	+/- 7.4
Distribution Mains Greater Than 24"									
Percentage of systems with this size pipe	0.0	0.0	0.0	12.9	35.5	52.2	60.6	100.0	1.0
Average length of pipe	*	*	*	2.5	4.1	10.9	28.5	60.5	9.7
Confidence interval	*	*	*	+/- 1.7	+/- 4.2	+/- 3.4	+/- 10.5	+/- 39.7	+/- 4.7
Observations	115	108	55	22	19	10	17	5	351

(Continued)

Table 49 (Cont.)
Average Size of Distribution Systems
By Diameter of Pipe and Ownership
(Length of Pipe in Miles)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems									
Distribution Mains Less Than 6"									
Percentage of systems with this size pipe	90.9	83.2	84.5	74.7	76.7	76.1	83.9	68.2	84.1
Average length of pipe	3.4	2.8	26.6	77.8	54.8	43.0	102.9	301.9	20.2
Confidence interval	+/- 4.8	+/- 1.1	+/- 26.3	+/- 67.4	+/- 30.5	+/- 10.2	+/- 15.7	+/- 90.6	+/- 9.3
Distribution Mains 6" to 10"									
Percentage of systems with this size pipe	21.0	48.7	91.4	83.5	92.2	87.5	88.0	82.6	60.7
Average length of pipe	1.4	2.8	9.5	53.8	99.8	251.6	437.8	1,770.5	35.5
Confidence interval	+/- 1.0	+/- 0.9	+/- 1.8	+/- 19.2	+/- 15.3	+/- 87.9	+/- 44.7	+/- 314.0	+/- 4.4
Distribution Mains Greater Than 10" and Less Than 24"									
Percentage of systems with this size pipe	0.0	3.1	29.3	53.5	82.9	85.5	89.5	82.6	21.0
Average length of pipe	19.9	3.0	2.5	7.2	25.1	62.8	125.7	549.9	21.1
Confidence interval	+/- 24.9	+/- 1.3	+/- 0.6	+/- 2.3	+/- 5.3	+/- 8.5	+/- 12.8	+/- 122.7	+/- 2.9
Distribution Mains Greater Than 24"									
Percentage of systems with this size pipe	0.0	0.0	2.1	3.2	27.1	64.4	72.9	67.0	4.1
Average length of pipe	9.7	0.2	0.9	2.1	6.1	13.2	34.2	138.6	15.1
Confidence interval	+/- 0.0	+/- 0.0	+/- 1.2	+/- 1.3	+/- 3.7	+/- 3.2	+/- 3.7	+/- 36.3	+/- 3.2
Observations	142	188	227	140	161	110	206	53	1,227

Data:

Q.12A

Notes:

Includes systems reporting zero miles of pipe.

Table 50
Pressure Zones and Booster Disinfection Practices
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Average number of pressure zones in the distribution system	1.4	1.2	1.5	2.5	3.6	5.1	6.5	20.7	1.6
<i>Confidence interval</i>	+/- 0.3	+/- 0.1	+/- 0.4	+/- 1.2	+/- 2.6	+/- 2.9	+/- 2.3	+/- 13.7	+/- 0.2
Average number of pressure zones with booster disinfection stations	0.0	0.0	0.0	0.6	0.3	0.5	0.5	0.5	0.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.4	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.5	+/- 0.0
Average number of booster disinfection stations in the distribution system	0.0	0.0	0.1	0.5	0.2	1.2	0.8	0.5	0.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.1	+/- 0.3	+/- 0.1	+/- 0.9	+/- 0.3	+/- 0.5	+/- 0.0
Primarily Surface Water Systems									
Average number of pressure zones in the distribution system	1.6	1.6	1.8	2.3	3.7	4.2	8.4	31.3	3.2
<i>Confidence interval</i>	+/- 0.4	+/- 0.5	+/- 0.3	+/- 0.5	+/- 1.0	+/- 1.2	+/- 2.4	+/- 9.4	+/- 0.4
Average number of pressure zones with booster disinfection stations	0.0	0.1	0.1	0.3	0.3	0.6	0.9	3.1	0.3
<i>Confidence interval</i>	+/- 0.0	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.4	+/- 0.3	+/- 1.4	+/- 0.1
Average number of booster disinfection stations in the distribution system	0.0	0.1	0.1	0.3	0.5	0.6	1.5	5.4	0.4
<i>Confidence interval</i>	+/- 0.0	+/- 0.2	+/- 0.1	+/- 0.2	+/- 0.3	+/- 0.3	+/- 0.4	+/- 3.9	+/- 0.1

(Continued)

Table 50 (Cont.)
Pressure Zones and Booster Disinfection Practices
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Average number of pressure zones in the distribution system	1.3	2.7	1.8	4.0	2.7	6.2	8.7	10.1	2.5
<i>Confidence interval</i>	+/- 0.4	+/- 2.0	+/- 0.8	+/- 3.1	+/- 1.0	+/- 2.0	+/- 2.0	+/- 6.9	+/- 0.7
Average number of pressure zones with booster disinfection stations	0.3	0.2	0.3	0.6	0.4	0.5	2.3	2.1	0.4
<i>Confidence interval</i>	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.5	+/- 0.5	+/- 0.3	+/- 1.0	+/- 1.8	+/- 0.2
Average number of booster disinfection stations in the distribution system	0.3	0.2	0.4	0.8	0.4	0.6	5.5	5.9	0.4
<i>Confidence interval</i>	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.5	+/- 0.4	+/- 0.3	+/- 4.2	+/- 6.5	+/- 0.2
All Systems									
Average number of pressure zones in the distribution system	1.4	1.5	1.6	2.8	3.4	5.0	8.1	24.7	1.9
<i>Confidence interval</i>	+/- 0.2	+/- 0.3	+/- 0.3	+/- 1.0	+/- 1.3	+/- 1.2	+/- 1.5	+/- 6.9	+/- 0.2
Average number of pressure zones with booster disinfection stations	0.0	0.0	0.1	0.5	0.3	0.5	1.1	2.5	0.1
<i>Confidence interval</i>	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.3	+/- 1.0	+/- 0.0
Average number of booster disinfection stations in the distribution system	0.0	0.0	0.1	0.5	0.3	0.8	2.2	4.9	0.2
<i>Confidence interval</i>	+/- 0.0	+/- 0.0	+/- 0.1	+/- 0.2	+/- 0.1	+/- 0.3	+/- 0.9	+/- 2.9	+/- 0.0

Data: Q.13.A

Notes:

Table 51
Number of Annual Pressure Losses below 20 PSI
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Pressure losses due to power outage	0.3	0.2	0.1	0.9	0.0	0.0	0.1	0.0	0.2
<i>Confidence interval</i>	<i>+/- 0.2</i>	<i>+/- 0.2</i>	<i>+/- 0.1</i>	<i>+/- 1.3</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>
Pressure losses due to fire	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.3	0.0
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.4</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.2</i>	<i>+/- 0.4</i>	<i>+/- 0.0</i>
Pressure losses due to main pipeline burst	0.3	0.9	1.4	1.3	1.9	10.6	17.2	2.4	1.0
<i>Confidence interval</i>	<i>+/- 0.2</i>	<i>+/- 1.1</i>	<i>+/- 1.4</i>	<i>+/- 1.0</i>	<i>+/- 1.6</i>	<i>+/- 7.9</i>	<i>+/- 10.8</i>	<i>+/- 1.0</i>	<i>+/- 0.5</i>
Pressure losses due to other reasons	0.1	0.0	0.0	1.5	0.1	6.2	16.2	0.0	0.2
<i>Confidence interval</i>	<i>+/- 0.1</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 2.2</i>	<i>+/- 0.2</i>	<i>+/- 7.3</i>	<i>+/- 15.3</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>
Primarily Surface Water Systems									
Pressure losses due to power outage	0.6	0.3	0.0	0.2	0.3	0.0	0.3	0.3	0.2
<i>Confidence interval</i>	<i>+/- 0.9</i>	<i>+/- 0.4</i>	<i>+/- 0.1</i>	<i>+/- 0.3</i>	<i>+/- 0.4</i>	<i>+/- 0.0</i>	<i>+/- 0.3</i>	<i>+/- 0.2</i>	<i>+/- 0.1</i>
Pressure losses due to fire	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.0
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.4</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>	<i>+/- 0.1</i>
Pressure losses due to main pipeline burst	0.3	1.1	1.0	2.0	7.3	10.3	11.5	4.3	3.2
<i>Confidence interval</i>	<i>+/- 0.4</i>	<i>+/- 1.6</i>	<i>+/- 1.1</i>	<i>+/- 1.5</i>	<i>+/- 7.3</i>	<i>+/- 6.8</i>	<i>+/- 8.8</i>	<i>+/- 4.3</i>	<i>+/- 1.6</i>
Pressure losses due to other reasons	0.4	0.0	0.0	1.2	2.3	0.6	6.5	1.8	1.1
<i>Confidence interval</i>	<i>+/- 0.5</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 1.8</i>	<i>+/- 3.8</i>	<i>+/- 1.1</i>	<i>+/- 8.8</i>	<i>+/- 1.7</i>	<i>+/- 0.9</i>

(Continued)

Table 51 (Cont.)
Number of Annual Pressure Losses below 20 PSI
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Pressure losses due to power outage	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0
<i>Confidence interval</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.4</i>	<i>+/- 0.2</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>
Pressure losses due to fire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>
Pressure losses due to main pipeline burst	0.0	4.6	2.1	1.6	1.1	1.4	8.7	7.9	2.7
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 8.2</i>	<i>+/- 3.4</i>	<i>+/- 1.6</i>	<i>+/- 1.5</i>	<i>+/- 1.6</i>	<i>+/- 6.8</i>	<i>+/- 9.3</i>	<i>+/- 2.9</i>
Pressure losses due to other reasons	0.0	0.0	0.1	0.0	0.2	2.9	12.0	0.3	0.2
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.3</i>	<i>+/- 4.1</i>	<i>+/- 15.5</i>	<i>+/- 0.3</i>	<i>+/- 0.2</i>
All Systems									
Pressure losses due to power outage	0.3	0.2	0.0	0.6	0.2	0.1	0.2	0.1	0.2
<i>Confidence interval</i>	<i>+/- 0.2</i>	<i>+/- 0.2</i>	<i>+/- 0.0</i>	<i>+/- 0.9</i>	<i>+/- 0.2</i>	<i>+/- 0.1</i>	<i>+/- 0.2</i>	<i>+/- 0.1</i>	<i>+/- 0.1</i>
Pressure losses due to fire	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.1	0.0
<i>Confidence interval</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.3</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 0.1</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>
Pressure losses due to main pipeline burst	0.3	1.5	1.5	1.5	3.3	8.1	12.5	5.1	1.5
<i>Confidence interval</i>	<i>+/- 0.2</i>	<i>+/- 1.5</i>	<i>+/- 1.2</i>	<i>+/- 0.7</i>	<i>+/- 2.3</i>	<i>+/- 4.1</i>	<i>+/- 5.8</i>	<i>+/- 4.1</i>	<i>+/- 0.6</i>
Pressure losses due to other reasons	0.1	0.0	0.0	1.2	0.8	3.4	10.1	0.9	0.3
<i>Confidence interval</i>	<i>+/- 0.1</i>	<i>+/- 0.0</i>	<i>+/- 0.0</i>	<i>+/- 1.4</i>	<i>+/- 1.1</i>	<i>+/- 3.1</i>	<i>+/- 7.0</i>	<i>+/- 0.8</i>	<i>+/- 0.1</i>

Data:

Q.13.B

Notes:

Table 52
System Flushing Practices
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Percentage of systems that flush their distribution system on a regular basis	31.8	70.4	87.5	88.0	91.5	85.4	75.3	64.1	65.3
Of the systems that flush on a regular basis:									
Average percentage of systems flushed each year	98.9	98.5	94.2	77.9	75.9	44.1	52.3	72.9	93.8
Percentage of systems that use each type of the following approaches:									
Uni-directional	7.0	12.4	21.5	26.4	41.3	47.5	46.5	81.3	17.8
Conventional or random	40.0	60.6	60.2	71.5	68.1	64.8	67.3	100.0	58.9
Dead end	63.4	52.2	43.7	85.3	72.2	89.2	89.2	100.0	55.1
Other	0.0	1.4	2.0	1.8	5.3	3.2	13.6	0.0	1.7
Of systems that do not flush on a regular basis:									
Percentage that flushed their system once	5.1	17.3	14.1	13.4	28.0	0.0	16.9	0.0	10.0
Percentage that flushed their system more than one time	3.5	16.1	32.8	61.0	0.0	18.6	16.2	0.0	11.0
Average number of years between last two system flushes	1.0	2.2	1.2	4.3	*	1.0	1.5	*	1.9
Primarily Surface Water Systems									
Percentage of systems that flush their distribution system on a regular basis	32.4	53.9	82.7	76.1	87.0	80.9	69.2	55.3	72.2
Of systems that flush on a regular basis:									
Average percentage of system flushed each year	89.7	92.8	87.3	82.5	78.3	70.3	63.4	36.4	82.3
Percentage of systems that use each type of the following approaches:									
Uni-directional	25.5	13.4	23.2	22.0	30.1	21.2	40.0	61.9	24.8
Conventional or random	27.2	77.8	59.9	73.1	71.4	85.7	75.0	71.4	68.1
Dead end	39.2	40.4	48.0	78.0	78.0	80.0	82.2	66.7	62.9
Other	14.2	1.0	0.0	4.9	4.0	8.6	13.2	14.3	3.8
Of systems that do not flush on a regular basis:									
Percentage that flushed their system once	3.0	5.6	56.2	23.1	12.2	0.0	11.3	29.4	17.6
Percentage that flushed their system more than one time	0.0	2.6	13.1	30.9	61.2	5.2	26.3	17.6	15.1
Average number of years between last two system flushes	*	1.0	1.0	3.3	2.2	1.0	1.6	1.0	2.2

(Continued)

**Table 52 (Cont.)
System Flushing Practices
By Primary Water Source**

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems									
Percentage of systems that flush their distribution system on a regular basis	49.3	78.8	86.1	86.2	76.4	71.0	85.1	35.9	79.8
Of systems that flush on a regular basis:									
Average percentage of system flushed each year	100.0	91.5	97.3	69.4	44.3	58.1	59.0	43.8	88.7
Percentage of systems that use each type of the following approaches:									
Uni-directional	67.9	6.6	28.6	33.0	11.3	53.1	59.8	75.0	25.1
Conventional or random	66.1	65.4	46.3	41.5	72.2	62.6	70.2	75.0	54.0
Dead end	33.9	53.3	44.5	98.4	80.4	82.2	85.2	100.0	55.4
Other	0.0	0.0	0.0	10.6	8.2	11.2	15.0	0.0	2.0
Of systems that do not flush on a regular basis:									
Percentage that flushed their system once	0.0	0.0	15.3	39.8	0.0	14.5	16.0	14.0	8.0
Percentage that flushed their system more than one time	66.1	24.6	30.7	50.0	36.7	14.5	52.1	0.0	38.6
Average number of years between last two system flushes	1.0	1.0	4.5	1.0	1.0	1.0	1.0	*	1.8
All Systems									
Percentage of systems that flush their distribution system on a regular basis	32.9	71.0	86.7	85.3	87.6	80.2	73.9	52.9	68.4
Of systems that flush on a regular basis:									
Average percentage of system flushed each year	98.7	97.2	94.5	76.5	71.4	57.4	59.6	43.8	91.8
Percentage of systems that use each type of the following approaches:									
Uni-directional	13.6	11.5	23.5	27.3	33.6	38.5	46.3	66.9	19.9
Conventional or random	42.3	61.9	56.4	64.2	69.6	72.5	71.9	76.7	58.7
Dead end	59.7	52.0	44.2	87.4	75.0	84.1	84.7	76.6	55.8
Other	0.4	1.1	1.3	4.6	5.4	7.0	13.7	10.0	2.0
Of systems that do not flush on a regular basis:									
Percentage that flushed their system once	4.8	14.7	18.8	22.6	14.0	5.1	13.2	22.3	10.3
Percentage that flushed their system more than one time	6.5	16.2	30.2	49.2	29.6	12.2	26.9	11.3	14.4
Average number of years between last two system flushes	1.0	2.0	2.2	3.3	1.7	1.0	1.5	1.0	1.9

Data:

Q.14, Q.15, Q.16, Q.17

Notes:

The questionnaire did not define "regular basis."

Table 53
Seasonal Disinfection Residuals for Entry Points and Distribution Systems

Season	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Summer (June through September)									
Average entry point disinfectant residual for the treatment plant with the highest average daily flow (mg/L as Cl ₂)									
Ground water treatment plants									
Total Cl ₂	1.65	1.10	1.48	1.52	1.47	2.05	2.37	1.89	1.76
Free Cl ₂	1.02	1.09	1.15	0.99	3.39	0.93	0.68	0.40	1.31
Surface water treatment plants (including mixed plants)									
Total Cl ₂	1.93	1.71	1.85	1.96	2.15	2.41	2.45	2.13	2.23
Free Cl ₂	0.94	1.18	1.44	1.37	1.37	1.38	1.03	1.02	1.23
Average distribution system residual (mg/L as Cl ₂)									
Ground water treatment plants									
Total Cl ₂	1.04	0.78	1.01	1.11	1.13	1.86	1.66	1.54	1.33
Free Cl ₂	0.77	0.81	0.62	0.77	2.66	0.63	0.54	0.51	0.94
Surface water treatment plants (including mixed plants)									
Total Cl ₂	0.83	1.38	1.26	1.41	1.68	1.58	1.64	1.63	1.56
Free Cl ₂	0.65	0.63	0.70	0.77	0.94	0.87	0.66	0.75	0.74
Average percentage of systems samples <0.2 mg/L (including non-detects), total Cl ₂	7.6	5.6	4.9	3.7	7.5	5.3	2.7	4.8	5.0

(Continued)

Table 53 (Cont.)
Seasonal Disinfection Residuals for Entry Points and Distribution Systems

Season	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Winter (December, January, and February)									
Average entry point disinfectant residual for the treatment plant with the highest average daily flow (mg/L as Cl ₂)									
Ground water treatment plants									
Total Cl ₂	1.65	1.06	1.36	1.43	1.49	2.19	2.43	1.86	1.76
Free Cl ₂	0.96	1.10	1.11	1.07	3.10	0.91	0.73	0.43	1.27
Surface water treatment plants (including mixed plants)									
Total Cl ₂	1.70	3.50	1.91	2.02	2.07	2.45	2.31	2.04	2.18
Free Cl ₂	0.91	1.19	1.43	1.33	1.30	1.35	1.01	0.97	1.20
Average distribution system residual (mg/L as Cl ₂)									
Ground water treatment plants									
Total Cl ₂	0.96	0.78	0.91	0.97	1.14	1.75	1.83	1.46	1.31
Free Cl ₂	0.75	0.85	0.64	0.80	2.92	0.64	0.58	0.53	0.99
Surface water treatment plants (including mixed plants)									
Total Cl ₂	1.24	1.35	1.34	1.49	1.76	1.77	1.74	1.65	1.65
Free Cl ₂	0.69	0.66	0.75	0.85	1.05	0.97	0.75	0.79	0.81
Average percentage of systems samples <0.2 mg/L (including non-detects), total Cl ₂									
	5.5	5.6	5.7	2.9	6.5	4.5	2.2	4.9	4.6

Data:

Q.18

Notes:

If system has more than one treatment plant, the residuals reported are for the plant with the highest average daily flow.

The estimate of distribution system residuals distinguishes between ground and surface water plants. The distribution system is characterized as ground water if the largest treatment plant treats ground water. If the largest treatment plant treats surface water or surface and ground water, the distribution system is characterized as surface water.

Table 54
Water Security Awareness and Security Barriers
By Ownership
(Percentage of Systems)

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	
Public Systems									
Attended EPA-sponsored water security training	48.4	33.0	27.5	54.7	55.8	60.2	79.5	87.1	39.3
Used EPA Web-based water security technology product guides	0.0	12.7	10.0	21.4	30.0	37.3	50.8	68.3	15.6
Heard of EPA's Response Protocol Toolbox	23.1	22.3	18.7	39.7	38.9	47.8	75.5	85.4	27.2
Heard of the 14 features of an "active and effective" water security program	9.2	15.1	16.9	24.1	23.0	27.4	45.0	53.6	18.7
Heard of mutual aid and assistance agreements/compacts	56.8	60.6	68.5	56.5	58.5	68.5	83.2	88.9	63.3
Interested in joining such an agreement or compact	68.9	60.3	56.0	73.3	65.7	80.9	71.3	72.7	62.0
Barriers to enhancing security									
Lack of interest at the system, public, or rate board level	31.0	54.7	46.4	54.0	57.5	64.4	71.1	71.7	50.8
Competing priorities (regulatory compliance, aging infrastructure, etc.)	74.1	63.9	70.6	64.9	64.8	64.7	57.5	49.9	67.3
Lack of funding	33.9	25.1	27.0	12.7	12.5	13.0	9.6	1.9	22.4
Lack of knowledge / guidance / training materials	9.4	8.9	18.5	24.4	9.5	9.6	4.4	12.8	15.0
Other	17.2	25.9	21.6	22.6	34.0	31.4	32.8	37.7	24.5
Preferred sources of water security information and products									
Department of Homeland Security	0.0	4.3	3.4	12.9	5.2	14.4	9.6	16.4	5.4
EPA	25.7	8.4	5.4	11.6	10.0	9.5	21.3	14.9	9.2
Water Associations	48.1	38.1	35.9	35.1	36.7	28.4	24.0	19.0	36.7
No preference	17.8	42.5	44.5	31.8	38.4	40.7	36.8	42.4	39.6
Other	7.8	0.3	9.9	5.0	5.3	2.6	5.3	5.5	6.0
Private Systems									
Attended EPA-sponsored water security training	17.4	19.9	30.9	71.4	35.5	58.4	79.3	100.0	23.0
Used EPA Web-based water security technology product guides	3.9	7.7	5.7	22.6	7.7	21.3	17.3	24.4	6.5
Heard of EPA's Response Protocol Toolbox	6.6	10.7	17.0	41.0	33.6	55.0	35.1	87.8	11.6
Heard of the 14 features of an "active and effective" water security program	2.7	14.4	28.8	41.7	6.9	26.9	24.9	63.4	12.8
Heard of mutual aid and assistance agreements/compacts	19.4	28.3	55.2	55.1	13.6	46.1	38.8	87.8	29.7
Interested in joining such an agreement or compact	39.6	38.5	48.5	59.6	37.1	61.1	26.3	72.2	43.2
Systems reporting the following barriers to enhancing security									
Lack of interest at the system, public, or rate board level	22.3	32.1	40.2	56.2	54.6	65.2	44.7	36.6	30.6
Competing priorities (regulatory compliance, aging infrastructure, etc.)	47.0	44.2	58.6	53.8	13.7	47.1	38.8	12.2	47.5
Lack of funding	37.9	39.5	36.1	16.5	4.3	16.9	10.5	0.0	36.9
Lack of knowledge / guidance / training materials	22.9	22.2	10.6	10.9	12.9	25.8	0.0	0.0	20.1
Other	44.1	37.6	41.7	41.2	62.1	37.1	62.1	100.0	41.4
Preferred sources of water security information and products									
Department of Homeland Security	1.2	0.0	2.5	8.3	8.6	16.9	33.9	12.2	1.4
EPA	2.7	10.8	6.1	15.9	17.1	7.9	17.0	48.8	7.1
Water Associations	21.8	20.9	41.6	31.0	12.9	21.3	6.8	0.0	24.6
No preference	46.6	52.8	32.1	31.5	38.6	53.9	14.2	38.9	46.1
Other	12.8	10.8	13.5	8.2	0.0	0.0	24.8	0.0	11.8

(Continued)

Table 54 (Cont.)
Water Security Awareness and Security Barriers
By Ownership
(Percentage of Systems)

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	
All Systems									
Attended EPA-sponsored water security training	21.5	25.0	28.4	58.2	54.1	60.0	79.5	88.8	31.3
Used EPA Web-based water security technology product guides	3.3	9.6	8.8	21.7	28.2	35.8	46.8	62.5	11.1
Heard of EPA's Response Protocol Toolbox	8.8	15.1	18.2	40.0	38.5	48.5	70.7	85.7	19.5
Heard of the 14 features of an "active and effective" water security program	3.5	14.7	20.1	27.8	21.7	27.4	42.6	54.9	15.8
Heard of mutual aid and assistance agreements/compacts	24.3	40.7	64.9	56.2	54.8	66.3	77.9	88.7	46.7
Interested in joining such an agreement or compact	48.6	50.9	54.2	70.5	65.1	79.6	68.6	72.6	56.1
Systems reporting the following barriers to enhancing security									
Lack of interest at the system, public, or rate board level	23.4	40.7	44.7	54.5	57.3	64.5	68.0	67.0	40.8
Competing priorities (regulatory compliance, aging infrastructure, etc.)	50.5	51.8	67.4	62.6	60.6	63.0	55.2	44.9	57.5
Lack of funding	37.4	34.0	29.5	13.5	11.8	13.4	9.7	1.6	29.6
Lack of knowledge / guidance / training materials	21.1	17.1	16.4	21.6	9.8	11.1	3.8	11.1	17.5
Other	40.6	33.1	27.0	26.5	36.3	32.0	36.3	46.0	32.8
Preferred sources of water security information and products									
Department of Homeland Security	1.0	1.7	3.2	12.0	5.4	14.6	12.5	15.8	3.4
EPA	5.8	9.9	5.5	12.5	10.6	9.3	20.8	19.4	8.2
Water Associations	25.3	27.5	37.5	34.2	34.7	27.7	22.0	16.4	30.7
No preference	42.8	48.9	41.1	31.7	38.4	41.9	34.1	42.0	42.8
Other	12.1	6.8	10.9	5.7	4.8	2.4	7.6	4.8	8.9

Data:

Q.20

Notes:

Table 55
Water Security Awareness and Security Barriers
By Ownership
(Percentage of Systems)

Ownership Type	System Service Population Category				
	25 - 3,300	3,301 - 49,999	50,000 - 99,999	Over 100,000	All Sizes
Public Systems					
Attended EPA-sponsored water security training	31.2	55.2	60.2	80.8	39.3
Used EPA Web-based water security technology product guides	10.1	25.3	37.3	53.8	15.6
Heard of EPA's Response Protocol Toolbox	20.3	39.4	47.8	77.2	27.2
Heard of the 14 features of an "active and effective" water security program	15.6	23.6	27.4	46.5	18.7
Heard of mutual aid and assistance agreements/compacts	64.7	57.4	68.5	84.2	63.3
Interested in joining such an agreement or compact	58.3	69.8	80.9	71.6	62.0
Barriers to enhancing security					
Lack of interest at the system, public, or rate board level	47.9	55.6	64.4	71.2	50.8
Competing priorities (regulatory compliance, aging infrastructure, etc.)	68.6	64.9	64.7	56.2	67.3
Lack of funding	27.0	12.6	13.0	8.3	22.4
Lack of knowledge / guidance / training materials	14.4	17.6	9.6	5.8	15.0
Other	22.7	27.8	31.4	33.6	24.5
Preferred sources of water security information and products					
Department of Homeland Security	3.4	9.4	14.4	10.7	5.4
EPA	8.2	10.9	9.5	20.2	9.2
Water Associations	37.7	35.8	28.4	23.2	36.7
No preference	41.5	34.8	40.7	37.8	39.6
Other	6.4	5.1	2.6	5.3	6.0
Private Systems					
Attended EPA-sponsored water security training	20.6	63.3	58.4	83.2	23.0
Used EPA Web-based water security technology product guides	5.7	19.3	21.3	18.6	6.5
Heard of EPA's Response Protocol Toolbox	9.9	39.4	55.0	45.0	11.6
Heard of the 14 features of an "active and effective" water security program	11.6	33.9	26.9	32.1	12.8
Heard of mutual aid and assistance agreements/compacts	28.7	45.8	46.1	48.0	29.7
Interested in joining such an agreement or compact	41.8	58.1	61.1	42.0	43.2
Systems reporting the following barriers to enhancing security					
Lack of interest at the system, public, or rate board level	29.1	55.8	65.2	43.2	30.6
Competing priorities (regulatory compliance, aging infrastructure, etc.)	47.7	44.8	47.1	33.8	47.5
Lack of funding	38.3	13.8	16.9	8.5	36.9
Lack of knowledge / guidance / training materials	20.6	11.3	25.8	0.0	20.1
Other	41.1	45.9	37.1	69.2	41.4
Preferred sources of water security information and products					
Department of Homeland Security	0.9	8.4	16.9	29.8	1.4
EPA	6.6	16.2	7.9	22.9	7.1
Water Associations	24.6	26.9	21.3	5.5	24.6
No preference	46.8	33.1	53.9	18.8	46.1
Other	12.1	6.3	0.0	20.1	11.8

Table 55 (Cont.)
Water Security Awareness and Security Barriers
By Ownership
(Percentage of Systems)

Ownership Type	System Service Population Category				
	25 - 3,300	3,301 - 49,999	50,000 - 99,999	Over 100,000	All Sizes
All Systems					
Attended EPA-sponsored water security training	25.1	56.5	60.0	81.1	31.3
Used EPA Web-based water security technology product guides	7.6	24.4	35.8	49.5	11.1
Heard of EPA's Response Protocol Toolbox	14.4	39.4	48.5	73.3	19.5
Heard of the 14 features of an "active and effective" water security program	13.3	25.2	27.4	44.7	15.8
Heard of mutual aid and assistance agreements/compacts	44.1	55.6	66.3	79.8	46.7
Interested in joining such an agreement or compact	52.2	68.3	79.6	69.4	56.1
Systems reporting the following barriers to enhancing security					
Lack of interest at the system, public, or rate board level	37.2	55.7	64.5	67.8	40.8
Competing priorities (regulatory compliance, aging infrastructure, etc.)	56.6	61.7	63.0	53.4	57.5
Lack of funding	33.5	12.8	13.4	8.3	29.6
Lack of knowledge / guidance / training materials	18.0	16.6	11.1	5.1	17.5
Other	33.2	30.6	32.0	37.9	32.8
Preferred sources of water security information and products					
Department of Homeland Security	2.0	9.2	14.6	13.0	3.4
EPA	7.3	11.7	9.3	20.6	8.2
Water Associations	30.2	34.4	27.7	21.0	30.7
No preference	44.5	34.5	41.9	35.5	42.8
Other	9.7	5.3	2.4	7.1	8.9

Data: Q.20

Notes:

Table 56
Service Connections Profile
By Ownership
(Number of Connections)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean Residential Connections	50	115	512	2,724	6,831	18,279	39,311	184,684	3,385
<i>Confidence Interval</i>	+/- 2	+/- 25	+/- 67	+/- 1,587	+/- 977	+/- 1,335	+/- 3,834	+/- 36,091	+/- 399
Median Residential Connections	36	105	355	1,701	5,500	17,176	34,345	148,473	320
Mean Non-Residential Connections	7	14	51	366	561	1,536	3,816	15,349	310
<i>Confidence Interval</i>	+/- 5	+/- 8	+/- 11	+/- 313	+/- 103	+/- 410	+/- 362	+/- 3,502	+/- 45
Median Non-Residential Connections	3	5	35	160	450	1,395	3,296	12,641	37
Observations	25	84	181	127	156	111	204	52	940
Private Systems									
Mean Residential Connections	24	88	602	1,686	5,378	65,938	92,001	333,021	2,662
<i>Confidence Interval</i>	+/- 11	+/- 31	+/- 495	+/- 528	+/- 1,262	+/- 76,266	+/- 32,527	+/- 100,565	+/- 1,448
Median Residential Connections	23	65	310	1,855	4,628	17,331	64,279	424,185	50
Mean Non-Residential Connections	17	24	29	55	95	8,917	8,113	30,696	236
<i>Confidence Interval</i>	+/- 14	+/- 40	+/- 20	+/- 34	+/- 97	+/- 10,378	+/- 3,158	+/- 10,367	+/- 141
Median Non-Residential Connections	4	1	10	10	10	2,643	6,543	40,152	5
Observations	117	111	56	27	20	12	21	6	370
All Systems									
Mean Residential Connections	30	110	527	2,422	6,770	21,243	47,035	204,696	3,217
<i>Confidence Interval</i>	+/- 11	+/- 21	+/- 100	+/- 1,150	+/- 937	+/- 5,447	+/- 8,357	+/- 43,351	+/- 405
Median Residential Connections	24	77	347	1,768	5,400	17,331	39,302	168,670	120
Mean Non-Residential Connections	15	16	48	276	542	1,995	4,446	17,419	293
<i>Confidence Interval</i>	+/- 11	+/- 11	+/- 10	+/- 228	+/- 100	+/- 856	+/- 737	+/- 4,319	+/- 44
Median Non-Residential Connections	4	5	33	116	435	1,395	3,475	14,362	25
Observations	142	195	237	154	176	123	225	58	1,310

Data:

Q.21A

Notes

Table 57
Population Served
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean Population Served Directly by System	65	259	1,241	4,989	18,845	53,621	136,788	792,060	9,611
<i>Confidence Interval</i>	+/- 14	+/- 31	+/- 127	+/- 420	+/- 2,039	+/- 3,867	+/- 10,146	+/- 198,330	+/- 1,205
Mean Population Served per Residential Connection	2.0	3.8	2.9	2.9	3.0	3.2	3.7	6.6	3.1
<i>Confidence Interval</i>	+/- 1	+/- 2	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 4	+/- 1
Mean Population Served through Sales to Other Systems	0	1	20	504	2,574	15,350	63,005	454,076	3,272
<i>Confidence Interval</i>	+/- 0	+/- 1	+/- 19	+/- 195	+/- 729	+/- 3,856	+/- 10,802	+/- 122,082	+/- 559
Mean Total Population Served	65	259	1,260	5,493	21,420	68,971	199,793	1,246,136	12,884
<i>Confidence Interval</i>	+/- 14	+/- 31	+/- 128	+/- 395	+/- 1,908	+/- 3,117	+/- 9,037	+/- 228,454	+/- 1,517
Observations	27	84	181	127	156	111	204	52	942
Private Systems									
Mean Population Served Directly by System	59	237	1,191	5,818	20,223	42,684	217,830	902,748	1,874
<i>Confidence Interval</i>	+/- 5	+/- 25	+/- 196	+/- 953	+/- 5,458	+/- 14,959	+/- 63,920	+/- 262,723	+/- 651
Mean Population Served per Residential Connection	4.2	3.3	3.4	3.0	2.9	2.9	3.0	3.0	3.6
<i>Confidence Interval</i>	+/- 2	+/- 0	+/- 1	+/- 1	+/- 0	+/- 2	+/- 0	+/- 0	+/- 1
Mean Population Served through Sales to Other Systems	0	0	1	273	3,926	26,657	41,707	85,420	266
<i>Confidence Interval</i>	+/- 0	+/- 0	+/- 2	+/- 250	+/- 3,064	+/- 13,910	+/- 24,732	+/- 54,977	+/- 92
Mean Total Population Served	59	238	1,192	6,090	24,148	69,341	259,536	988,168	2,140
<i>Confidence Interval</i>	+/- 5	+/- 25	+/- 196	+/- 877	+/- 5,459	+/- 6,088	+/- 52,344	+/- 213,177	+/- 681
Observations	118	111	56	27	20	13	21	6	372
All Systems									
Mean Population Served Directly by System	60	246	1,227	5,165	18,960	52,540	146,908	807,248	5,795
<i>Confidence Interval</i>	+/- 4	+/- 19	+/- 106	+/- 392	+/- 1,930	+/- 3,830	+/- 14,605	+/- 176,717	+/- 565
Mean Population Served per Residential Connection	3.9	3.5	3.0	2.9	3.0	3.2	3.6	6.1	3.4
<i>Confidence Interval</i>	+/- 2	+/- 1	+/- 0	+/- 0	+/- 0	+/- 0	+/- 0	+/- 4	+/- 1
Mean Population Served through Sales to Other Systems	0	0	15	455	2,686	16,468	60,345	403,489	1,789
<i>Confidence Interval</i>	+/- 0	+/- 1	+/- 14	+/- 163	+/- 715	+/- 3,844	+/- 10,240	+/- 110,783	+/- 250
Mean Total Population Served	60	246	1,242	5,620	21,646	69,008	207,254	1,210,737	7,584
<i>Confidence Interval</i>	+/- 4	+/- 19	+/- 107	+/- 365	+/- 1,807	+/- 2,875	+/- 11,898	+/- 198,102	+/- 646
Observations	145	195	237	154	176	124	225	58	1,314

Data:

Q.21A

Notes:

Table 58
Total Water System Revenue and Revenue Per Thousand Gallons Delivered
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Mean Revenue in Thousands of Dollars	8	23	183	447	2,122	6,275	14,810	125,197	318
Confidence Interval	+/- 4	+/- 6	+/- 60	+/- 140	+/- 649	+/- 1,844	+/- 3,986	+/- 42,382	+/- 66
Median Revenue in Thousands of Dollars	0	17	125	199	1,399	6,575	8,597	168,169	16
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	2.60	2.97	4.29	3.62	2.91	3.49	4.39	2.08	3.26
Confidence Interval	+/- 1.42	+/- 0.77	+/- 1.45	+/- 1.21	+/- 0.54	+/- 0.65	+/- 2.57	+/- 0.12	+/- 0.63
Observations	88	105	111	62	66	40	56	6	534
Primarily Surface Water Systems									
Mean Revenue in Thousands of Dollars	24	66	354	726	2,639	17,543	27,851	148,038	5,558
Confidence Interval	+/- 13	+/- 34	+/- 98	+/- 201	+/- 592	+/- 13,702	+/- 7,123	+/- 29,058	+/- 1,158
Median Revenue in Thousands of Dollars	23	17	240	607	2,110	7,206	16,860	95,200	231
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	6.00	5.18	5.75	3.62	3.91	5.10	2.88	2.53	4.78
Confidence Interval	+/- 4.49	+/- 3.05	+/- 1.32	+/- 0.58	+/- 0.73	+/- 2.42	+/- 0.32	+/- 0.25	+/- 0.76
Observations	49	67	78	65	85	54	124	39	561
Primarily Purchased Water Systems									
Mean Revenue in Thousands of Dollars	20	56	1,001	632	3,234	9,606	29,676	94,925	1,520
Confidence Interval	+/- 16	+/- 38	+/- 1,163	+/- 196	+/- 1,276	+/- 2,801	+/- 5,027	+/- 42,503	+/- 569
Median Revenue in Thousands of Dollars	10	28	138	608	1,916	7,923	23,757	86,020	93
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	4.94	5.77	5.68	4.53	3.60	3.64	4.97	2.55	5.32
Confidence Interval	+/- 1.01	+/- 2.79	+/- 1.64	+/- 1.14	+/- 0.61	+/- 1.64	+/- 1.62	+/- 1.01	+/- 1.04
Observations	8	23	48	26	25	30	45	13	218
All Systems									
Mean Revenue in Thousands of Dollars	9	29	418	543	2,492	11,463	25,042	132,404	996
Confidence Interval	+/- 4	+/- 8	+/- 326	+/- 99	+/- 462	+/- 5,418	+/- 4,302	+/- 23,226	+/- 145
Median Revenue in Thousands of Dollars	0	17	130	390	1,634	7,008	17,092	95,200	24
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	2.91	3.44	4.78	3.89	3.32	4.20	3.63	2.49	3.76
Confidence Interval	+/- 1.28	+/- 0.78	+/- 1.06	+/- 0.72	+/- 0.37	+/- 1.11	+/- 0.67	+/- 0.28	+/- 0.52
Observations	145	195	237	153	176	124	225	58	1,313

Data: Q.21

Notes:

Total water system revenue includes revenue from water sales to residential and non-residential customers and to other systems; fees; transfers from the government including municipal government transfers from the general fund; and other sources including penalties and fines.

Table 59
Total Water System Revenue
By Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean	37	49	477	523	2,569	7,732	21,999	136,101	1,607
<i>Confidence Interval</i>	+/- 23	+/- 17	+/- 440	+/- 104	+/- 494	+/- 1,210	+/- 2,509	+/- 26,199	+/- 254
Median	17	31	144	411	1,696	7,008	16,286	94,936	108
Number of Systems Reporting Zero Revenue	4	12	8	46	37	25	42	3	177
Observations	27	84	181	127	156	111	204	52	942
Private Systems									
Ancillary Systems									
Mean	1	5	50	N/A	N/A	N/A	N/A	N/A	5
<i>Confidence Interval</i>	+/- 1	+/- 4	+/- 66	N/A	N/A	N/A	N/A	N/A	+/- 3
Median	0	0	0	N/A	N/A	N/A	N/A	N/A	0
Number of Systems Reporting Zero Revenue	53	32	5	N/A	N/A	N/A	N/A	N/A	90
Observations	61	43	7	N/A	N/A	N/A	N/A	N/A	111
Other Private Systems									
Mean	9	25	281	618	1,633	46,432	47,430	108,252	608
<i>Confidence Interval</i>	+/- 4	+/- 8	+/- 218	+/- 270	+/- 980	+/- 52,013	+/- 22,189	+/- 48,116	+/- 310
Median	5	18	111	390	1,330	6,783	35,898	168,169	13
Number of Systems Reporting Zero Revenue	17	17	11	10	9	5	6	2	77
Observations	57	68	49	26	20	13	21	6	260
All Private Systems									
Mean	5	17	259	618	1,633	46,432	47,430	108,252	370
<i>Confidence Interval</i>	+/- 2	+/- 6	+/- 203	+/- 275	+/- 1,023	+/- 52,350	+/- 22,162	+/- 47,872	+/- 172
Median	0	3	103	390	1,330	6,783	35,898	168,169	1
Number of Systems Reporting Zero Revenue	70	49	16	10	9	5	6	2	167
Observations	118	111	56	26	20	13	21	6	371

Data: Q.21

Notes:

Total water system revenue includes revenue from water sales to residential and non-residential customers and to other systems; fees; transfers from the government including municipal government transfers from the general fund; and other sources including penalties and fines.

Table 60
Total Water System Revenue and Revenue Per Thousand Gallons Delivered, Excluding Systems With Zero Revenue
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Mean Revenue in Thousands of Dollars	19	35	207	853	2,840	9,730	24,556	142,215	510
Confidence Interval	+/- 8	+/- 7	+/- 66	+/- 197	+/- 767	+/- 2,416	+/- 5,484	+/- 34,992	+/- 103
Median Revenue in Thousands of Dollars	11	27	133	758	1,696	7,314	18,870	168,169	61
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	5.19	4.49	4.75	3.86	3.20	3.64	5.39	2.08	4.60
Confidence Interval	+/- 2.59	+/- 0.94	+/- 1.56	+/- 1.24	+/- 0.51	+/- 0.59	+/- 3.09	+/- 0.12	+/- 0.80
Observations	37	68	97	38	50	25	34	5	354
Primarily Surface Water Systems									
Mean Revenue in Thousands of Dollars	34	110	377	1,224	3,873	22,387	32,360	156,040	7,535
Confidence Interval	+/- 18	+/- 34	+/- 104	+/- 195	+/- 670	+/- 17,269	+/- 7,895	+/- 29,828	+/- 1,559
Median Revenue in Thousands of Dollars	26	63	244	1,057	2,972	7,706	20,297	99,039	655
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	8.09	8.78	6.07	3.83	4.07	5.24	2.93	2.53	5.45
Confidence Interval	+/- 7.37	+/- 3.28	+/- 1.37	+/- 0.54	+/- 0.73	+/- 2.47	+/- 0.32	+/- 0.25	+/- 0.76
Observations	27	49	73	42	60	43	105	37	436
Primarily Purchased Water Systems									
Mean Revenue in Thousands of Dollars	20	74	1,135	879	3,916	11,109	35,027	109,398	1,817
Confidence Interval	+/- 16	+/- 47	+/- 1,311	+/- 179	+/- 1,401	+/- 2,914	+/- 5,060	+/- 51,676	+/- 678
Median Revenue in Thousands of Dollars	10	44	195	835	2,241	9,044	26,043	94,936	138
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	4.96	6.95	6.33	4.53	3.60	3.64	5.11	2.55	5.85
Confidence Interval	+/- 1.01	+/- 2.98	+/- 1.74	+/- 1.14	+/- 0.61	+/- 1.65	+/- 1.64	+/- 1.01	+/- 1.07
Observations	7	18	43	20	20	26	38	11	183
All Systems									
Mean Revenue in Thousands of Dollars	20	45	471	927	3,345	15,221	31,489	143,831	1,475
Confidence Interval	+/- 8	+/- 11	+/- 366	+/- 124	+/- 545	+/- 7,137	+/- 5,016	+/- 24,799	+/- 210
Median Revenue in Thousands of Dollars	11	29	142	835	2,383	7,923	21,573	102,102	87
Mean Revenue Per Thousand Gallons of Water									
Produced in Dollars	5.29	5.06	5.28	4.06	3.52	4.30	3.84	2.49	4.96
Confidence Interval	+/- 2.10	+/- 0.94	+/- 1.14	+/- 0.73	+/- 0.36	+/- 1.13	+/- 0.69	+/- 0.28	+/- 0.60
Observations	71	135	213	100	130	94	177	53	973

Data:

Q.21

Notes:

Excludes systems that do not report positive revenue.

Total water system revenue includes revenue from water sales to residential and non-residential customers and to other systems; fees; transfers from the government including municipal government transfers from the general fund; and other sources including penalties and fines.

Table 61
Total Water System Revenue and Revenue Per Thousand Gallons Delivered, Excluding Systems With Zero Revenue
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean Revenue in Thousands of Dollars	46	57	504	890	3,366	10,011	27,639	143,904	1,913
Confidence Interval	+/- 25	+/- 19	+/- 465	+/- 134	+/- 574	+/- 1,360	+/- 3,011	+/- 27,583	+/- 299
Median Revenue in Thousands of Dollars	18	38	150	758	2,344	7,676	20,293	97,763	149
Mean Revenue Per Thousand Gallons of Water									
Delivered in Dollars	9.17	4.56	4.24	3.63	3.39	4.01	3.63	2.49	4.43
Confidence Interval	+/- 7.88	+/- 1.24	+/- 0.56	+/- 0.56	+/- 0.36	+/- 1.10	+/- 0.72	+/- 0.32	+/- 0.62
Observations	23	72	173	84	119	86	162	49	768
Private Systems									
Mean Revenue in Thousands of Dollars	12	32	357	1,089	3,009	80,994	60,014	143,229	731
Confidence Interval	+/- 4	+/- 8	+/- 262	+/- 293	+/- 1,313	+/- 83,489	+/- 21,902	+/- 28,160	+/- 365
Median Revenue in Thousands of Dollars	10	23	133	976	2,725	15,107	42,571	168,169	26
Mean Revenue Per Thousand Gallons of Water									
Delivered in Dollars	4.19	5.21	6.61	5.61	5.17	3.20	4.03	2.41	5.19
Confidence Interval	+/- 1.19	+/- 1.16	+/- 1.91	+/- 2.51	+/- 1.28	+/- 0.78	+/- 0.78	+/- 0.45	+/- 0.76
Observations	48	63	40	16	11	8	15	4	205

Data: Q.21

Notes:

Excludes systems that do not report positive revenue.

Total water system revenue includes revenue from water sales to residential and non-residential customers and to other systems; fees; transfers from the government including municipal government transfers from the general fund; and other sources including penalties and fines.

Table 62
Total Water System Revenue for Systems Reporting Positive Revenue and Expenses
By Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean	49	58	268	889	3,146	10,255	27,951	144,747	1,800
Confidence interval	+/- 27	+/- 20	+/- 97	+/- 141	+/- 510	+/- 1,451	+/- 3,173	+/- 28,175	+/- 222
Median	18	38	146	758	2,173	7,847	20,179	95,200	139
Observations	22	69	167	78	115	80	153	48	732
Private Systems									
Ancillary Systems									
Mean	6	18	189	N/A	N/A	N/A	N/A	N/A	20
Confidence Interval	+/- 1	+/- 6	+/- 81	N/A	N/A	N/A	N/A	N/A	+/- 13
Median	6	16	155	N/A	N/A	N/A	N/A	N/A	10
Observations	8	9	2	N/A	N/A	N/A	N/A	N/A	19
Other Private Systems									
Mean	14	36	378	1,081	3,009	11,742	57,039	90,985	547
Confidence Interval	+/- 6	+/- 10	+/- 298	+/- 343	+/- 1,314	+/- 2,762	+/- 24,648	+/- 21,456	+/- 289
Median	11	27	114	976	2,725	13,776	42,571	90,985	32
Observations	33	46	35	13	11	6	13	2	159
All Private Systems									
Mean	12	33	370	1,081	3,009	11,742	57,039	90,985	451
Confidence Interval	+/- 5	+/- 8	+/- 296	+/- 357	+/- 1,484	+/- 2,445	+/- 24,717	+/- 30,160	+/- 224
Median	10	23	133	976	2,725	13,776	42,571	90,985	26
Observations	41	55	37	13	11	6	13	2	178
All Systems									
Mean	21	46	290	921	3,138	10,342	31,303	142,663	1,321
Confidence Interval	+/- 9	+/- 11	+/- 99	+/- 132	+/- 484	+/- 1,386	+/- 5,255	+/- 27,054	+/- 135
Median	11	28	138	835	2,187	7,923	20,941	95,200	87
Observations	63	124	204	91	126	86	166	50	910

Data: Q.21

Notes: Excludes systems that did not report positive revenue or expenses.

Table 63
Percentage of Systems with Each Type of Revenue Source
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Water Sales	74.4	85.1	94.4	56.4	74.9	74.0	78.1	92.8	82.3
Confidence Interval	+/- 29.9	+/- 9.7	+/- 4.6	+/- 10.2	+/- 7.6	+/- 7.7	+/- 4.1	+/- 4.1	+/- 3.9
Water-Related Operations	26.6	45.6	70.0	55.2	67.3	64.6	73.0	83.0	59.1
Confidence Interval	+/- 24.9	+/- 14.3	+/- 9.2	+/- 10.2	+/- 8.3	+/- 8.7	+/- 4.5	+/- 10.1	+/- 6.0
General Fund	7.8	9.4	9.6	4.5	6.3	20.8	15.0	22.8	8.7
Confidence Interval	+/- 14.5	+/- 8.5	+/- 5.1	+/- 3.1	+/- 3.6	+/- 7.1	+/- 3.5	+/- 10.1	+/- 3.0
Other Revenue Sources	1.1	6.0	10.1	18.9	29.9	42.8	48.1	55.3	13.8
Confidence Interval	+/- 1.6	+/- 6.8	+/- 5.7	+/- 7.8	+/- 8.2	+/- 10.0	+/- 5.4	+/- 9.8	+/- 3.3
Percentage of Systems Reporting No Revenue	17.4	12.9	5.3	39.6	23.7	22.8	20.4	5.4	15.7
Confidence Interval	+/- 29.0	+/- 9.1	+/- 4.6	+/- 10.1	+/- 7.4	+/- 7.4	+/- 4.0	+/- 3.6	+/- 3.7
Observations	27	84	181	127	156	111	204	52	942
Private Systems									
Water Sales	39.2	52.2	72.6	56.0	54.3	57.3	79.0	75.6	50.2
Confidence Interval	+/- 12.1	+/- 11.5	+/- 15.8	+/- 20.8	+/- 25.5	+/- 25.0	+/- 13.8	+/- 23.9	+/- 7.3
Water-Related Operations	12.3	13.4	46.1	47.7	54.3	32.6	44.1	24.4	19.8
Confidence Interval	+/- 8.8	+/- 8.0	+/- 16.0	+/- 21.0	+/- 25.5	+/- 22.9	+/- 23.4	+/- 23.9	+/- 6.1
Other Revenue Sources	36.8	41.6	12.4	35.7	24.1	9.0	47.5	63.4	34.8
Confidence Interval	+/- 10.5	+/- 11.3	+/- 10.7	+/- 19.2	+/- 22.1	+/- 15.0	+/- 24.2	+/- 30.9	+/- 6.6
Percentage of Systems Reporting No Revenue	29.1	12.8	19.2	41.5	45.7	42.7	21.0	24.4	22.0
Confidence Interval	+/- 11.5	+/- 7.2	+/- 12.0	+/- 20.8	+/- 25.5	+/- 25.0	+/- 13.8	+/- 23.9	+/- 6.0
Observations	118	111	56	27	20	13	21	6	372

(Continued)

Table 63 (Cont.)
Percentage of Systems with Each Type of Revenue Source
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems									
Water Sales	43.8	64.8	88.5	56.3	73.2	72.4	78.2	90.5	66.5
Confidence Interval	+/- 11.4	+/- 9.1	+/- 6.0	+/- 9.1	+/- 7.3	+/- 7.5	+/- 4.0	+/- 4.5	+/- 4.4
Water-Related Operations	14.1	25.7	63.5	53.6	66.2	61.5	69.5	75.2	39.7
Confidence Interval	+/- 8.2	+/- 8.3	+/- 8.1	+/- 9.2	+/- 7.9	+/- 8.5	+/- 5.4	+/- 11.0	+/- 4.4
General Fund	1.0	3.6	7.0	3.6	5.8	18.8	13.2	19.8	4.4
Confidence Interval	+/- 2.0	+/- 3.4	+/- 3.7	+/- 2.5	+/- 3.3	+/- 6.4	+/- 3.1	+/- 9.2	+/- 1.6
Other Revenue Sources	32.1	28.0	10.8	22.4	29.4	39.5	48.0	56.4	24.2
Confidence Interval	+/- 9.4	+/- 8.8	+/- 5.3	+/- 7.4	+/- 7.8	+/- 9.5	+/- 5.6	+/- 9.7	+/- 3.9
Percentage of Systems Reporting No Revenue	27.5	12.8	9.1	40.0	25.5	24.7	20.5	7.9	18.8
Confidence Interval	+/- 10.8	+/- 5.6	+/- 5.2	+/- 9.0	+/- 7.1	+/- 7.2	+/- 3.9	+/- 4.2	+/- 3.5
Observations	145	195	237	154	176	124	225	58	1314

Data:

Q.21

Notes:

Systems have more than one type of revenue, therefore column totals do not equal 100.

Water Sales includes revenue from the sale of water to residential and non-residential customers.

Water Related Operations includes revenue from connection and development fees, transfers from the general fund of municipal governments, and other related fees (fines and penalties, for example.)

General Fund includes transfers from municipal government general funds to publicly owned systems.

Other is all other sources of water-related revenue, including fines, penalties, and other fees.

Table 64
Percentage of System Revenue Received from Each Revenue Source For Systems Reporting Positive Revenue
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Water Sales	86.3	86.1	86.7	82.3	82.6	77.7	78.4	79.8	85.2
Confidence Interval	+/- 17.3	+/- 7.9	+/- 3.6	+/- 6.9	+/- 3.8	+/- 4.5	+/- 2.5	+/- 3.6	+/- 2.8
Water-Related Operations	3.5	6.0	7.9	12.4	13.9	11.3	15.0	12.5	8.5
Confidence Interval	+/- 4.5	+/- 3.9	+/- 2.4	+/- 5.6	+/- 3.4	+/- 2.9	+/- 2.0	+/- 2.9	+/- 1.7
General Fund	9.4	5.2	2.6	3.2	1.2	5.7	1.2	1.8	3.6
Confidence Interval	+/- 17.3	+/- 5.4	+/- 1.6	+/- 4.3	+/- 0.8	+/- 3.3	+/- 0.5	+/- 1.0	+/- 1.9
Other Revenue Sources	0.9	2.7	2.8	2.2	2.4	5.4	5.4	5.9	2.7
Confidence Interval	+/- 1.6	+/- 4.6	+/- 2.3	+/- 1.3	+/- 1.2	+/- 2.0	+/- 1.5	+/- 2.1	+/- 1.5
Observations	24	73	173	81	119	86	162	49	767
Private Systems									
Water Sales	45.2	52.7	84.9	84.5	85.7	94.9	97.3	98.7	56.3
Confidence Interval	+/- 12.2	+/- 12.2	+/- 11.4	+/- 9.8	+/- 8.8	+/- 5.0	+/- 2.2	+/- 1.5	+/- 7.4
Water-Related Operations	3.7	1.0	4.5	4.5	11.0	5.1	1.8	0.2	2.7
Confidence Interval	+/- 3.6	+/- 0.6	+/- 2.5	+/- 2.7	+/- 8.1	+/- 5.0	+/- 1.6	+/- 0.3	+/- 1.5
Other Revenue Sources	51.2	46.3	10.6	11.0	3.3	0.0	0.9	1.0	41.0
Confidence Interval	+/- 13.3	+/- 12.4	+/- 11.8	+/- 9.8	+/- 4.5	+/- 0.0	+/- 0.6	+/- 1.2	+/- 7.8
Observations	86	96	44	18	11	8	15	4	282

(Continued)

Table 64 (Cont.)
Percentage of System Revenue Received from Each Revenue Source For Systems Reporting Positive Revenue
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems									
Water Sales	51.3	65.5	86.2	82.7	82.8	78.9	80.7	81.9	71.5
Confidence Interval	+/- 11.2	+/- 9.2	+/- 4.0	+/- 5.9	+/- 3.6	+/- 4.3	+/- 2.6	+/- 3.7	+/- 4.1
Water-Related Operations	3.6	2.9	7.1	10.8	13.7	10.9	13.4	11.2	5.8
Confidence Interval	+/- 3.2	+/- 1.6	+/- 2.1	+/- 4.6	+/- 3.3	+/- 2.7	+/- 2.0	+/- 2.8	+/- 1.1
General Fund	1.4	2.0	2.0	2.5	1.1	5.2	1.0	1.6	1.9
Confidence Interval	+/- 2.7	+/- 2.2	+/- 1.3	+/- 3.5	+/- 0.7	+/- 3.0	+/- 0.5	+/- 0.9	+/- 1.0
Other Revenue Sources	43.6	29.6	4.7	4.0	2.4	5.0	4.8	5.4	20.9
Confidence Interval	+/- 11.9	+/- 9.5	+/- 3.6	+/- 2.2	+/- 1.1	+/- 1.9	+/- 1.3	+/- 2.0	+/- 4.2
Observations	110	169	217	99	130	94	177	53	1049

Data:

Q.21

Notes:

Systems have more than one type of revenue, therefore column totals do not equal 100.

Water Sales includes revenue from the sale of water to residential and non-residential customers.

Water Related Operations includes revenue from connection and development fees, transfers from the general fund of municipal governments, and other related fees (fines and penalties, for example.)

General Fund includes transfers from municipal government general funds to publicly owned systems.

Other is all other sources of water-related revenue, including fines, penalties, and other fees.

Table 65
Average Revenue of Community Water Systems Serving 10,000 or Fewer Reporting Positive Revenue
By Ownership and Type of Revenue Source

Population Served	Water Revenue					Non-water Revenue	Municipal Non-water System Revenue (Net of Transfers to Water System)	Total Revenue, Including Municipal Government Revenue
	Water Sales Revenue	Water Related Revenue			Total Water Revenue			
		General Fund Transfers	Other Water Related Revenue	Total Water Related Revenue				
Public Systems								
Mean Revenue								
25-100	26,962	63,702	1,916	15,964	31,180	25,495	385,927	186,474
101-500	42,398	84,995	9,966	27,437	57,132	44,046	213,651	164,078
Subtotal, 25-500	39,575	81,246	8,917	25,577	51,997	43,249	240,486	168,291
501-3,300	233,998	89,416	39,305	50,779	271,632	137,623	993,251	908,211
3,301-10,000	783,150	179,361	133,986	144,298	890,168	64,975	5,349,726	3,914,971
Subtotal, 25-10,000	230,244	94,611	47,346	59,943	276,020	96,268	1,571,303	1,171,867
Observations								
25-100	20	2	11	13	21	2	7	22
101-500	72	7	45	46	72	3	38	75
Subtotal, 25-500	92	9	56	59	93	5	45	97
501-3,300	171	20	132	135	172	20	107	173
3,301-10,000	77	11	74	76	84	26	70	117
Subtotal, 25-10,000	340	40	262	270	349	51	222	387

(Continued)

Table 65 (Cont.)
Average Revenue of Community Water Systems Serving 10,000 or Fewer Reporting Positive Revenue
By Ownership and Type of Revenue Source

Population Served	Water Revenue					Non-water Revenue	Municipal Non-water System Revenue (Net of Transfers to Water System)	Total Revenue, Including Municipal Government Revenue
	Water Sales Revenue	Water Related Revenue			Total Water Revenue			
		General Fund Transfers	Other Water Related Revenue	Total Water Related Revenue				
Private Systems								
Mean Revenue								
25-100	10,613		3,536	3,536	11,719	211,715		116,343
101-500	31,743		4,366	4,366	32,455	580,569		292,685
Subtotal, 25-500	22,385		3,958	3,958	23,393	402,364		211,801
501-3,300	338,117		28,753	30,079	357,235	3,685,785		791,382
3,301-10,000	1,020,381		74,548	80,602	1,088,984	6,014,066		4,577,333
Subtotal, 25-10,000	136,609		20,514	21,023	143,447	773,652		431,109
Observations								
25-100	48		13	13	48	43		86
101-500	62		21	21	63	41		97
Subtotal, 25-500	110		34	34	111	84		183
501-3,300	40		25	24	40	5		44
3,301-10,000	16		17	14	16	12		18
Subtotal, 25-10,000	166		76	72	167	101		245

(Continued)

Table 65 (Cont.)
Average Revenue of Community Water Systems Serving 10,000 or Fewer Reporting Positive Revenue
By Ownership and Type of Revenue Source

Population Served	Water Revenue					Non-water Revenue	Municipal Non-water System Revenue (Net of Transfers to Water System)	Total Revenue, Including Municipal Government Revenue
	Water Sales Revenue	Water Related Revenue			Total Water Revenue			
		General Fund Transfers	Other Water Related Revenue	Total Water Related Revenue				
All Systems								
Mean Revenue								
25-100	14,254	63,702	3,136	7,245	16,390	210,909	385,927	126,840
101-500	37,117	84,995	8,174	20,067	44,755	536,067	213,651	242,323
Subtotal, 25-500	29,427	81,246	6,704	16,141	35,147	385,638	240,486	198,735
501-3,300	257,359	89,416	37,146	46,745	290,787	1,113,768	993,251	880,052
3,301-10,000	832,171	179,361	122,293	132,816	927,074	1,986,360	5,349,726	4,010,351
Subtotal, 25-10,000	191,953	94,611	39,729	49,275	222,291	639,251	1,571,303	804,636
Observations								
25-100	68	2	24	26	69	45	7	108
101-500	134	7	66	67	135	44	38	172
Subtotal, 25-500	202	9	90	93	204	89	45	280
501-3,300	211	20	157	159	212	25	107	217
3,301-10,000	93	11	91	90	100	38	70	135
Subtotal, 25-10,000	506	40	338	342	516	152	222	632

Data:

Q. 21

Note:

Total revenue is not derived from the simple addition of all the subcategories of revenue. Rather, it is the weighted average of the revenue with the weights dependent on the likelihood that the average system will have access to a particular revenue subcategory.

Table 66
Average Water Sales Revenue Profile:
Percentage of Revenue from Each Customer Category
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Residential	93.8	93.3	86.1	69.9	73.3	69.5	58.3	48.2	84.3
Confidence Interval	+/- 8.8	+/- 5.1	+/- 4.7	+/- 9.0	+/- 4.6	+/- 5.0	+/- 2.9	+/- 6.1	+/- 2.9
Non-Residential	6.2	6.4	12.8	19.3	20.7	18.7	27.0	23.4	12.8
Confidence Interval	+/- 8.8	+/- 5.1	+/- 4.7	+/- 6.5	+/- 3.7	+/- 3.0	+/- 2.0	+/- 3.3	+/- 2.7
Wholesale	0.0	0.3	1.0	10.8	6.1	11.8	14.7	28.4	2.9
Confidence Interval	+/- 0.0	+/- 0.5	+/- 0.9	+/- 7.7	+/- 3.0	+/- 4.9	+/- 2.9	+/- 7.0	+/- 1.0
Observations	27	84	181	127	156	111	204	52	942
Private Systems									
Residential	96.6	99.5	93.5	87.6	79.0	56.9	65.0	61.6	96.2
Confidence Interval	+/- 5.8	+/- 0.6	+/- 7.0	+/- 8.9	+/- 15.3	+/- 21.3	+/- 4.8	+/- 2.9	+/- 2.5
Non-Residential	0.5	0.3	6.4	7.3	2.7	18.2	30.8	34.8	2.2
Confidence Interval	+/- 0.6	+/- 0.3	+/- 6.9	+/- 5.4	+/- 2.2	+/- 12.8	+/- 3.1	+/- 3.3	+/- 1.6
Wholesale	2.9	0.3	0.2	5.0	18.3	24.9	4.2	3.6	1.6
Confidence Interval	+/- 5.8	+/- 0.5	+/- 0.3	+/- 7.3	+/- 14.1	+/- 25.1	+/- 3.0	+/- 0.5	+/- 1.9
Observations	118	111	56	27	20	13	21	6	372
All Systems									
Residential	96.0	96.4	87.8	73.5	73.6	68.6	59.1	49.7	88.8
Confidence Interval	+/- 5.0	+/- 2.6	+/- 4.0	+/- 7.7	+/- 4.4	+/- 5.0	+/- 2.7	+/- 5.5	+/- 2.0
Non-Residential	1.8	3.4	11.4	16.9	19.6	18.6	27.5	24.7	8.8
Confidence Interval	+/- 2.1	+/- 2.6	+/- 4.0	+/- 5.5	+/- 3.6	+/- 2.9	+/- 1.8	+/- 3.1	+/- 1.8
Wholesale	2.3	0.3	0.8	9.6	6.8	12.8	13.4	25.7	2.4
Confidence Interval	+/- 4.5	+/- 0.4	+/- 0.7	+/- 6.3	+/- 2.9	+/- 4.9	+/- 2.7	+/- 6.6	+/- 0.9
Observations	145	195	237	154	176	124	225	58	1,314

Data: Q.21

Notes:

Column totals may not equal 100 due to rounding.

Table 67
Water System Revenue from All Sources per Thousand Gallons Delivered
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean	9.04	4.04	4.04	3.46	3.18	3.91	3.41	2.39	4.15
Confidence Interval	+/- 7.71	+/- 1.18	+/- 0.55	+/- 0.57	+/- 0.37	+/- 1.08	+/- 0.69	+/- 0.35	+/- 0.60
Median	4.62	3.42	3.08	3.37	2.93	2.97	2.47	2.24	3.30
Observations	24	78	168	74	111	77	158	47	737
Private Systems									
Mean	2.05	2.81	5.13	5.48	5.17	3.20	3.64	2.41	2.99
Confidence Interval	+/- 0.77	+/- 0.92	+/- 1.82	+/- 2.46	+/- 1.28	+/- 0.78	+/- 0.94	+/- 0.45	+/- 0.59
Median	0.00	1.19	4.69	4.70	5.60	3.48	3.69	2.07	1.64
Observations	95	95	52	15	11	7	15	4	294
All Systems									
Mean	2.91	3.30	4.34	3.89	3.31	3.86	3.44	2.39	3.57
Confidence Interval	+/- 1.28	+/- 0.74	+/- 0.63	+/- 0.72	+/- 0.38	+/- 1.00	+/- 0.62	+/- 0.32	+/- 0.43
Median	0.99	2.50	3.58	3.43	3.10	3.00	2.58	2.19	2.84
Observations	119	173	220	89	122	84	173	51	1,031

Data: Q.21

Notes: Includes wholesale deliveries and unaccounted for water.

Table 68
Water System Revenue from Water Sales per Thousand Gallons Delivered
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean	4.31	3.19	3.40	2.81	2.61	3.26	2.62	2.03	3.23
Confidence Interval	+/- 1.65	+/- 0.66	+/- 0.44	+/- 0.50	+/- 0.31	+/- 0.97	+/- 0.54	+/- 0.25	+/- 0.29
Median	3.74	2.97	2.91	2.63	2.59	2.51	2.01	1.99	2.83
Observations	24	78	168	74	111	77	158	47	737
Private Systems									
Mean	1.85	2.70	4.91	5.10	4.43	3.03	3.54	2.41	2.82
Confidence Interval	+/- 0.69	+/- 0.91	+/- 1.82	+/- 2.33	+/- 1.16	+/- 0.77	+/- 0.97	+/- 0.45	+/- 0.57
Median	0.00	1.19	4.63	4.24	4.38	3.11	3.59	2.07	1.34
Observations	95	95	52	15	11	7	15	4	294
All Systems									
Mean	2.15	2.90	3.81	3.29	2.73	3.24	2.73	2.07	3.03
Confidence Interval	+/- 0.66	+/- 0.60	+/- 0.59	+/- 0.68	+/- 0.32	+/- 0.90	+/- 0.51	+/- 0.23	+/- 0.31
Median	0.84	2.36	3.14	3.04	2.69	2.52	2.22	2.02	2.52
Observations	119	173	220	89	122	84	173	51	1,031

Data: Q.21

Notes:

Table 69
Water System Revenue from Water Sales per Thousand Gallons Delivered
By Ownership and Customer Class

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Residential									
Mean	4.90	3.63	4.04	3.64	3.35	4.15	2.78	2.68	3.85
Confidence Interval	+/- 2.10	+/- 0.72	+/- 0.58	+/- 0.77	+/- 0.39	+/- 1.13	+/- 0.17	+/- 0.37	+/- 0.36
Median	4.30	3.27	3.26	3.11	3.18	3.04	2.66	2.53	3.25
Observations	24	78	168	68	105	70	138	38	689
Non-Residential									
Mean	2.95	4.40	4.42	3.12	2.90	3.02	2.67	2.76	3.80
Confidence Interval	+/- 1.58	+/- 1.27	+/- 1.74	+/- 0.73	+/- 0.44	+/- 0.74	+/- 0.28	+/- 0.54	+/- 0.81
Median	2.18	4.49	3.34	2.73	2.52	2.69	2.11	2.53	3.00
Observations	6	21	73	57	86	61	126	36	466
Wholesale									
Mean	*	0.00	2.01	1.62	2.09	2.40	1.66	1.99	1.83
Confidence Interval	*	+/- 0.00	+/- 0.93	+/- 0.65	+/- 0.58	+/- 0.93	+/- 0.15	+/- 0.26	0.37
Median	*	0.00	1.75	1.44	2.08	1.87	1.53	1.71	1.59
Observations	*	1	13	26	43	43	104	41	271
Private Systems									
Residential									
Mean	1.95	2.92	5.41	6.22	5.67	6.23	6.00	3.00	3.09
Confidence Interval	+/- 0.72	+/- 0.97	+/- 2.01	+/- 3.03	+/- 1.50	+/- 1.75	+/- 1.87	+/- 0.49	+/- 0.62
Median	0.00	1.33	5.12	4.83	5.63	6.25	5.30	2.65	1.64
Observations	91	95	51	14	11	5	15	4	286
Non-Residential									
Mean	1.15	7.88	3.22	4.86	3.60	3.20	4.34	2.87	3.99
Confidence Interval	+/- 2.48	+/- 8.98	+/- 2.06	+/- 2.83	+/- 1.33	+/- 1.71	+/- 1.24	+/- 0.86	+/- 2.00
Median	0.00	2.00	5.38	2.91	3.91	4.02	4.66	2.20	2.60
Observations	6	8	15	11	8	5	15	4	72
Wholesale									
Mean	0.50	*	3.71	4.11	3.35	2.11	2.67	1.68	1.95
Confidence Interval	+/- 0.74	*	+/- 4.46	+/- 0.42	+/- 1.80	+/- 0.88	+/- 0.80	+/- 0.22	+/- 1.24
Median	0.00	*	6.49	3.84	3.01	2.77	2.91	1.55	1.07
Observations	2	*	2	3	8	4	12	4	35

(Continued)

Table 69 (Cont.)
Water System Revenue from Water Sales per Thousand Gallons Delivered
By Ownership and Customer Class

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Residential									
Mean	2.33	3.20	4.42	4.22	3.51	4.27	3.19	2.72	3.48
Confidence Interval	+/- 0.72	+/- 0.65	+/- 0.70	+/- 0.96	+/- 0.41	+/- 1.07	+/- 0.46	+/- 0.33	+/- 0.36
Median	0.99	2.48	3.51	3.59	3.22	3.10	2.89	2.65	2.89
Observations	115	173	219	82	116	75	153	42	975
Non-Residential									
Mean	1.68	5.05	4.21	3.46	2.93	3.03	2.90	2.78	3.84
Confidence Interval	+/- 2.09	+/- 2.01	+/- 1.48	+/- 0.86	+/- 0.42	+/- 0.69	+/- 0.36	+/- 0.48	+/- 0.75
Median	0.00	4.49	3.44	2.82	2.64	2.69	2.22	2.53	2.91
Observations	12	29	88	68	94	66	141	40	538
Wholesale									
Mean	0.50	0.00	2.09	1.86	2.22	2.38	1.80	1.95	1.85
Confidence Interval	+/- 0.74	+/- 0.00	+/- 0.90	+/- 0.67	+/- 0.56	+/- 0.87	+/- 0.23	+/- 0.23	+/- 0.37
Median	0.00	0.00	1.75	1.53	2.08	1.93	1.74	1.55	1.52
Observations	2	1	15	29	51	47	116	45	306

Q 26

Q.21

Notes:

Table 70
Annual Residential Revenue per Connection
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean Residential Revenues per Connection	470	314	445	320	290	352	343	349	383
<i>Confidence interval</i>	+/- 287	+/- 60	+/- 244	+/- 54	+/- 28	+/- 40	+/- 20	+/- 30	+/- 117
Median Residential Revenues per Connection	309	274	283	264	259	308	302	334	278
Observations	22	72	169	63	98	66	137	38	665
Private Systems									
Ancillary Systems									
Mean Residential Revenues per Connection	196	352	727	N/A	N/A	N/A	N/A	N/A	305
<i>Confidence interval</i>	+/- 48	+/- 164	+/- 65	N/A	N/A	N/A	N/A	N/A	+/- 101
Median Residential Revenues per Connection	180	313	700	N/A	N/A	N/A	N/A	N/A	283
Observations	6	11	2	N/A	N/A	N/A	N/A	N/A	19
Other Private Systems									
Mean Residential Revenues per Connection	408	429	592	480	390	483	401	291	467
<i>Confidence interval</i>	+/- 105	+/- 119	+/- 245	+/- 127	+/- 112	+/- 141	+/- 53	+/- 48	+/- 84
Median Residential Revenues per Connection	415	313	397	423	366	469	432	251	365
Observations	38	49	38	13	11	6	15	4	174
All Private Systems									
Mean Residential Revenues per Connection	361	413	596	480	390	483	401	291	441
<i>Confidence interval</i>	+/- 91	+/- 102	+/- 242	+/- 124	+/- 116	+/- 138	+/- 53	+/- 50	+/- 74
Median Residential Revenues per Connection	312	313	397	423	366	469	432	251	342
Observations	44	60	40	13	11	6	15	4	193
All Systems									
Mean Residential Revenues per Connection	388	363	479	358	297	362	351	341	405
<i>Confidence interval</i>	+/- 126	+/- 59	+/- 197	+/- 56	+/- 29	+/- 39	+/- 20	+/- 28	+/- 79
Median Residential Revenues per Connection	312	291	304	340	269	330	328	305	298
Observations	66	132	209	76	109	72	152	42	858

Data:

Q.21

Notes:

Excludes systems that did not report positive revenue.

Table 71
Percentage of Systems with Each Residential Rate Structure and Billing Profile
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Metered Charges									
Uniform Rate	41.2	46.3	54.5	35.6	38.7	30.9	27.3	35.1	46.0
Declining Block Rate	7.8	9.7	20.6	16.1	16.2	6.1	17.8	17.2	15.7
Increasing Block Rate	16.0	14.7	13.6	10.9	25.7	34.5	31.1	27.5	15.9
Seasonal Rate	0.0	2.0	0.0	0.0	0.0	3.0	4.8	7.5	0.6
Unmetered Charges									
Separate Flat Fee for Water	8.9	26.7	18.8	19.7	19.5	10.0	21.7	18.4	20.2
Annual Connection Fee	0.0	0.0	0.0	3.9	6.7	3.6	2.8	7.5	1.5
Combined Flat Fee for Water and Other Services	17.0	2.3	0.0	3.0	5.1	2.6	2.4	1.9	2.7
Other billing methods	0.7	6.2	6.5	2.3	2.6	1.8	8.9	16.5	5.0
Observations	27	84	181	127	155	111	204	52	941
Private Systems									
Metered Charges									
Uniform Rate	15.1	27.3	48.0	50.7	55.2	29.2	33.1	51.2	26.6
Declining Block Rate	0.0	5.0	15.6	2.6	18.5	7.9	56.5	63.4	4.8
Increasing Block Rate	8.7	9.6	14.0	24.9	2.1	7.9	0.0	12.2	10.4
Seasonal Rate	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0
Unmetered Charges									
Separate Flat Fee for Water	12.9	18.1	12.0	7.9	19.4	25.8	3.4	24.4	14.7
Annual Connection Fee	0.0	1.3	0.0	5.0	4.8	0.0	0.0	0.0	0.7
Combined Flat Fee for Water and Other Services	34.8	37.3	1.8	0.0	0.0	0.0	0.0	0.0	28.9
Other billing methods	15.2	1.6	11.1	0.0	12.9	0.0	0.0	0.0	8.6
Observations	118	111	56	27	19	13	21	6	371

(Continued)

Table 71 (Cont.)
Percentage of Systems with Each Residential Rate Structure and Billing Profile
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Metered Charges									
Uniform Rate	18.5	34.6	52.7	38.7	40.0	30.8	28.0	37.3	36.4
Declining Block Rate	1.0	6.8	19.2	13.3	16.4	6.2	22.4	23.3	10.3
Increasing Block Rate	9.7	11.6	13.7	13.8	23.9	31.9	27.3	25.5	13.2
Seasonal Rate	0.0	0.8	0.0	0.0	0.0	2.7	4.7	6.5	0.3
Unmetered Charges									
Separate Flat Fee for Water	12.4	21.4	17.0	17.2	19.5	11.5	19.5	19.2	17.4
Annual Connection Fee	0.0	0.8	0.0	4.2	6.6	3.3	2.5	6.5	1.1
Combined Flat Fee for Water and Other Services	32.5	23.9	0.5	2.4	4.7	2.4	2.1	1.6	15.7
Other billing methods	13.3	3.4	7.7	1.8	3.3	1.6	7.8	14.3	6.8
Observations	145	195	237	154	174	124	225	58	1,312

Data: Q.22

Notes: These rate structures only apply to residential customers.
Column totals may be greater than or less than 100.

Table 72
Percentage of Systems with Each Non-residential Rate Structure and Billing Profile
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Metered Charges									
Uniform Rate	24.0	29.3	45.3	30.0	37.7	41.6	33.4	44.3	36.8
Declining Block Rate	7.8	6.4	17.2	15.9	18.0	7.3	20.6	22.7	13.8
Increasing Block Rate	8.0	8.3	9.9	8.3	20.0	25.7	24.8	14.7	11.0
Seasonal Rate	0.0	2.0	0.0	0.0	0.0	3.0	5.3	11.2	0.7
Unmetered Charges									
Separate Flat Fee for Water	16.6	17.5	14.3	15.1	21.9	9.0	19.0	16.6	16.2
Annual Connection Fee	0.0	0.0	0.0	4.3	6.7	2.6	5.1	11.2	1.6
Combined Flat Fee for Water and Other Services	0.0	2.2	0.0	4.0	6.1	1.7	2.4	1.8	1.9
Other billing methods	0.0	4.3	5.2	2.0	4.0	1.9	4.8	7.3	4.0
Observations	27	84	181	127	155	111	204	52	941
Private Systems									
Metered Charges									
Uniform Rate	1.4	5.1	29.8	40.6	27.8	30.3	17.3	63.4	9.0
Declining Block Rate	0.0	2.5	2.8	5.9	20.2	15.8	72.2	63.4	2.1
Increasing Block Rate	0.1	1.4	7.3	16.5	2.1	11.3	0.0	0.0	2.4
Seasonal Rate	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0
Unmetered Charges									
Separate Flat Fee for Water	3.9	5.5	4.9	12.9	7.0	17.9	6.8	24.4	5.1
Annual Connection Fee	0.0	0.0	0.0	2.6	4.8	0.0	0.0	0.0	0.1
Combined Flat Fee for Water and Other Services	2.5	5.1	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Other billing methods	3.9	0.1	4.7	0.0	0.0	0.0	3.4	0.0	2.4
Observations	118	111	56	27	19	13	21	6	371

(Continued)

Table 72 (Cont.)
Percentage of Systems with Each Non-residential Rate Structure and Billing Profile
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Metered Charges									
Uniform Rate	4.4	14.4	41.1	32.2	37.0	40.5	31.4	46.8	23.1
Declining Block Rate	1.0	4.0	13.3	13.9	18.1	8.1	26.8	28.1	8.0
Increasing Block Rate	1.1	4.1	9.2	10.0	18.7	24.3	21.8	12.7	6.7
Seasonal Rate	0.0	0.8	0.0	0.0	0.0	2.7	5.1	9.7	0.3
Unmetered Charges									
Separate Flat Fee for Water	5.6	10.1	11.7	14.6	20.8	9.9	17.6	17.7	10.7
Annual Connection Fee	0.0	0.0	0.0	3.9	6.6	2.4	4.5	9.7	0.9
Combined Flat Fee for Water and Other Services	2.2	4.0	0.0	3.2	5.7	1.5	2.1	1.5	2.5
Other billing methods	3.4	1.8	5.1	1.6	3.7	1.7	4.6	6.3	3.2
Observations	145	195	237	154	174	124	225	58	1,312

Data: Q.22

Notes: These rate structures only apply to non-residential customers.
Column totals may be greater than or less than 100.

Table 73
Percentage of Systems with Programs to Lower the Cost of Drinking Water for Low-income Households
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Percentage of systems with a program	17.0	0.4	1.3	5.8	8.6	15.8	18.9	16.9	4.2
Average number of households that qualify	24	7	12	71	261	422	370	4,168	247
Of the systems with a program, the percentage that use the following eligibility requirements									
Income	100.0	0.0	9.6	26.8	42.5	34.0	37.6	50.0	48.6
Age, Disability, and/or Income	0.0	58.9	90.4	73.2	57.5	46.0	55.7	50.0	49.3
Other	0.0	41.1	0.0	0.0	0.0	20.0	6.7	0.0	2.1
Observations	27	84	181	117	151	107	196	51	914
Private Systems									
Percentage of systems with a program	5.2	0.0	2.5	0.0	12.9	9.8	42.0	24.4	2.8
Average number of households that qualify	2	*	20	*	0	100	1,024	0	57
Of the systems with a program, the percentage that use the following eligibility requirements									
Income	33.0	*	0.0	*	*	100.0	100.0	100.0	31.8
Age, Disability, and/or Income	33.0	*	0.0	*	*	0.0	0.0	0.0	25.9
Other	33.9	*	100.0	*	*	0.0	0.0	0.0	42.3
Observations	118	111	56	26	19	12	21	6	369
All Systems									
Percentage of systems with a program	6.8	0.1	1.6	4.5	8.9	15.2	21.8	17.9	3.5
Average number of households that qualify	11	7	14	71	231	402	495	3,842	185
Of the systems with a program, the percentage that use the following eligibility requirements									
Income	59.7	0.0	5.9	26.8	42.5	40.7	63.4	60.2	42.8
Age, Disability, and/or Income	19.9	58.9	55.9	73.2	57.5	41.3	32.7	39.8	41.2
Other	20.4	41.1	38.1	0.0	0.0	18.0	4.0	0.0	16.1
Observations	145	195	237	143	170	119	217	57	1,283

Data: Q.23

Notes:

Table 74
Characteristics of Water Systems Serving Less than 100,000 with a Seasonal Population
By Ownership

Ownership Type	System Service Population Category						
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	All Sizes <100,001
Public Systems							
Percentage of systems that serve a residential population that changes on a seasonal basis	0.0	0.0	0.0	8.6	10.5	7.8	8.6
Average daily flow during the peak season (millions of gallons per day)	*	*	*	1.3	3.6	12.2	3.1
Year-Round Average daily flow (millions of gallons per day)	*	*	*	0.8	2.9	9.5	2.4
Average duration of peak season (days)	*	*	*	87.5	90.9	96.8	89.7
Observations	0	1	10	139	212	120	482
Private Systems							
Percentage of systems that serve a residential population that changes on a seasonal basis	*	0.0	0.0	26.0	2.2	0.0	19.8
Average daily flow during the peak season (millions of gallons per day)	*	*	*	1.0	7.0	19.3	1.1
Year-Round Average daily flow (millions of gallons per day)	*	*	*	0.4	5.6	17.0	0.5
Average duration of peak season (days)	*	*	*	121.6	60.0	90.0	120.2
Observations	0.0	1	1	47	18	10	77
All Systems							
Percentage of systems that serve a residential population that changes on a seasonal basis	0.0	0.0	0.0	12.3	9.9	7.1	10.2
Average daily flow during the peak season (millions of gallons per day)	*	*	*	1.1	3.6	12.2	2.6
Year-Round Average daily flow (millions of gallons per day)	*	*	*	0.6	3.0	9.5	1.9
Average duration of peak season (days)	*	*	*	102.9	90.4	96.8	97.9
Observations	0	2	11	186	230	130	559

Data:

Q.24

Notes:

Table 75
Total Expenses
By Primary Water Source
(Thousands of Dollars)

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Mean	10	43	168	598	2,674	7,379	23,182	99,861	382
Confidence interval	+/- 4	+/- 23	+/- 43	+/- 215	+/- 812	+/- 2,121	+/- 7,199	+/- 78,307	+/- 65
Median	3	18	104	321	1,273	7,304	10,669	0	17
Observations	88	105	111	62	65	40	56	6	533
Primarily Surface Water Systems									
Mean	167	238	469	1,353	3,125	9,225	33,857	184,151	6,321
Confidence interval	+/- 252	+/- 191	+/- 154	+/- 460	+/- 689	+/- 2,118	+/- 8,695	+/- 46,705	+/- 1,161
Median	43	85	246	766	2,547	7,597	20,371	120,700	416
Observations	49	67	78	65	82	54	124	39	558
Primarily Purchased Water Systems									
Mean	16	43	330	755	3,380	9,779	39,788	153,373	1,535
Confidence interval	+/- 17	+/- 20	+/- 165	+/- 182	+/- 1,265	+/- 2,252	+/- 7,147	+/- 76,677	+/- 375
Median	7	32	166	798	2,074	9,261	27,702	81,991	91
Observations	8	23	48	27	25	30	45	13	219
All Systems									
Mean	15	50	236	778	2,944	8,689	32,447	165,944	1,110
Confidence interval	+/- 8	+/- 21	+/- 54	+/- 156	+/- 531	+/- 1,259	+/- 5,398	+/- 38,489	+/- 116
Median	4	20	132	522	1,636	8,029	20,371	108,484	26
Observations	145	195	237	154	172	124	225	58	1,310

Data: Q.26

Notes: Systems reporting zero expenses are included in this analysis.

Table 76
Total Expenses per Thousand Gallons Delivered
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Mean	4.52	3.44	3.81	2.92	3.39	3.72	3.06	1.33	3.80
Confidence interval	+/- 1.81	+/- 0.79	+/- 0.95	+/- 0.89	+/- 0.92	+/- 1.17	+/- 0.88	+/- 1.34	+/- 0.62
Median	2.25	2.62	2.55	2.97	2.65	4.17	2.52	0.00	2.53
Observations	69	93	103	32	46	23	37	4	407
Primarily Surface Water Systems									
Mean	8.98	7.16	6.26	5.59	4.08	4.39	3.69	3.16	5.79
Confidence interval	+/- 2.87	+/- 1.70	+/- 1.31	+/- 1.41	+/- 0.81	+/- 1.73	+/- 0.45	+/- 0.38	+/- 0.59
Median	7.35	5.45	4.39	4.13	3.11	2.74	3.16	2.76	4.37
Observations	38	55	71	37	58	41	100	37	437
Primarily Purchased Water Systems									
Mean	3.80	4.86	5.59	4.64	3.70	3.30	4.23	3.75	4.95
Confidence interval	+/- 1.71	+/- 1.48	+/- 1.12	+/- 1.42	+/- 1.26	+/- 1.28	+/- 0.56	+/- 1.74	+/- 0.70
Median	3.85	5.15	4.67	4.02	3.24	2.66	3.54	3.05	4.40
Observations	8	19	45	18	19	22	35	11	177
All Systems									
Mean	4.61	3.76	4.48	3.94	3.64	3.89	3.66	3.10	4.18
Confidence interval	+/- 1.61	+/- 0.70	+/- 0.69	+/- 0.71	+/- 0.59	+/- 0.88	+/- 0.34	+/- 0.53	+/- 0.48
Median	2.55	2.76	3.15	3.36	2.75	2.77	3.12	2.69	2.93
Observations	115	167	219	87	123	86	172	52	1,021

Data: Q.26, Q.21

Notes:

Table 77
Total Expenses
By Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean	64	74	262	799	2,997	9,134	30,612	187,589	1,976
Confidence interval	+/- 62	+/- 41	+/- 73	+/- 177	+/- 558	+/- 1,330	+/- 3,656	+/- 41,171	+/- 249
Median	15	35	144	571	1,659	8,029	19,727	120,700	115
Observations	27	84	181	127	153	111	204	52	939
Private Systems									
Mean	7	36	165	696	2,283	4,518	16,738	24,563	144
Confidence interval	+/- 3	+/- 23	+/- 65	+/- 340	+/- 1,580	+/- 3,191	+/- 5,218	+/- 24,516	+/- 39
Median	3	10	85	474	1,395	0	20,548	0	8
Observations	118	111	56	27	19	13	18	6	368

Data: Q.26

Notes: Systems reporting zero expenses are included in this analysis.

Table 78
Total Expenses per Thousand Gallons Delivered
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean	8.31	4.78	4.89	4.05	3.62	4.07	3.63	3.34	4.78
Confidence interval	+/- 7.75	+/- 1.34	+/- 0.95	+/- 0.83	+/- 0.61	+/- 0.94	+/- 0.33	+/- 0.49	+/- 0.71
Median	3.85	3.19	3.28	3.36	2.75	2.90	3.05	2.76	3.20
Observations	22	77	168	74	114	78	158	48	739
Private Systems									
Mean	4.08	3.04	3.40	3.47	4.05	1.81	3.92	1.15	3.53
Confidence interval	+/- 1.40	+/- 0.65	+/- 0.80	+/- 1.23	+/- 1.68	+/- 0.79	+/- 1.55	+/- 1.31	+/- 0.63
Median	2.40	2.62	2.93	3.95	4.82	2.62	3.80	0.00	2.62
Observations	93	90	51	13	9	8	14	4	282

Data: Q.26, Q.21

Notes:

Table 79
Total Expenses for Systems Reporting Positive Revenues and Expenses
By Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean	82	88	287	1,098	3,753	11,468	38,390	202,343	2,326
Confidence interval	+/- 82	+/- 49	+/- 82	+/- 244	+/- 676	+/- 1,485	+/- 4,635	+/- 44,087	+/- 300
Median	17	40	156	718	2,547	9,499	26,646	168,087	157
Observations	22	69	167	78	115	80	153	48	732
Private Systems									
Mean	15	45	228	1,153	3,611	10,879	63,599	100,581	463
Confidence interval	+/- 7	+/- 28	+/- 89	+/- 442	+/- 2,045	+/- 3,353	+/- 34,496	+/- 19,094	+/- 272
Median	10	23	116	822	2,793	11,596	32,170	100,581	23
Observations	41	55	37	13	11	6	13	2	178
All Systems									
Mean	32	67	274	1,108	3,744	11,434	41,295	198,399	1,665
Confidence interval	+/- 21	+/- 29	+/- 66	+/- 217	+/- 647	+/- 1,412	+/- 6,650	+/- 42,304	+/- 175
Median	11	28	151	781	2,715	10,115	27,702	160,798	91
Observations	63	124	204	91	126	86	166	50	910

Data: Q.26

Notes: Excludes systems that did not report positive revenues or expenses.

Table 80
Percentage Breakdown of Expenses By Major Categories
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Purchased water	10.2	7.4	10.6	12.2	11.5	15.9	11.3	14.2	10.2
Confidence interval	+/- 10.5	+/- 6.5	+/- 4.8	+/- 6.3	+/- 4.4	+/- 4.7	+/- 2.0	+/- 6.5	+/- 2.9
Security	0.0	0.0	0.1	2.6	0.2	1.3	1.0	0.4	0.4
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.1	+/- 3.6	+/- 0.1	+/- 1.8	+/- 0.9	+/- 0.1	+/- 0.5
Depreciation	4.6	5.5	5.9	10.4	10.3	11.9	11.0	10.7	7.0
Confidence interval	+/- 7.2	+/- 4.7	+/- 1.8	+/- 2.4	+/- 1.7	+/- 2.2	+/- 1.0	+/- 1.6	+/- 1.6
Payments to General Fund	0.0	0.8	2.3	4.2	3.5	3.9	4.0	1.9	2.2
Confidence interval	+/- 0.0	+/- 1.1	+/- 1.6	+/- 3.5	+/- 1.5	+/- 1.4	+/- 0.9	+/- 0.5	+/- 0.9
Other Routine Operating Expenses	77.3	64.5	58.6	48.8	45.4	35.8	36.4	32.9	57.6
Confidence interval	+/- 19.6	+/- 8.9	+/- 5.7	+/- 7.2	+/- 5.0	+/- 3.9	+/- 2.6	+/- 4.2	+/- 3.9
Debt Service Expenses	0.8	10.8	14.9	12.5	11.9	14.1	15.6	17.9	12.4
Confidence interval	+/- 0.9	+/- 5.0	+/- 3.3	+/- 3.7	+/- 2.9	+/- 3.2	+/- 1.2	+/- 2.7	+/- 2.0
Capital Improvements	4.0	6.8	5.9	8.2	14.0	16.1	18.3	20.4	7.6
Confidence interval	+/- 6.2	+/- 5.3	+/- 3.2	+/- 3.3	+/- 3.8	+/- 3.0	+/- 2.0	+/- 3.3	+/- 2.1
Payments to Reserve funds	3.2	4.3	1.8	1.1	3.2	1.1	2.3	1.6	2.6
Confidence interval	+/- 6.0	+/- 3.9	+/- 1.3	+/- 0.7	+/- 1.7	+/- 0.7	+/- 0.7	+/- 0.7	+/- 1.2
Private Systems									
Purchased water	3.5	7.3	13.9	16.0	6.9	37.6	6.8	0.4	7.1
Confidence interval	+/- 6.2	+/- 5.2	+/- 8.2	+/- 12.2	+/- 9.0	+/- 26.9	+/- 10.9	+/- 0.4	+/- 3.6
Security	0.3	0.2	0.1	8.4	0.0	0.0	0.5	1.9	0.4
Confidence interval	+/- 0.5	+/- 0.2	+/- 0.1	+/- 15.5	+/- 0.0	+/- 0.0	+/- 0.2	+/- 1.6	+/- 0.5
Depreciation	1.8	0.9	6.8	14.9	15.6	9.2	14.1	14.5	2.8
Confidence interval	+/- 1.6	+/- 0.8	+/- 3.5	+/- 6.5	+/- 7.5	+/- 3.8	+/- 5.4	+/- 0.8	+/- 1.0
Income Taxes	0.9	0.0	2.9	3.0	1.2	5.0	5.3	4.7	1.0
Confidence interval	+/- 0.8	+/- 0.0	+/- 3.8	+/- 3.0	+/- 2.2	+/- 3.6	+/- 4.7	+/- 4.1	+/- 0.7
Other Routine Operating Expenses	79.8	78.6	63.0	42.0	38.3	26.3	46.4	39.3	75.0
Confidence interval	+/- 8.6	+/- 9.1	+/- 10.0	+/- 14.0	+/- 12.2	+/- 15.0	+/- 7.5	+/- 7.8	+/- 5.7
Debt Service Expenses:	3.7	1.5	9.8	8.6	17.8	7.1	8.2	21.0	4.1
Confidence interval	+/- 4.4	+/- 1.9	+/- 4.2	+/- 5.0	+/- 9.4	+/- 8.0	+/- 3.7	+/- 7.1	+/- 2.1
Capital Improvements	7.3	8.1	1.9	6.9	19.7	14.8	18.5	18.2	6.9
Confidence interval	+/- 4.8	+/- 5.9	+/- 1.4	+/- 5.3	+/- 16.4	+/- 10.4	+/- 7.3	+/- 11.2	+/- 3.1
Payments to Reserve funds	2.7	3.5	1.8	0.2	0.4	0.0	0.1	0.0	2.7
Confidence interval	+/- 2.7	+/- 2.8	+/- 2.2	+/- 0.3	+/- 0.5	+/- 0.0	+/- 0.2	+/- 0.0	+/- 1.6

(Continued)

Table 80 (Cont.)
Percentage Breakdown of Expenses By Major Categories
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems									
Purchased water	4.5	7.3	11.4	12.8	11.2	17.0	10.8	13.7	8.8
<i>Confidence interval</i>	+/- 5.5	+/- 4.6	+/- 4.1	+/- 5.6	+/- 4.2	+/- 4.7	+/- 2.1	+/- 6.3	+/- 2.4
Security	0.2	0.1	0.1	3.6	0.2	1.3	0.9	0.4	0.4
<i>Confidence interval</i>	+/- 0.4	+/- 0.1	+/- 0.1	+/- 4.1	+/- 0.1	+/- 1.7	+/- 0.8	+/- 0.1	+/- 0.3
Depreciation	2.2	2.8	6.1	11.2	10.6	11.7	11.3	10.8	5.0
<i>Confidence interval</i>	+/- 1.8	+/- 2.1	+/- 1.6	+/- 2.3	+/- 1.7	+/- 2.1	+/- 1.0	+/- 1.5	+/- 1.0
Income Taxes	0.0	0.3	1.7	3.5	3.3	3.7	3.6	1.8	1.2
<i>Confidence interval</i>	+/- 0.0	+/- 0.5	+/- 1.3	+/- 2.9	+/- 1.4	+/- 1.3	+/- 0.9	+/- 0.5	+/- 0.5
Payments to General Fund	0.8	0.0	0.7	0.5	0.1	0.3	0.6	0.2	0.4
<i>Confidence interval</i>	+/- 0.7	+/- 0.0	+/- 0.9	+/- 0.6	+/- 0.1	+/- 0.3	+/- 0.6	+/- 0.2	+/- 0.3
Other Routine Operating Expenses	79.4	72.7	59.6	47.6	45.0	35.3	37.5	33.1	65.6
<i>Confidence interval</i>	+/- 7.9	+/- 7.0	+/- 4.9	+/- 6.5	+/- 4.8	+/- 3.8	+/- 2.6	+/- 4.1	+/- 3.5
Debt Service Expenses	3.3	5.4	13.7	11.8	12.3	13.7	14.8	18.0	8.5
<i>Confidence interval</i>	+/- 3.7	+/- 2.6	+/- 2.8	+/- 3.2	+/- 2.8	+/- 3.1	+/- 1.2	+/- 2.6	+/- 1.5
Capital Improvements	6.8	7.5	4.9	8.0	14.3	16.0	18.3	20.4	7.3
<i>Confidence interval</i>	+/- 4.2	+/- 4.1	+/- 2.5	+/- 2.9	+/- 3.7	+/- 2.9	+/- 1.9	+/- 3.2	+/- 1.8
Payments to Reserve funds	2.8	3.8	1.8	0.9	3.1	1.1	2.1	1.5	2.6
<i>Confidence interval</i>	+/- 2.4	+/- 2.3	+/- 1.1	+/- 0.6	+/- 1.6	+/- 0.7	+/- 0.6	+/- 0.7	+/- 1.0

Data:

Q.26

Notes:

Column totals may not equal 100 due to rounding.

Excludes systems that did not report positive expenses.

Debt service includes principal and interest. The general fund includes payments in lieu of taxes.

Table 81
Ratio of Revenue to Expenses for Systems Reporting Positive Revenue and Expenses
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Average Ratio	1.4	1.5	1.4	1.6	1.4	1.5	1.4	1.3	1.4
Confidence interval	+/- 0.4	+/- 0.3	+/- 0.1	+/- 0.7	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.1	+/- 0.1
10th Percentile	0.7	0.7	0.7	0.6	0.8	0.8	0.8	0.8	0.7
25th Percentile	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0
50th Percentile	1.5	1.3	1.2	1.1	1.2	1.2	1.1	1.2	1.2
75th Percentile	1.6	1.8	1.5	1.5	1.7	1.6	1.4	1.4	1.6
90th Percentile	2.1	3.0	2.4	2.0	2.2	2.3	2.1	1.6	2.5
Observations	22	69	167	78	115	80	153	48	732
Private Systems									
Average Ratio	1.6	1.5	1.8	1.2	1.7	1.4	1.3	1.2	1.6
Confidence interval	+/- 0.8	+/- 0.3	+/- 0.6	+/- 0.2	+/- 0.8	+/- 0.3	+/- 0.2	+/- 0.1	+/- 0.3
10th Percentile	0.4	0.9	0.9	0.8	0.9	1.2	1.0	1.1	0.8
25th Percentile	0.8	1.0	1.1	0.9	0.9	1.2	1.0	1.1	1.0
50th Percentile	1.1	1.2	1.2	1.2	1.0	1.2	1.2	1.2	1.2
75th Percentile	1.6	1.4	1.7	1.3	1.7	1.5	1.3	1.3	1.6
90th Percentile	2.3	2.6	2.9	1.6	2.2	2.1	2.1	1.3	2.4
Observations	41	55	37	13	11	6	13	2	178
All Systems									
Average Ratio	1.5	1.5	1.5	1.5	1.4	1.5	1.4	1.3	1.5
Confidence interval	+/- 0.6	+/- 0.2	+/- 0.2	+/- 0.6	+/- 0.2	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.1
10th Percentile	0.4	0.8	0.8	0.6	0.8	0.8	0.8	0.8	0.7
25th Percentile	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0
50th Percentile	1.2	1.2	1.2	1.1	1.2	1.2	1.1	1.2	1.2
75th Percentile	1.6	1.6	1.5	1.4	1.7	1.6	1.4	1.4	1.6
90th Percentile	2.1	2.8	2.4	1.9	2.2	2.2	2.1	1.6	2.4
Observations	63	124	204	91	126	86	166	50	910

Data: Q.21, Q.26C

Notes: Refer to next table for additional detail on private systems.

Revenues include water sales and other water-related fees. Expenses include operating expenses, depreciation, and interest. It excludes principal payments and payments to capital and reserve funds. Only systems that report positive revenue and expenses are included. This table includes the same systems as tables 62 and 79, but the average ratio is not the ratio of the average revenue from table 62 and expenses from table 79. The ratio is calculated for each system and this table reports the average of that ratio, as well as the 10th, 25th, 50th, 75th, and 90th percentiles. (The average of the ratios is not equal to the ratio of the averages.)

Table 82
Ratio of Revenue to Expenses for Systems Reporting
Positive Revenue for Small Privately Owned Systems, By Type

Ownership Type	System Service Population Category				
	100 or Less	101 - 500	501 - 3,300	3,301- 10,000	All Sizes
Ancillary Systems					
Average Ratio	1.2	1.7	1.4	N/A	1.4
Confidence interval	+/- 0.6	+/- 0.5	+/- 0.4	N/A	+/- 0.4
10th Percentile	0.4	1.0	1.2	N/A	0.5
25th Percentile	0.6	1.1	1.2	N/A	0.9
50th Percentile	0.9	1.4	1.2	N/A	1.2
75th Percentile	1.7	2.6	1.2	N/A	1.8
90th Percentile	2.5	3.0	2.5	N/A	2.6
Observations	8	9	2	N/A	19
Other Private Systems					
Average Ratio	1.7	1.4	1.8	1.2	1.6
Confidence interval	+/- 1.1	+/- 0.3	+/- 0.6	+/- 0.2	+/- 0.4
10th Percentile	0.4	0.8	0.9	0.8	0.8
25th Percentile	1.0	1.0	1.1	0.9	1.0
50th Percentile	1.2	1.2	1.2	1.2	1.2
75th Percentile	1.6	1.3	1.7	1.3	1.5
90th Percentile	2.3	2.4	2.9	1.6	2.3
Observations	33	46	35	13	127
All Private Systems					
Average Ratio	1.6	1.5	1.8	1.2	1.6
Confidence interval	+/- 0.8	+/- 0.3	+/- 0.6	+/- 0.2	+/- 0.3
10th Percentile	0.4	0.9	0.9	0.8	0.8
25th Percentile	0.8	1.0	1.1	0.9	1.0
50th Percentile	1.1	1.2	1.2	1.2	1.2
75th Percentile	1.6	1.4	1.7	1.3	1.6
90th Percentile	2.3	2.6	2.9	1.6	2.4
Observations	41	55	37	13	146

Data: Q.21, Q.26C

Notes:

Table 83
Average System Revenue and Expenses for Systems That Reported Positive Revenue and Expenses
By Type of Revenue and Expense
(Thousands of Dollars)

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	
Public Systems									
Revenue									
Water Sales	42,061	42,533	229,714	758,567	2,537,418	8,197,502	21,890,502	118,344,392	1,455,670
Connection, Development Fees, and Other Water Related	646	5,496	29,288	116,580	554,302	1,263,232	5,783,524	23,565,712	298,567
Revenue from the Government	6,692	9,676	9,422	13,588	54,508	794,605	277,081	2,836,918	45,476
Total Revenue	49,399	57,705	268,423	888,735	3,146,229	10,255,338	27,951,108	144,747,024	1,799,713
Expenses									
General Operations	35,812	36,284	179,173	546,258	1,861,957	5,499,756	16,118,521	82,908,912	1,048,470
Depreciation	3,932	8,671	20,707	135,087	374,269	1,571,869	4,332,834	23,655,039	261,115
Interest	48	4,585	21,622	74,226	198,061	638,812	2,681,573	24,792,533	194,666
Income Taxes	0	1,233	4,498	46,644	128,462	393,756	1,500,383	2,943,939	64,681
Total Expenses	39,791	50,773	226,001	802,215	2,562,749	8,104,194	24,633,310	134,300,416	1,568,933
Net Income									
Sales Only	2,270	-8,240	3,713	-43,648	-25,331	93,308	-2,742,808	-15,956,029	-113,263
Sales and Fees	2,915	-2,744	33,001	72,932	528,972	1,356,540	3,040,717	7,609,683	185,304
Sales, Fees, and Government	9,608	6,931	42,422	86,519	583,480	2,151,145	3,317,798	10,446,601	230,780
Observations	22	69	167	78	115	80	153	48	732

(Continued)

Table 83 (Cont.)
Average System Revenue and Expenses for Systems That Reported Positive Revenue and Expenses
By Type of Revenue and Expense

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems									
Revenue									
Water Sales	10,421	31,416	349,383	998,870	2,397,964	11,281,324	56,591,902	90,180,297	431,366
Connection, Development Fees, and Other	1,272	1,218	17,591	63,164	587,218	460,209	444,726	804,264	18,261
Revenue from the Government	0	0	3,494	18,746	23,416	0	2,161	0	1,851
Total Revenue	11,693	32,633	370,469	1,080,780	3,008,598	11,741,533	57,038,788	90,984,560	451,478
Expenses									
General Operations	9,452	24,784	161,902	623,466	1,233,603	7,083,655	33,465,764	44,154,836	245,817
Depreciation	521	943	15,343	235,611	511,678	935,865	7,869,484	14,350,468	56,468
Interest	999	580	12,892	83,915	305,736	319,861	6,821,033	17,225,662	42,541
Income Taxes	191	98	3,614	35,443	44,893	689,946	2,121,944	3,688,922	13,562
Total Expenses	11,163	26,404	193,751	978,435	2,095,910	9,029,327	50,278,224	79,419,888	358,387
Net Income									
Sales Only	-742	5,011	155,632	20,435	302,054	2,251,997	6,313,679	10,760,408	72,978
Sales and Fees	530	6,229	173,223	83,600	889,272	2,712,206	6,758,404	11,564,672	91,240
Sales, Fees, and Government	530	6,229	176,717	102,345	912,688	2,712,206	6,760,565	11,564,672	93,091
Observations	41	55	37	13	11	6	13	2	178

Q.21, Q.26

Excludes systems that did not report positive revenue or expenses.

Table 84
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.5	0.4	0.5	0.6	1.4	2.0	3.4	6.8	33.9	1.2
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.7	+/- 0.5	+/- 0.7	+/- 1.8	+/- 33.7	+/- 0.2
Observations	12	9	21	29	39	54	37	41	5	226
Average Hourly Salary or Wage (Dollars)	30.0	21.0	26.0	20.3	28.1	29.9	34.9	38.4	39.6	25.8
Confidence interval	+/- 13.0	+/- 7.5	+/- 7.6	+/- 3.6	+/- 2.5	+/- 2.2	+/- 3.4	+/- 2.3	+/- 5.9	+/- 2.6
Observations	12	8	20	28	35	53	37	38	5	216
Benefits as Percentage of Salary or Wage	23.7	18.0	21.2	25.4	33.8	31.0	31.2	41.4	42.6	27.1
Confidence interval	+/- 19.7	+/- 10.6	+/- 12.0	+/- 8.9	+/- 9.1	+/- 4.2	+/- 6.1	+/- 3.5	+/- 3.8	+/- 4.7
Observations	11	7	18	23	28	49	36	37	5	196
Part-time Employees										
Mean Number of Employees	0.9	1.1	1.0	1.0	1.0	2.0	2.0	2.0	*	1.0
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.1
Observations	12	13	25	20	1	1	1	1	*	49
Average Hourly Salary or Wage (Dollars)	19.4	11.5	16.5	21.3	34.5	119.2	27.5	45.8	*	20.1
Confidence interval	+/- 6.2	+/- 7.1	+/- 5.0	+/- 3.9	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 4.3
Observations	10	6	16	18	1	1	1	1	*	38
Benefits as Percentage of Salary or Wage	7.6	3.0	5.4	25.2	35.0	25.0	25.0	0.0	*	12.1
Confidence interval	+/- 9.2	+/- 6.1	+/- 5.6	+/- 15.7	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 6.6
Observations	12	12	24	17	1	1	1	1	*	45
Average Hours Per Employee Per Week	3.3	7.7	5.5	9.5	20.0	10.0	40.0	42.0	*	7.1
Confidence interval	+/- 1.4	+/- 3.7	+/- 2.0	+/- 3.5	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 1.8
Observations	11	12	23	20	1	1	1	1	*	47
Contract Employees										
Mean Number of Employees	2.0	1.0	1.0	1.0	1.0	1.9	1.0	*	*	1.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.4	+/- 0.0	+/- 0.3	+/- 0.0	*	*	+/- 0.1
Observations	1	2	3	4	3	2	1	*	*	13
Average Hourly Labor Cost (Dollars)	10.0	28.1	27.9	18.6	31.0	36.5	27.0	*	*	25.1
Confidence interval	+/- 0.0	+/- 6.5	+/- 6.5	+/- 6.8	+/- 16.8	+/- 3.7	+/- 0.0	*	*	+/- 4.1
Observations	1	2	3	4	2	2	1	*	*	12
Average Hours Per Employee Per Week	0.5	5.8	5.7	16.9	30.0	65.8	20.0	*	*	17.3
Confidence interval	+/- 0.0	+/- 8.5	+/- 8.4	+/- 11.2	+/- 18.3	+/- 10.3	+/- 0.0	*	*	+/- 6.3
Observations	1	2	3	4	2	2	1	*	*	12

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	0.8	2.4	3.7	8.0	20.3	32.1	1.4
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.7	+/- 1.1	+/- 2.1	+/- 7.9	+/- 23.6	+/- 0.2
Observations	16	27	43	43	34	45	36	44	4	249
Average Hourly Salary or Wage (Dollars)	19.4	16.8	17.6	15.4	17.6	19.1	19.1	23.3	21.9	17.1
Confidence interval	+/- 7.6	+/- 3.3	+/- 3.3	+/- 1.9	+/- 1.6	+/- 1.5	+/- 2.6	+/- 1.2	+/- 2.7	+/- 1.5
Observations	10	20	30	39	31	44	35	42	4	225
Benefits as Percentage of Salary or Wage	16.7	18.0	17.5	22.1	37.1	33.7	31.4	44.9	41.9	24.4
Confidence interval	+/- 13.1	+/- 7.2	+/- 6.8	+/- 6.9	+/- 9.9	+/- 5.4	+/- 5.6	+/- 3.9	+/- 4.2	+/- 3.9
Observations	10	15	25	34	23	42	33	40	4	201
Part-time Employees										
Mean Number of Employees	1.1	1.0	1.1	1.2	1.6	1.2	2.5	1.0	*	1.1
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.9	+/- 0.4	+/- 2.7	+/- 0.0	*	+/- 0.1
Observations	24	32	56	38	4	5	2	2	*	107
Average Hourly Salary or Wage (Dollars)	15.7	14.1	14.6	15.0	15.2	16.0	15.3	15.9	*	14.8
Confidence interval	+/- 4.7	+/- 2.1	+/- 2.0	+/- 2.5	+/- 5.3	+/- 12.6	+/- 4.0	+/- 5.1	*	+/- 1.5
Observations	12	24	36	37	4	4	2	2	*	85
Benefits as Percentage of Salary or Wage	4.8	10.2	7.7	18.6	12.3	6.7	35.0	0.0	*	11.4
Confidence interval	+/- 5.5	+/- 6.4	+/- 4.4	+/- 10.0	+/- 14.4	+/- 6.9	+/- 0.0	+/- 0.0	*	+/- 4.5
Observations	20	25	45	33	3	3	1	1	*	86
Average Hours Per Employee Per Week	5.5	9.7	7.9	10.0	16.3	22.8	40.0	25.0	*	9.0
Confidence interval	+/- 2.3	+/- 2.4	+/- 1.9	+/- 2.5	+/- 8.0	+/- 12.7	+/- 0.0	+/- 0.0	*	+/- 1.5
Observations	23	31	54	38	4	4	2	1	*	103
Contract Employees										
Mean Number of Employees	0.8	0.9	0.9	1.0	1.0	1.0	4.0	*	*	0.9
Confidence interval	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.3	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 0.1
Observations	14	27	41	12	4	1	1	*	*	59
Average Hourly Labor Cost (Dollars)	34.3	39.6	37.6	35.7	27.4	13.4	*	*	*	36.9
Confidence interval	+/- 13.0	+/- 12.6	+/- 9.2	+/- 14.9	+/- 7.7	+/- 0.0	*	*	*	+/- 7.9
Observations	16	25	41	11	3	1	*	*	*	56
Average Hours Per Employee Per Week	2.8	2.9	2.9	12.4	15.8	25.0	40.0	*	*	4.8
Confidence interval	+/- 1.4	+/- 1.4	+/- 1.0	+/- 8.4	+/- 14.1	+/- 0.0	+/- 0.0	*	*	+/- 1.8
Observations	19	27	46	12	4	1	1	*	*	64

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.6	0.5	0.5	0.9	3.4	5.7	13.3	25.8	191.7	2.1
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.3	+/- 0.9	+/- 1.0	+/- 3.2	+/- 4.3	+/- 38.7	+/- 0.3
Observations	17	25	42	47	43	52	33	37	3	257
Average Hourly Salary or Wage (Dollars)	18.3	15.8	16.6	15.0	16.7	18.2	17.6	20.6	22.7	16.3
Confidence interval	+/- 6.5	+/- 2.9	+/- 2.8	+/- 1.8	+/- 1.4	+/- 1.5	+/- 2.8	+/- 1.3	+/- 3.6	+/- 1.2
Observations	12	21	33	43	40	52	33	36	3	240
Benefits as Percentage of Salary or Wage	20.9	17.8	19.1	31.5	33.6	34.9	33.9	44.4	49.7	27.8
Confidence interval	+/- 17.7	+/- 6.5	+/- 8.1	+/- 8.8	+/- 8.1	+/- 4.7	+/- 5.7	+/- 4.0	+/- 3.7	+/- 4.4
Observations	13	17	30	37	33	49	33	34	3	219
Part-time Employees										
Mean Number of Employees	1.2	1.2	1.2	1.4	1.2	2.6	3.3	2.7	2.0	1.3
Confidence interval	+/- 0.4	+/- 0.4	+/- 0.3	+/- 0.2	+/- 0.3	+/- 1.2	+/- 2.3	+/- 1.5	+/- 0.0	+/- 0.2
Observations	9	27	36	25	4	8	7	3	1	84
Average Hourly Salary or Wage (Dollars)	15.1	14.3	14.5	12.1	11.9	12.2	14.5	15.8	13.0	13.5
Confidence interval	+/- 2.9	+/- 2.8	+/- 2.3	+/- 1.8	+/- 4.1	+/- 4.6	+/- 2.4	+/- 5.2	+/- 0.0	+/- 1.5
Observations	6	22	28	23	4	8	7	3	1	74
Benefits as Percentage of Salary or Wage	0.0	7.4	4.8	13.7	22.0	13.5	15.7	24.1	0.0	7.9
Confidence interval	+/- 0.0	+/- 6.6	+/- 4.5	+/- 11.5	+/- 5.8	+/- 12.2	+/- 17.2	+/- 22.9	+/- 0.0	+/- 4.5
Observations	14	27	41	23	3	6	5	3	1	82
Average Hours Per Employee Per Week	1.5	8.0	6.2	7.9	25.6	31.4	33.9	22.0	40.0	8.3
Confidence interval	+/- 0.9	+/- 2.8	+/- 2.1	+/- 2.4	+/- 5.8	+/- 6.5	+/- 5.5	+/- 5.2	+/- 0.0	+/- 1.7
Observations	9	27	36	25	4	8	7	3	1	84
Contract Employees										
Mean Number of Employees	0.8	0.8	0.8	0.7	2.0	17.0	4.4	1.0	10.0	1.0
Confidence interval	+/- 0.2	+/- 0.2	+/- 0.1	+/- 0.3	+/- 0.0	+/- 0.0	+/- 1.3	+/- 0.0	+/- 0.0	+/- 0.3
Observations	12	12	24	5		1	3	1	1	37
Average Hourly Labor Cost (Dollars)	34.5	36.5	35.6	30.3	21.0	18.0	27.0	48.9	16.0	34.4
Confidence interval	+/- 14.3	+/- 20.7	+/- 13.2	+/- 29.1	+/- 1.6	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 11.6
Observations	9	12	21	4	2	1	1	1	1	31
Average Hours Per Employee Per Week	2.1	5.1	3.5	6.3	30.0	60.0	40.0	17.0	8.0	5.2
Confidence interval	+/- 1.8	+/- 4.0	+/- 2.1	+/- 3.9	+/- 16.3	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 2.4
Observations	12	12	24	4	2	1	2	1	1	35

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	0.8	1.9	2.9	5.3	13.2	55.3	1.5
Confidence interval	+/- 0.4	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.5	+/- 0.8	+/- 1.9	+/- 5.5	+/- 43.3	+/- 0.2
Observations	7	15	22	31	35	48	35	41	5	217
Average Hourly Salary or Wage (Dollars)	16.0	16.6	16.4	15.9	14.7	21.6	18.3	21.8	23.6	16.9
Confidence interval	+/- 3.3	+/- 10.9	+/- 7.2	+/- 4.9	+/- 1.5	+/- 4.6	+/- 2.8	+/- 1.8	+/- 3.7	+/- 2.8
Observations	7	12	19	28	32	48	35	38	5	205
Benefits as Percentage of Salary or Wage	12.5	18.4	16.8	21.0	35.7	32.3	32.8	44.3	42.6	25.1
Confidence interval	+/- 12.0	+/- 8.8	+/- 7.4	+/- 8.1	+/- 9.3	+/- 4.7	+/- 6.0	+/- 3.8	+/- 3.9	+/- 3.8
Observations	5	12	17	23	27	44	33	37	5	186
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.1	1.2	2.4	1.3	2.0	*	1.1
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.4	+/- 1.4	+/- 0.5	+/- 0.6	*	+/- 0.1
Observations	8	27	35	41	5	4	4	8	*	97
Average Hourly Salary or Wage (Dollars)	13.3	11.5	11.8	14.5	10.3	30.4	14.8	12.6	*	13.5
Confidence interval	+/- 6.7	+/- 2.7	+/- 2.7	+/- 2.8	+/- 2.3	+/- 27.1	+/- 3.2	+/- 1.7	*	+/- 2.0
Observations	5	19	24	39	4	4	4	8	*	83
Benefits as Percentage of Salary or Wage	1.8	6.0	4.6	18.4	7.0	16.1	21.4	10.7	*	9.9
Confidence interval	+/- 3.7	+/- 5.5	+/- 3.9	+/- 9.4	+/- 9.5	+/- 15.6	+/- 15.7	+/- 12.0	*	+/- 4.4
Observations	12	24	36	32	4	3	3	7	*	85
Average Hours Per Employee Per Week	5.4	7.6	7.2	12.6	20.3	14.4	30.6	23.4	*	10.1
Confidence interval	+/- 3.9	+/- 2.5	+/- 2.1	+/- 3.1	+/- 9.4	+/- 4.3	+/- 7.7	+/- 4.0	*	+/- 1.9
Observations	8	27	35	40	5	4	4	7	*	95
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.0	2.0	2.0	1.0	6.0	1.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.1
Observations	1	4	5	5	1	1	1	3	1	17
Average Hourly Labor Cost (Dollars)	10.0	14.2	13.3	27.8	20.0	12.0	27.0	35.2	16.0	19.0
Confidence interval	+/- 0.0	+/- 10.0	+/- 8.1	+/- 23.6	+/- 0.0	+/- 0.0	+/- 0.0	+/- 14.8	+/- 0.0	+/- 11.7
Observations	1	4	5	5	1	1	1	2	1	16
Average Hours Per Employee Per Week	0.1	7.2	5.7	8.0	40.0	60.0	20.0	17.4	8.0	9.6
Confidence interval	+/- 0.0	+/- 6.6	+/- 5.8	+/- 6.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 13.1	+/- 0.0	+/- 5.8
Observations	1	4	5	5	1	1	1	3	1	17

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Surface Water Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.3	0.6	0.6	0.6	1.2	1.9	4.4	10.2	30.9	3.1
Confidence interval	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.1	+/- 0.1	+/- 0.3	+/- 1.8	+/- 2.9	+/- 11.6	+/- 0.5
Observations	4	10	14	27	50	63	46	112	32	344
Average Hourly Salary or Wage (Dollars)	27.3	24.4	24.8	23.3	25.9	29.4	32.5	36.3	38.6	28.4
Confidence interval	+/- 8.3	+/- 4.7	+/- 4.3	+/- 2.1	+/- 3.1	+/- 2.4	+/- 1.8	+/- 1.1	+/- 2.0	+/- 1.3
Observations	3	9	12	26	45	61	44	112	32	332
Benefits as Percentage of Salary or Wage	27.7	32.8	32.1	30.0	32.1	32.2	35.7	41.4	37.5	33.3
Confidence interval	+/- 2.4	+/- 6.5	+/- 5.6	+/- 6.8	+/- 4.7	+/- 3.2	+/- 3.9	+/- 3.0	+/- 3.0	+/- 2.2
Observations	3	8	11	22	41	58	41	109	31	313
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.3	1.9	2.0	1.3	*	1.2
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.0	+/- 0.0	+/- 0.4	+/- 1.7	+/- 0.0	+/- 0.4	*	+/- 0.3
Observations	4	6	10	9	4	4	1	3	*	31
Average Hourly Salary or Wage (Dollars)	57.9	18.2	26.0	20.7	32.7	25.8	35.0	63.6	*	27.7
Confidence interval	+/- 45.0	+/- 7.1	+/- 8.6	+/- 4.4	+/- 10.7	+/- 6.1	+/- 0.0	+/- 26.0	*	+/- 3.5
Observations	2	5	7	6	4	4	1	3	*	25
Benefits as Percentage of Salary or Wage	0.0	12.5	10.0	24.7	36.3	33.5	28.0	24.5	*	28.7
Confidence interval	+/- 0.0	+/- 12.7	+/- 11.1	+/- 14.6	+/- 33.1	+/- 13.7	+/- 0.0	+/- 29.7	*	+/- 11.0
Observations	1	3	4	6	4	4	1	2	*	21
Average Hours Per Employee Per Week	2.3	7.3	6.0	10.7	3.8	17.4	20.0	24.0	*	9.1
Confidence interval	+/- 1.1	+/- 4.6	+/- 3.4	+/- 4.9	+/- 0.6	+/- 3.9	+/- 0.0	+/- 4.0	*	+/- 2.8
Observations	4	6	10	9	3	3	1	3	*	29
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	*	1.0	*	*	1.3	*	1.1
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.0	*	*	+/- 0.3	*	+/- 0.1
Observations	1	2	3	*	1	*	*	7	*	11
Average Hourly Labor Cost (Dollars)	8.3	30.0	26.0	*	*	*	*	35.3	*	27.6
Confidence interval	+/- 0.0	+/- 21.8	+/- 19.1	*	*	*	*	+/- 33.1	*	+/- 17.0
Observations	1	2	3	*	*	*	*	2	*	5
Average Hours Per Employee Per Week	8.0	7.5	7.6	*	40.0	*	*	36.5	*	24.6
Confidence interval	+/- 0.0	+/- 5.3	+/- 4.3	*	+/- 0.0	*	*	+/- 5.2	*	+/- 10.4
Observations	1	2	3	*	1	*	*	5	*	9

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Surface Water Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.9	0.7	0.7	1.4	2.7	5.6	15.6	22.8	93.8	6.6
Confidence interval	+/- 0.6	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.4	+/- 0.8	+/- 9.1	+/- 4.3	+/- 21.8	+/- 1.0
Observations	9	27	36	57	58	72	47	107	32	409
Average Hourly Salary or Wage (Dollars)	24.9	13.2	14.4	16.3	17.7	19.0	19.1	22.5	23.7	17.9
Confidence interval	+/- 3.7	+/- 3.7	+/- 4.2	+/- 1.2	+/- 1.4	+/- 1.1	+/- 1.1	+/- 0.8	+/- 1.5	+/- 0.9
Observations	8	24	32	56	55	70	45	108	32	398
Benefits as Percentage of Salary or Wage	32.9	28.3	29.1	29.7	35.7	34.4	36.4	42.2	42.1	34.0
Confidence interval	+/- 11.7	+/- 9.7	+/- 8.3	+/- 5.9	+/- 4.9	+/- 3.6	+/- 3.8	+/- 3.0	+/- 3.8	+/- 2.4
Observations	8	21	29	50	49	65	42	106	32	373
Part-time Employees										
Mean Number of Employees	1.0	1.2	1.1	1.7	1.6	1.4	1.0	1.8	2.0	1.4
Confidence interval	+/- 0.1	+/- 0.2	+/- 0.1	+/- 0.5	+/- 0.4	+/- 0.4	+/- 0.0	+/- 0.7	+/- 0.0	+/- 0.2
Observations	23	27	50	15	7	8	2	9	1	92
Average Hourly Salary or Wage (Dollars)	11.4	15.0	13.2	19.0	13.3	15.2	16.0	12.7	13.7	14.8
Confidence interval	+/- 5.8	+/- 3.8	+/- 4.5	+/- 4.4	+/- 3.5	+/- 3.7	+/- 8.6	+/- 1.8	+/- 0.0	+/- 2.9
Observations	15	25	40	15	7	7	2	8	1	80
Benefits as Percentage of Salary or Wage	5.0	10.2	7.6	20.8	20.6	14.5	28.0	3.7	0.0	13.2
Confidence interval	+/- 8.6	+/- 9.5	+/- 7.4	+/- 13.9	+/- 15.1	+/- 13.8	+/- 0.0	+/- 4.3	+/- 0.0	+/- 6.7
Observations	12	24	36	16	6	7	1	7	1	74
Average Hours Per Employee Per Week	9.3	8.4	8.9	11.9	14.0	22.4	16.0	21.8	20.0	12.2
Confidence interval	+/- 1.9	+/- 2.6	+/- 1.6	+/- 3.3	+/- 4.7	+/- 7.8	+/- 5.7	+/- 3.3	+/- 0.0	+/- 1.8
Observations	22	26	48	16	7	8	2	8	1	90
Contract Employees										
Mean Number of Employees	0.9	1.1	1.0	1.0	1.0	1.0	5.5	6.1	*	1.3
Confidence interval	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.0	+/- 0.0	+/- 0.0	+/- 7.9	+/- 2.1	*	+/- 0.2
Observations	19	26	45	6	1	1	2	9	*	64
Average Hourly Labor Cost (Dollars)	68.6	23.2	39.0	27.0	27.0	42.5	19.8	28.1	*	35.5
Confidence interval	+/- 49.7	+/- 5.6	+/- 18.9	+/- 10.0	+/- 0.0	+/- 0.0	+/- 9.2	+/- 10.4	*	+/- 13.2
Observations	19	24	43	6	1	1	2	8	*	61
Average Hours Per Employee Per Week	3.6	10.0	8.4	15.1	9.0	40.0	40.0	38.6	*	11.8
Confidence interval	+/- 2.1	+/- 2.4	+/- 2.2	+/- 11.7	+/- 0.0	+/- 0.0	+/- 0.0	+/- 3.8	*	+/- 2.8
Observations	19	26	45	7	1	1	2	9	*	65

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Surface Water Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.2	0.6	0.5	1.2	3.6	7.9	16.0	39.0	169.8	10.9
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.6	+/- 1.4	+/- 3.0	+/- 9.4	+/- 44.7	+/- 1.7
Observations	2	18	20	40	52	65	39	96	31	343
Average Hourly Salary or Wage (Dollars)	20.6	15.1	15.4	15.7	16.2	16.9	17.3	20.6	22.1	16.8
Confidence interval	+/- 10.8	+/- 1.8	+/- 1.9	+/- 1.1	+/- 1.5	+/- 1.1	+/- 0.9	+/- 0.7	+/- 1.3	+/- 0.6
Observations	2	15	17	39	48	63	39	98	31	335
Benefits as Percentage of Salary or Wage	28.5	23.7	24.0	29.2	37.4	34.2	35.7	41.4	39.4	34.1
Confidence interval	+/- 2.6	+/- 7.1	+/- 6.7	+/- 5.4	+/- 5.3	+/- 3.6	+/- 4.7	+/- 3.3	+/- 3.9	+/- 2.3
Observations	2	16	18	36	45	59	38	96	30	322
Part-time Employees										
Mean Number of Employees	1.1	1.1	1.1	1.8	1.5	1.8	3.0	3.5	10.0	1.8
Confidence interval	+/- 0.3	+/- 0.4	+/- 0.3	+/- 0.6	+/- 0.5	+/- 1.5	+/- 0.7	+/- 1.3	+/- 0.0	+/- 0.3
Observations	7	11	18	13	4	5	4	9	1	54
Average Hourly Salary or Wage (Dollars)	19.5	11.8	13.1	16.2	13.3	14.8	10.1	10.8	6.6	14.4
Confidence interval	+/- 6.0	+/- 3.3	+/- 3.3	+/- 3.7	+/- 5.0	+/- 5.7	+/- 0.2	+/- 1.3	+/- 0.0	+/- 2.0
Observations	4	10	14	14	4	5	4	9	1	51
Benefits as Percentage of Salary or Wage	8.1	5.0	5.4	20.1	16.7	8.8	1.8	6.4	15.0	13.4
Confidence interval	+/- 14.8	+/- 6.4	+/- 5.8	+/- 11.8	+/- 31.6	+/- 15.7	+/- 3.1	+/- 4.1	+/- 0.0	+/- 6.8
Observations	3	9	12	13	3	4	4	9	1	46
Average Hours Per Employee Per Week	6.2	6.3	6.3	11.9	21.8	20.0	30.5	26.7	14.0	14.4
Confidence interval	+/- 6.5	+/- 3.9	+/- 3.4	+/- 3.8	+/- 12.6	+/- 0.0	+/- 7.2	+/- 5.1	+/- 0.0	+/- 2.4
Observations	7	11	18	14	4	5	4	9	1	55
Contract Employees										
Mean Number of Employees	0.5	1.2	1.1	1.0	*	*	*	4.7	*	1.3
Confidence interval	+/- 0.0	+/- 0.4	+/- 0.3	+/- 0.0	*	*	*	+/- 2.5	*	+/- 0.3
Observations	3	6	9	2	*	*	*	3	*	14
Average Hourly Labor Cost (Dollars)	19.3	18.1	18.4	28.3	*	*	*	11.3	*	21.1
Confidence interval	+/- 0.0	+/- 9.9	+/- 7.8	+/- 31.7	*	*	*	+/- 2.6	*	+/- 12.1
Observations	3	6	9	2	*	*	*	3	*	14
Average Hours Per Employee Per Week	1.8	5.2	4.5	3.4	*	*	*	40.0	*	6.6
Confidence interval	+/- 0.0	+/- 3.4	+/- 2.9	+/- 1.0	*	*	*	+/- 0.0	*	+/- 2.3
Observations	3	6	9	2	*	*	*	3	*	14

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Surface Water Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	0.2	0.8	0.7	1.0	2.1	3.0	7.0	17.7	101.4	6.9
Confidence interval	+/- 0.4	+/- 0.5	+/- 0.4	+/- 0.3	+/- 0.4	+/- 0.6	+/- 2.9	+/- 4.7	+/- 45.2	+/- 1.3
Observations	3	11	14	19	41	60	42	110	31	317
Average Hourly Salary or Wage (Dollars)	33.7	15.5	17.8	16.3	16.0	19.0	18.4	22.5	21.6	18.3
Confidence interval	+/- 13.1	+/- 2.2	+/- 5.0	+/- 1.9	+/- 1.8	+/- 2.3	+/- 1.8	+/- 1.0	+/- 1.5	+/- 1.0
Observations	2	11	13	20	37	56	40	110	31	307
Benefits as Percentage of Salary or Wage	35.0	32.6	33.0	34.5	34.7	33.7	36.4	41.0	39.4	35.4
Confidence interval	+/- 20.5	+/- 14.0	+/- 12.2	+/- 7.8	+/- 5.7	+/- 3.7	+/- 3.7	+/- 3.1	+/- 3.8	+/- 2.3
Observations	3	10	13	19	33	53	36	108	30	292
Part-time Employees										
Mean Number of Employees	1.0	0.9	1.0	1.3	1.4	1.3	1.2	2.2	4.0	1.3
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.3	+/- 0.3	+/- 0.5	+/- 0.3	+/- 1.1	+/- 1.4	+/- 0.2
Observations	6	14	20	25	8	7	5	12	4	81
Average Hourly Salary or Wage (Dollars)	12.6	13.9	13.8	14.0	14.7	22.5	15.4	15.4	23.1	15.2
Confidence interval	+/- 4.5	+/- 5.2	+/- 4.6	+/- 2.7	+/- 3.2	+/- 9.2	+/- 4.5	+/- 2.6	+/- 7.3	+/- 1.9
Observations	4	12	16	23	8	6	5	12	5	75
Benefits as Percentage of Salary or Wage	9.3	1.9	2.8	17.4	35.6	21.2	19.5	12.6	31.2	17.7
Confidence interval	+/- 10.5	+/- 3.9	+/- 3.7	+/- 6.2	+/- 26.7	+/- 14.3	+/- 9.3	+/- 10.6	+/- 11.6	+/- 5.2
Observations	4	13	17	22	7	6	4	10	5	71
Average Hours Per Employee Per Week	6.3	12.1	11.0	14.7	13.9	19.1	16.2	23.3	23.3	15.0
Confidence interval	+/- 3.4	+/- 4.5	+/- 3.8	+/- 4.1	+/- 4.7	+/- 2.1	+/- 7.3	+/- 5.1	+/- 1.9	+/- 2.3
Observations	6	12	18	26	8	7	5	11	3	78
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	*	*	1.0	1.0	3.3	*	1.3
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 0.0	+/- 0.0	+/- 1.5	*	+/- 0.2
Observations	2	4	6	*	*	1	1	4	*	12
Average Hourly Labor Cost (Dollars)	34.5	19.6	22.3	*	*	20.0	*	22.9	*	21.9
Confidence interval	+/- 21.6	+/- 4.4	+/- 5.3	*	*	+/- 0.0	*	+/- 12.0	*	+/- 3.9
Observations	2	4	6	*	*	1	*	3	*	10
Average Hours Per Employee Per Week	1.5	14.6	12.3	*	*	8.0	13.2	18.2	*	12.1
Confidence interval	+/- 1.0	+/- 16.1	+/- 13.3	*	*	+/- 0.0	+/- 0.0	+/- 5.1	*	+/- 8.6
Observations	2	4	6	*	*	1	1	3	*	11

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.3	0.1	0.1	0.7	1.1	1.4	3.1	7.5	15.8	1.4
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.3	+/- 0.2	+/- 0.3	+/- 0.5	+/- 2.1	+/- 11.2	+/- 0.3
Observations	1	3	4	12	22	22	24	41	12	137
Average Hourly Salary or Wage (Dollars)	*	20.1	20.1	22.8	27.5	33.9	42.4	43.3	45.5	28.1
Confidence interval	*	+/- 4.6	+/- 4.6	+/- 5.6	+/- 4.8	+/- 3.2	+/- 3.8	+/- 3.0	+/- 5.6	+/- 2.8
Observations	*	3	3	12	22	20	24	40	12	133
Benefits as Percentage of Salary or Wage	*	29.1	29.1	35.6	21.2	32.4	43.3	41.7	52.1	30.7
Confidence interval	*	+/- 4.2	+/- 4.2	+/- 17.0	+/- 6.3	+/- 7.0	+/- 7.4	+/- 3.6	+/- 20.3	+/- 5.6
Observations	*	3	3	10	20	20	24	39	12	128
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	*	1.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.0
Observations	1	1	2	3	1	3	1	1	*	11
Average Hourly Salary or Wage (Dollars)	20.0	40.0	29.6	14.3	20.0	31.4	40.0	25.0	*	23.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 14.2	+/- 5.9	+/- 0.0	+/- 8.9	+/- 0.0	+/- 0.0	*	+/- 7.8
Observations	1	1	2	3	1	3	1	1	*	11
Benefits as Percentage of Salary or Wage	0.0	10.0	4.8	0.0	*	39.6	30.0	0.0	*	10.1
Confidence interval	+/- 0.0	+/- 0.0	+/- 7.1	+/- 0.0	*	+/- 20.3	+/- 0.0	+/- 0.0	*	+/- 8.4
Observations	1	1	2	1	*	3	1	1	*	8
Average Hours Per Employee Per Week	2.0	7.5	4.6	14.0	10.0	31.5	5.0	20.0	*	11.7
Confidence interval	+/- 0.0	+/- 0.0	+/- 3.9	+/- 10.9	+/- 0.0	+/- 33.4	+/- 0.0	+/- 0.0	*	+/- 6.8
Observations	1	1	2	3	1	3	1	1	*	11
Contract Employees										
Mean Number of Employees	*	*	*	1.0	1.0	2.0	1.0	1.0	1.0	1.1
Confidence interval	*	*	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.2
Observations	*	*	*	1	1	1	1	2	1	7
Average Hourly Labor Cost (Dollars)	*	*	*	15.0	21.2	28.0	50.0	53.0	43.0	20.6
Confidence interval	*	*	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 13.7	+/- 0.0	+/- 6.9
Observations	*	*	*	1	1	1	1	2	1	7
Average Hours Per Employee Per Week	*	*	*	13.0	40.0	40.0	5.0	27.5	40.0	24.3
Confidence interval	*	*	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 19.3	+/- 0.0	+/- 16.8
Observations	*	*	*	1	1	1	1	2	1	7

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	*	0.2	0.2	1.5	1.5	3.8	6.2	15.1	59.5	3.1
Confidence interval	*	+/- 0.1	+/- 0.1	+/- 0.9	+/- 0.7	+/- 0.8	+/- 2.1	+/- 2.8	+/- 35.6	+/- 1.2
Observations	*	3	3	7	8	5	10	25	7	65
Average Hourly Salary or Wage (Dollars)	*	16.8	16.8	25.2	24.0	19.9	27.1	26.8	28.9	23.5
Confidence interval	*	+/- 0.3	+/- 0.3	+/- 13.1	+/- 4.4	+/- 3.7	+/- 2.6	+/- 2.3	+/- 4.4	+/- 5.9
Observations	*	2	2	6	8	4	10	25	7	62
Benefits as Percentage of Salary or Wage	*	33.0	33.0	24.5	25.0	11.1	42.8	39.2	42.6	26.8
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 6.8	+/- 6.3	+/- 2.2	+/- 8.2	+/- 4.5	+/- 2.4	+/- 4.0
Observations	*	1	1	5	8	4	10	24	7	59
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.5	1.8	1.5	1.0	3.0	*	1.4
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.5	+/- 0.4	+/- 0.7	+/- 0.0	+/- 0.0	*	+/- 0.4
Observations	4	2	6	12	3	2	1	1	*	25
Average Hourly Salary or Wage (Dollars)	13.9	28.8	18.8	17.4	16.9	10.8	16.9	19.2	*	17.6
Confidence interval	+/- 0.1	+/- 3.0	+/- 7.9	+/- 4.8	+/- 9.8	+/- 3.9	+/- 0.0	+/- 0.0	*	+/- 3.3
Observations	4	2	6	12	3	2	1	1	*	25
Benefits as Percentage of Salary or Wage	17.0	0.0	11.5	19.8	0.0	0.0	0.0	10.0	*	16.3
Confidence interval	+/- 24.5	+/- 0.0	+/- 18.7	+/- 14.3	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 12.5
Observations	4	2	6	10	2	2	1	1	*	22
Average Hours Per Employee Per Week	1.3	5.3	2.6	7.2	12.4	16.0	32.0	15.0	*	6.5
Confidence interval	+/- 0.5	+/- 3.2	+/- 1.9	+/- 3.6	+/- 4.8	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 3.3
Observations	4	2	6	12	3	1	1	1	*	24
Contract Employees										
Mean Number of Employees	*	0.5	0.5	1.0	*	4.5	*	21.0	11.0	1.2
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 5.8	*	+/- 0.0	+/- 12.2	+/- 0.5
Observations	*	1	1	3	*	2	*	1	2	9
Average Hourly Labor Cost (Dollars)	*	62.5	62.5	39.3	*	27.0	*	43.0	45.1	45.1
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 26.1	*	+/- 0.0	*	+/- 0.0	+/- 2.6	+/- 21.1
Observations	*	1	1	3	*	1	*	1	2	8
Average Hours Per Employee Per Week	*	3.0	3.0	0.9	*	40.0	*	40.0	36.4	2.9
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.2	*	+/- 0.0	*	+/- 0.0	+/- 4.5	+/- 2.5
Observations	*	1	1	3	*	1	*	1	2	8

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	*	0.7	0.7	1.3	2.6	8.1	17.4	31.0	51.9	4.2
Confidence interval	*	+/- 1.1	+/- 1.1	+/- 0.5	+/- 0.8	+/- 2.3	+/- 2.6	+/- 5.4	+/- 23.3	+/- 0.9
Observations	*	5	5	19	25	22	24	38	9	142
Average Hourly Salary or Wage (Dollars)	*	14.7	14.7	16.7	18.3	21.4	24.0	23.2	25.3	18.1
Confidence interval	*	+/- 1.4	+/- 1.4	+/- 2.1	+/- 2.1	+/- 1.9	+/- 1.7	+/- 1.6	+/- 4.5	+/- 1.2
Observations	*	4	4	18	25	20	24	37	9	137
Benefits as Percentage of Salary or Wage	*	27.3	27.3	34.7	19.9	34.9	46.9	44.1	60.3	30.4
Confidence interval	*	+/- 11.5	+/- 11.5	+/- 10.6	+/- 5.1	+/- 7.1	+/- 7.1	+/- 3.8	+/- 21.0	+/- 4.8
Observations	*	3	3	17	24	20	23	36	9	132
Part-time Employees										
Mean Number of Employees	1.3	1.1	1.2	1.3	1.4	2.9	2.3	2.8	4.0	1.3
Confidence interval	+/- 0.6	+/- 0.2	+/- 0.2	+/- 0.4	+/- 0.6	+/- 2.2	+/- 1.3	+/- 0.6	+/- 0.0	+/- 0.2
Observations	3	11	14	16	3	6	3	4	1	47
Average Hourly Salary or Wage (Dollars)	12.1	16.8	15.6	18.7	10.5	12.9	16.6	13.4	11.2	16.6
Confidence interval	+/- 1.0	+/- 5.8	+/- 4.5	+/- 3.6	+/- 2.6	+/- 3.9	+/- 8.0	+/- 2.3	+/- 0.0	+/- 2.7
Observations	3	11	14	16	2	6	3	4	1	46
Benefits as Percentage of Salary or Wage	0.0	2.8	1.9	17.6	0.0	13.7	13.3	27.0	0.0	8.4
Confidence interval	+/- 0.0	+/- 5.2	+/- 3.7	+/- 12.0	+/- 0.0	+/- 20.7	+/- 20.5	+/- 29.5	+/- 0.0	+/- 6.0
Observations	3	8	11	10	1	5	3	3	1	34
Average Hours Per Employee Per Week	4.5	4.6	4.6	10.4	19.7	23.4	26.7	41.4	29.0	9.0
Confidence interval	+/- 4.2	+/- 4.2	+/- 3.3	+/- 3.1	+/- 12.5	+/- 14.3	+/- 13.5	+/- 17.7	+/- 0.0	+/- 2.6
Observations	3	11	14	16	3	5	3	4	1	46
Contract Employees										
Mean Number of Employees	*	0.5	0.5	1.7	2.0	12.0	2.0	1.0	*	1.7
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.7	+/- 1.6	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.8
Observations	*	1	1	5	2	1	1	2	*	12
Average Hourly Labor Cost (Dollars)	*	62.5	62.5	18.1	59.5	26.0	25.0	35.0	*	32.2
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 8.7	+/- 67.3	+/- 0.0	+/- 0.0	+/- 24.4	*	+/- 19.6
Observations	*	1	1	5	2	1	1	2	*	12
Average Hours Per Employee Per Week	*	3.0	3.0	16.6	30.0	40.0	12.0	29.1	*	16.6
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 11.1	+/- 16.3	+/- 0.0	+/- 0.0	+/- 8.9	*	+/- 9.0
Observations	*	1	1	5	2	1	1	2	*	12

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Purchased Water Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	*	1.0	1.0	0.7	1.6	2.5	5.4	15.8	93.8	3.1
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.4	+/- 0.3	+/- 0.6	+/- 1.6	+/- 4.8	+/- 83.4	+/- 1.0
Observations	*	1	1	13	19	20	24	37	11	125
Average Hourly Salary or Wage (Dollars)	*	15.0	15.0	16.3	15.5	21.3	23.8	24.7	22.8	18.1
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 2.2	+/- 1.9	+/- 3.4	+/- 2.6	+/- 2.6	+/- 1.7	+/- 1.5
Observations	*	1	1	12	19	19	24	36	11	122
Benefits as Percentage of Salary or Wage	*	33.0	33.0	29.1	20.5	36.4	45.4	43.2	54.6	30.3
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 8.6	+/- 4.4	+/- 7.8	+/- 6.2	+/- 3.8	+/- 20.7	+/- 4.2
Observations	*	1	1	13	18	19	24	36	11	122
Part-time Employees										
Mean Number of Employees	1.0	1.1	1.1	1.3	1.0	1.4	1.5	4.9	63.6	1.4
Confidence interval	+/- 0.0	+/- 0.2	+/- 0.2	+/- 0.3	+/- 0.0	+/- 0.4	+/- 0.7	+/- 2.1	+/- 76.2	+/- 0.2
Observations	1	11	12	16	3	6	2	9	3	51
Average Hourly Salary or Wage (Dollars)	11.0	15.5	14.9	12.0	18.9	18.0	9.7	20.4	19.5	14.0
Confidence interval	+/- 0.0	+/- 6.1	+/- 5.4	+/- 2.3	+/- 9.1	+/- 4.5	+/- 1.6	+/- 6.0	+/- 4.8	+/- 2.6
Observations	1	10	11	15	3	6	2	9	3	49
Benefits as Percentage of Salary or Wage	0.0	3.9	2.7	7.8	40.0	20.6	0.0	31.3	15.0	7.0
Confidence interval	+/- 0.0	+/- 7.0	+/- 5.1	+/- 10.8	+/- 0.0	+/- 17.9	+/- 0.0	+/- 12.5	+/- 17.5	+/- 5.8
Observations	2	7	9	11	1	6	1	9	2	39
Average Hours Per Employee Per Week	2.0	6.7	6.2	12.1	6.9	20.6	22.0	27.1	26.2	10.1
Confidence interval	+/- 0.0	+/- 4.1	+/- 3.7	+/- 4.1	+/- 4.8	+/- 10.5	+/- 2.7	+/- 9.8	+/- 2.6	+/- 2.8
Observations	1	11	12	16	3	6	2	9	3	51
Contract Employees										
Mean Number of Employees	*	1.0	1.0	1.0	2.0	4.0	1.0	3.5	57.7	2.3
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 1.1	+/- 63.7	+/- 1.8
Observations	*	1	1	1	1	1	1	6	3	14
Average Hourly Labor Cost (Dollars)	*	50.0	50.0	35.0	16.6	25.0	35.0	38.1	35.7	38.4
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 16.7	+/- 7.7	+/- 13.1
Observations	*	1	1	1	1	1	1	6	3	14
Average Hours Per Employee Per Week	*	1.5	1.5	10.0	35.0	35.0	5.0	29.8	40.0	12.6
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 6.1	+/- 0.0	+/- 12.9
Observations	*	1	1	1	1	1	1	6	3	14

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.5	0.4	0.5	0.6	1.3	1.8	3.7	8.9	27.4	1.6
Confidence interval	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.1	+/- 0.4	+/- 0.3	+/- 0.7	+/- 1.9	+/- 9.0	+/- 0.2
Observations	17	22	39	68	111	139	107	194	49	707
Average Hourly Salary or Wage (Dollars)	30.0	21.0	25.4	21.3	27.5	30.7	35.8	38.2	40.5	26.7
Confidence interval	+/- 12.9	+/- 5.8	+/- 6.5	+/- 2.6	+/- 2.0	+/- 1.5	+/- 1.9	+/- 1.1	+/- 1.9	+/- 1.7
Observations	15	20	35	66	102	134	105	190	49	681
Benefits as Percentage of Salary or Wage	23.8	21.2	22.4	28.3	29.6	31.6	35.7	41.4	42.1	29.0
Confidence interval	+/- 19.5	+/- 7.9	+/- 10.3	+/- 7.3	+/- 5.2	+/- 2.8	+/- 3.7	+/- 2.1	+/- 6.6	+/- 3.1
Observations	14	18	32	55	89	127	101	185	48	637
Part-time Employees										
Mean Number of Employees	0.9	1.1	1.0	1.0	1.1	1.5	2.0	1.4	*	1.0
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.0	+/- 0.2	+/- 0.5	+/- 0.0	+/- 0.3	*	+/- 0.1
Observations	17	20	37	32	6	8	3	5	*	91
Average Hourly Salary or Wage (Dollars)	19.7	15.7	18.1	20.4	27.2	56.1	34.1	52.2	*	20.9
Confidence interval	+/- 5.6	+/- 10.2	+/- 5.3	+/- 3.5	+/- 7.2	+/- 37.9	+/- 6.8	+/- 18.8	*	+/- 3.7
Observations	13	12	25	27	6	8	3	5	*	74
Benefits as Percentage of Salary or Wage	7.0	3.6	5.4	23.9	36.1	33.5	27.7	12.0	*	12.7
Confidence interval	+/- 8.6	+/- 5.7	+/- 5.2	+/- 14.4	+/- 28.9	+/- 10.7	+/- 2.7	+/- 17.4	*	+/- 5.9
Observations	14	16	30	24	5	8	3	4	*	74
Average Hours Per Employee Per Week	3.1	7.7	5.5	10.1	8.0	21.5	21.7	27.1	*	7.8
Confidence interval	+/- 1.3	+/- 3.3	+/- 1.8	+/- 3.3	+/- 3.9	+/- 17.1	+/- 18.9	+/- 5.3	*	+/- 1.6
Observations	16	19	35	32	5	7	3	5	*	87
Contract Employees										
Mean Number of Employees	1.5	1.0	1.0	1.0	1.0	1.9	1.0	1.2	1.0	1.0
Confidence interval	+/- 1.0	+/- 0.0	+/- 0.0	+/- 0.3	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.1
Observations	2	4	6	5	5	3	2	9	1	31
Average Hourly Labor Cost (Dollars)	9.2	28.2	27.8	17.8	27.7	34.4	43.3	44.5	43.0	24.3
Confidence interval	+/- 1.8	+/- 6.3	+/- 6.2	+/- 5.7	+/- 13.2	+/- 4.1	+/- 11.9	+/- 17.7	+/- 0.0	+/- 4.1
Observations	2	4	6	5	3	3	2	4	1	24
Average Hours Per Employee Per Week	4.2	5.9	5.9	16.0	33.9	59.5	12.5	33.8	40.0	18.9
Confidence interval	+/- 8.0	+/- 8.0	+/- 7.8	+/- 8.9	+/- 13.0	+/- 17.7	+/- 12.4	+/- 6.9	+/- 0.0	+/- 5.1
Observations	2	4	6	5	4	3	2	7	1	28

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	1.0	2.4	4.4	11.2	21.1	80.3	2.6
Confidence interval	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.4	+/- 0.7	+/- 4.3	+/- 3.3	+/- 18.9	+/- 0.3
Observations	25	57	82	107	100	122	93	176	43	723
Average Hourly Salary or Wage (Dollars)	19.6	16.4	17.3	16.3	18.1	19.1	19.9	23.3	24.2	17.7
Confidence interval	+/- 7.4	+/- 2.9	+/- 2.9	+/- 1.9	+/- 1.2	+/- 1.0	+/- 1.5	+/- 0.6	+/- 1.4	+/- 1.1
Observations	18	46	64	101	94	118	90	175	43	685
Benefits as Percentage of Salary or Wage	17.2	19.0	18.3	23.8	35.4	33.4	34.9	42.4	42.1	26.9
Confidence interval	+/- 12.8	+/- 6.5	+/- 6.4	+/- 5.3	+/- 5.8	+/- 3.5	+/- 3.5	+/- 2.2	+/- 2.8	+/- 2.9
Observations	18	37	55	89	80	111	85	170	43	633
Part-time Employees										
Mean Number of Employees	1.1	1.0	1.1	1.3	1.6	1.3	1.6	1.8	2.0	1.2
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.5	+/- 0.3	+/- 1.2	+/- 0.6	+/- 0.0	+/- 0.1
Observations	51	61	112	65	14	15	5	12	1	224
Average Hourly Salary or Wage (Dollars)	15.0	14.7	14.8	15.7	15.2	15.2	15.8	13.5	13.7	15.2
Confidence interval	+/- 3.7	+/- 2.3	+/- 1.9	+/- 2.1	+/- 3.6	+/- 7.2	+/- 3.7	+/- 2.1	+/- 0.0	+/- 1.3
Observations	31	51	82	64	14	13	5	11	1	190
Benefits as Percentage of Salary or Wage	5.9	9.8	8.0	19.0	13.5	8.9	21.6	3.8	0.0	12.1
Confidence interval	+/- 5.5	+/- 6.0	+/- 4.2	+/- 7.9	+/- 10.2	+/- 6.7	+/- 16.6	+/- 3.8	+/- 0.0	+/- 4.0
Observations	36	51	87	59	11	12	3	9	1	182
Average Hours Per Employee Per Week	5.4	9.5	7.6	9.5	14.7	22.3	29.4	21.5	20.0	8.9
Confidence interval	+/- 2.0	+/- 2.3	+/- 1.7	+/- 2.1	+/- 4.7	+/- 7.7	+/- 6.1	+/- 2.9	+/- 0.0	+/- 1.3
Observations	49	59	108	66	14	13	5	10	1	217
Contract Employees										
Mean Number of Employees	0.8	0.9	0.9	1.0	1.0	2.2	5.0	7.7	11.0	1.0
Confidence interval	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.0	+/- 2.6	+/- 5.1	+/- 2.8	+/- 12.2	+/- 0.1
Observations	33	54	87	21	5	4	3	10	2	132
Average Hourly Labor Cost (Dollars)	36.1	39.5	38.2	36.0	27.3	22.5	19.8	29.9	45.1	37.4
Confidence interval	+/- 12.7	+/- 11.6	+/- 8.7	+/- 12.2	+/- 7.1	+/- 12.0	+/- 9.2	+/- 9.4	+/- 2.6	+/- 7.0
Observations	35	50	85	20	4	3	2	9	2	125
Average Hours Per Employee Per Week	2.8	3.5	3.3	9.9	15.4	31.4	40.0	38.8	36.4	5.2
Confidence interval	+/- 1.3	+/- 1.4	+/- 1.0	+/- 6.9	+/- 13.1	+/- 7.2	+/- 0.0	+/- 3.4	+/- 4.5	+/- 1.6
Observations	38	54	92	22	5	3	3	10	2	137

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.6	0.5	0.5	1.0	3.2	6.9	15.3	34.5	142.6	3.8
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.3	+/- 0.5	+/- 0.8	+/- 1.9	+/- 5.7	+/- 35.4	+/- 0.3
Observations	19	48	67	106	120	139	96	171	43	742
Average Hourly Salary or Wage (Dollars)	18.3	15.6	16.4	15.5	17.1	18.6	19.1	21.2	23.0	16.8
Confidence interval	+/- 6.4	+/- 2.3	+/- 2.4	+/- 1.3	+/- 1.0	+/- 1.0	+/- 1.4	+/- 0.6	+/- 1.4	+/- 0.8
Observations	14	40	54	100	113	135	96	171	43	712
Benefits as Percentage of Salary or Wage	21.0	19.5	20.0	32.0	30.0	34.7	37.7	42.6	45.2	29.4
Confidence interval	+/- 17.6	+/- 5.7	+/- 7.2	+/- 6.3	+/- 4.6	+/- 3.1	+/- 3.7	+/- 2.2	+/- 7.6	+/- 3.0
Observations	15	36	51	90	102	128	94	166	42	673
Part-time Employees										
Mean Number of Employees	1.2	1.2	1.2	1.4	1.3	2.6	3.0	3.2	3.9	1.3
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.3	+/- 1.1	+/- 1.2	+/- 0.8	+/- 2.6	+/- 0.2
Observations	19	49	68	54	11	19	14	16	3	185
Average Hourly Salary or Wage (Dollars)	14.1	15.0	14.8	14.9	11.6	12.8	13.8	12.4	11.4	14.6
Confidence interval	+/- 2.3	+/- 2.6	+/- 2.1	+/- 2.2	+/- 2.6	+/- 2.8	+/- 2.2	+/- 1.5	+/- 2.1	+/- 1.4
Observations	13	43	56	53	10	19	14	16	3	171
Benefits as Percentage of Salary or Wage	0.0	6.4	4.2	15.1	16.9	12.9	10.8	14.4	2.9	8.2
Confidence interval	+/- 0.1	+/- 5.2	+/- 3.6	+/- 8.2	+/- 11.4	+/- 10.4	+/- 9.2	+/- 8.2	+/- 4.4	+/- 3.6
Observations	20	44	64	46	7	15	12	15	3	162
Average Hours Per Employee Per Week	2.3	7.1	5.8	9.0	22.8	27.0	31.3	29.6	32.9	8.8
Confidence interval	+/- 1.4	+/- 2.6	+/- 1.9	+/- 1.7	+/- 6.2	+/- 6.4	+/- 4.8	+/- 5.9	+/- 9.0	+/- 1.2
Observations	19	49	68	55	11	18	14	16	3	185
Contract Employees										
Mean Number of Employees	0.8	0.8	0.8	1.2	2.0	15.6	3.7	2.8	10.0	1.1
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.6	+/- 0.8	+/- 2.7	+/- 1.6	+/- 1.5	+/- 0.0	+/- 0.3
Observations	15	19	34	12	4	2	4	6	1	63
Average Hourly Labor Cost (Dollars)	34.4	38.0	36.5	23.4	40.2	20.2	25.6	25.9	16.0	33.7
Confidence interval	+/- 14.2	+/- 19.0	+/- 12.6	+/- 13.8	+/- 40.3	+/- 4.4	+/- 1.0	+/- 13.9	+/- 0.0	+/- 9.9
Observations	12	19	31	11	4	2	2	6	1	57
Average Hours Per Employee Per Week	2.1	5.0	3.5	11.9	30.0	54.5	28.4	32.3	8.0	7.1
Confidence interval	+/- 1.8	+/- 3.6	+/- 2.0	+/- 7.9	+/- 11.5	+/- 11.0	+/- 21.2	+/- 6.6	+/- 0.0	+/- 2.4
Observations	15	19	34	11	4	2	3	6	1	61

(Continued)

Table 84 (Cont.)
Number of Employees and Annual Labor Costs
By Primary Water Source

Primary Water Source/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	0.8	1.9	2.9	6.0	16.3	93.1	2.7
Confidence interval	+/- 0.4	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.3	+/- 0.5	+/- 1.3	+/- 3.1	+/- 35.8	+/- 0.3
Observations	10	27	37	63	95	128	101	188	47	659
Average Hourly Salary or Wage (Dollars)	16.3	16.6	16.5	16.0	15.2	20.9	19.7	22.8	22.2	17.4
Confidence interval	+/- 3.3	+/- 10.2	+/- 6.8	+/- 3.4	+/- 1.0	+/- 2.6	+/- 1.6	+/- 0.9	+/- 1.1	+/- 1.8
Observations	9	24	33	60	88	123	99	184	47	634
Benefits as Percentage of Salary or Wage	13.3	19.3	17.7	24.4	31.3	33.7	37.2	42.1	43.8	28.0
Confidence interval	+/- 11.9	+/- 8.2	+/- 7.0	+/- 6.0	+/- 5.5	+/- 3.2	+/- 3.6	+/- 2.1	+/- 6.9	+/- 2.6
Observations	8	23	31	55	78	116	93	181	46	600
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.2	1.2	1.7	1.3	2.9	29.0	1.2
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.6	+/- 0.3	+/- 1.0	+/- 30.1	+/- 0.1
Observations	15	52	67	82	16	17	11	29	7	229
Average Hourly Salary or Wage (Dollars)	12.9	12.6	12.7	13.9	13.8	23.2	14.0	16.1	21.8	13.7
Confidence interval	+/- 5.6	+/- 2.6	+/- 2.5	+/- 2.1	+/- 4.5	+/- 10.8	+/- 2.8	+/- 2.3	+/- 4.8	+/- 1.6
Observations	10	41	51	77	15	16	11	29	8	207
Benefits as Percentage of Salary or Wage	1.6	5.5	4.2	15.8	16.0	19.4	17.6	17.7	26.7	9.8
Confidence interval	+/- 3.1	+/- 4.5	+/- 3.3	+/- 7.1	+/- 8.5	+/- 10.6	+/- 9.7	+/- 8.4	+/- 9.7	+/- 3.5
Observations	18	44	62	65	12	15	8	26	7	195
Average Hours Per Employee Per Week	5.0	7.5	7.0	12.6	14.9	18.2	22.3	24.4	24.8	10.4
Confidence interval	+/- 3.4	+/- 2.1	+/- 1.8	+/- 2.5	+/- 7.3	+/- 5.3	+/- 4.9	+/- 3.7	+/- 1.2	+/- 1.5
Observations	15	50	65	82	16	17	11	27	6	224
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.5	2.2	1.3	2.8	45.0	1.3
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 1.0	+/- 1.3	+/- 0.7	+/- 0.8	+/- 51.7	+/- 0.2
Observations	3	9	12	6	2	3	3	13	4	43
Average Hourly Labor Cost (Dollars)	11.3	21.5	19.7	29.0	18.3	16.5	32.7	33.6	30.8	23.0
Confidence interval	+/- 2.7	+/- 16.3	+/- 13.9	+/- 19.6	+/- 3.5	+/- 5.6	+/- 3.9	+/- 10.1	+/- 8.0	+/- 10.6
Observations	3	9	12	6	2	3	2	11	4	40
Average Hours Per Employee Per Week	0.2	6.4	5.4	8.3	37.5	43.5	12.7	23.9	32.1	10.3
Confidence interval	+/- 0.1	+/- 5.6	+/- 4.9	+/- 5.2	+/- 5.1	+/- 22.2	+/- 9.6	+/- 5.7	+/- 9.9	+/- 4.2
Observations	3	9	12	6	2	3	3	12	4	42

Data: Q.25

Notes: Labor costs includes wages, salaries, and fringe benefits.

Table 85
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub, 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.3	0.4	0.4	0.6	1.3	1.9	3.4	7.5	30.0	1.7
Confidence interval	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.1	+/- 0.5	+/- 0.3	+/- 0.6	+/- 1.0	+/- 10.1	+/- 0.2
Observations	6	14	20	55	93	128	99	178	44	617
Average Hourly Salary or Wage (Dollars)	34.4	23.0	26.0	20.8	27.5	31.0	35.3	38.3	41.2	27.2
Confidence interval	+/- 12.0	+/- 7.3	+/- 6.9	+/- 3.0	+/- 2.0	+/- 1.6	+/- 1.9	+/- 1.1	+/- 2.0	+/- 1.5
Observations	6	14	20	53	88	123	97	174	44	599
Benefits as Percentage of Salary or Wage	28.7	27.4	27.7	29.3	31.6	32.1	35.7	40.2	41.4	31.2
Confidence interval	+/- 21.3	+/- 5.9	+/- 7.5	+/- 8.9	+/- 5.4	+/- 3.0	+/- 3.8	+/- 1.5	+/- 7.7	+/- 3.0
Observations	6	13	19	46	78	116	93	169	43	564
Part-time Employees										
Mean Number of Employees	1.0	1.3	1.1	1.0	1.1	1.5	2.0	1.4	*	1.1
Confidence interval	+/- 0.0	+/- 0.6	+/- 0.3	+/- 0.0	+/- 0.2	+/- 0.6	+/- 0.0	+/- 0.3	*	+/- 0.2
Observations	7	9	16	23	4	7	2	5	*	57
Average Hourly Salary or Wage (Dollars)	18.4	20.8	19.3	19.2	23.4	58.3	31.0	52.2	*	21.7
Confidence interval	+/- 4.5	+/- 13.3	+/- 6.0	+/- 2.2	+/- 4.1	+/- 38.4	+/- 4.7	+/- 18.8	*	+/- 4.2
Observations	7	6	13	21	4	7	2	5	*	52
Benefits as Percentage of Salary or Wage	7.9	9.3	8.5	24.0	19.5	33.5	26.4	12.0	*	17.1
Confidence interval	+/- 16.0	+/- 13.0	+/- 10.7	+/- 15.8	+/- 14.4	+/- 11.3	+/- 1.9	+/- 17.4	*	+/- 9.4
Observations	7	6	13	20	3	7	2	4	*	49
Average Hours Per Employee Per Week	3.7	7.6	5.6	8.8	8.3	22.2	30.6	27.1	*	8.0
Confidence interval	+/- 2.3	+/- 5.5	+/- 3.1	+/- 2.7	+/- 4.1	+/- 18.3	+/- 12.5	+/- 5.3	*	+/- 2.1
Observations	7	8	15	23	4	6	2	5	*	55
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.0	1.9	1.0	1.2	1.0	1.1
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.4	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.2
Observations	1	1	2	4	4	3	2	8	1	24
Average Hourly Labor Cost (Dollars)	8.3	40.0	30.1	17.2	21.6	34.4	43.3	44.5	43.0	21.4
Confidence interval	+/- 0.0	+/- 0.0	+/- 21.0	+/- 6.4	+/- 0.7	+/- 4.1	+/- 11.9	+/- 17.7	+/- 0.0	+/- 4.6
Observations	1	1	2	4	2	3	2	4	1	18
Average Hours Per Employee Per Week	8.0	5.0	5.9	19.2	31.1	59.5	12.5	32.8	40.0	26.3
Confidence interval	+/- 0.0	+/- 0.0	+/- 1.9	+/- 10.8	+/- 16.3	+/- 17.7	+/- 12.4	+/- 8.0	+/- 0.0	+/- 10.2
Observations	1	1	2	4	3	3	2	6	1	21

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.7	0.4	0.5	1.0	2.5	4.4	9.1	17.4	89.9	3.3
Confidence interval	+/- 0.8	+/- 0.1	+/- 0.3	+/- 0.2	+/- 0.5	+/- 0.7	+/- 1.3	+/- 1.8	+/- 19.7	+/- 0.4
Observations	10	28	38	87	87	112	86	160	38	608
Average Hourly Salary or Wage (Dollars)	22.6	15.6	17.5	16.0	17.8	19.3	19.8	23.3	24.5	17.7
Confidence interval	+/- 13.3	+/- 3.6	+/- 4.7	+/- 2.3	+/- 1.3	+/- 1.0	+/- 1.5	+/- 0.7	+/- 1.6	+/- 1.3
Observations	10	27	37	84	82	109	83	159	38	592
Benefits as Percentage of Salary or Wage	29.0	21.2	23.6	24.1	34.4	33.7	34.6	40.9	41.9	29.1
Confidence interval	+/- 20.1	+/- 9.1	+/- 8.9	+/- 5.6	+/- 6.1	+/- 3.6	+/- 3.6	+/- 1.7	+/- 3.1	+/- 3.0
Observations	9	23	32	77	71	102	78	154	38	552
Part-time Employees										
Mean Number of Employees	1.3	1.0	1.1	1.3	1.5	1.2	1.6	1.8	2.0	1.2
Confidence interval	+/- 0.6	+/- 0.1	+/- 0.3	+/- 0.3	+/- 0.4	+/- 0.2	+/- 1.2	+/- 0.6	+/- 0.0	+/- 0.2
Observations	11	26	37	50	12	13	5	12	1	130
Average Hourly Salary or Wage (Dollars)	14.3	14.9	14.7	15.3	14.3	16.6	15.8	13.5	13.7	15.0
Confidence interval	+/- 2.8	+/- 2.3	+/- 1.8	+/- 2.1	+/- 3.2	+/- 8.1	+/- 3.7	+/- 2.1	+/- 0.0	+/- 1.4
Observations	11	24	35	49	12	11	5	11	1	124
Benefits as Percentage of Salary or Wage	17.1	17.5	17.3	23.6	14.1	9.0	21.6	3.8	0.0	20.5
Confidence interval	+/- 18.8	+/- 9.2	+/- 9.5	+/- 8.8	+/- 10.8	+/- 8.1	+/- 16.6	+/- 3.8	+/- 0.0	+/- 6.1
Observations	9	22	31	48	10	10	3	9	1	112
Average Hours Per Employee Per Week	4.9	10.0	8.0	9.8	15.1	23.8	29.4	21.5	20.0	10.1
Confidence interval	+/- 3.5	+/- 3.2	+/- 2.7	+/- 2.5	+/- 4.8	+/- 9.1	+/- 6.1	+/- 2.9	+/- 0.0	+/- 1.8
Observations	11	24	35	51	12	11	5	10	1	125
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.2	1.0	2.2	5.0	8.0	11.0	1.3
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.3	+/- 0.0	+/- 2.6	+/- 5.1	+/- 3.3	+/- 12.2	+/- 0.2
Observations	1	10	11	12	4	4	3	8	2	44
Average Hourly Labor Cost (Dollars)	10.0	31.4	31.2	33.5	31.1	22.5	19.8	32.4	45.1	31.9
Confidence interval	+/- 0.0	+/- 20.8	+/- 20.6	+/- 11.2	+/- 7.8	+/- 12.0	+/- 9.2	+/- 11.7	+/- 2.6	+/- 9.7
Observations	1	10	11	12	3	3	2	7	2	40
Average Hours Per Employee Per Week	7.0	3.5	3.5	15.0	8.5	31.4	40.0	39.4	36.4	11.8
Confidence interval	+/- 0.0	+/- 2.2	+/- 2.1	+/- 10.2	+/- 8.7	+/- 7.2	+/- 0.0	+/- 4.1	+/- 4.5	+/- 6.4
Observations	1	10	11	14	4	3	3	8	2	45

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.3	0.5	0.5	1.2	3.3	6.8	15.3	30.0	145.6	4.5
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.3	+/- 0.3	+/- 0.6	+/- 0.9	+/- 2.0	+/- 3.2	+/- 37.0	+/- 0.5
Observations	6	28	34	87	101	129	92	158	41	642
Average Hourly Salary or Wage (Dollars)	27.0	15.6	17.1	15.5	16.9	18.8	19.0	21.1	23.0	17.0
Confidence interval	+/- 15.6	+/- 3.2	+/- 3.8	+/- 1.5	+/- 1.1	+/- 1.0	+/- 1.5	+/- 0.7	+/- 1.4	+/- 1.0
Observations	6	27	33	84	95	126	91	157	41	627
Benefits as Percentage of Salary or Wage	28.7	22.8	23.8	33.3	30.9	34.8	37.4	41.2	45.8	31.9
Confidence interval	+/- 21.3	+/- 6.3	+/- 6.4	+/- 6.9	+/- 4.9	+/- 3.2	+/- 3.8	+/- 1.7	+/- 7.8	+/- 3.0
Observations	6	23	29	76	87	119	89	152	40	592
Part-time Employees										
Mean Number of Employees	1.6	1.0	1.2	1.5	1.3	2.7	3.0	3.2	7.1	1.5
Confidence interval	+/- 0.5	+/- 0.1	+/- 0.2	+/- 0.3	+/- 0.3	+/- 1.1	+/- 1.4	+/- 0.8	+/- 2.5	+/- 0.2
Observations	8	24	32	37	11	17	12	16	2	127
Average Hourly Salary or Wage (Dollars)	15.0	16.7	16.2	15.3	11.6	12.6	12.2	12.4	8.8	15.2
Confidence interval	+/- 2.2	+/- 3.5	+/- 2.7	+/- 3.0	+/- 2.6	+/- 3.0	+/- 1.3	+/- 1.5	+/- 1.9	+/- 1.7
Observations	8	23	31	36	10	17	12	16	2	124
Benefits as Percentage of Salary or Wage	0.1	6.1	4.4	18.3	16.9	13.0	5.9	14.4	7.7	11.1
Confidence interval	+/- 0.3	+/- 6.3	+/- 4.8	+/- 10.9	+/- 11.4	+/- 10.5	+/- 9.1	+/- 8.2	+/- 6.3	+/- 5.5
Observations	7	20	27	32	7	14	10	15	2	107
Average Hours Per Employee Per Week	4.4	6.8	6.2	9.3	22.8	28.7	33.8	29.6	21.3	10.6
Confidence interval	+/- 2.8	+/- 2.2	+/- 1.9	+/- 2.5	+/- 6.2	+/- 5.7	+/- 3.9	+/- 5.9	+/- 6.3	+/- 1.7
Observations	8	24	32	38	11	16	12	16	2	127
Contract Employees										
Mean Number of Employees	*	1.0	1.0	1.6	2.0	15.6	3.7	3.1	10.0	2.0
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.6	+/- 1.1	+/- 2.7	+/- 1.6	+/- 1.6	+/- 0.0	+/- 1.1
Observations	*	7	7	5	3	2	4	5	1	27
Average Hourly Labor Cost (Dollars)	*	14.0	14.0	15.8	47.0	20.2	25.6	28.4	16.0	19.8
Confidence interval	*	+/- 6.7	+/- 6.7	+/- 7.2	+/- 50.6	+/- 4.4	+/- 1.0	+/- 16.1	+/- 0.0	+/- 9.4
Observations	*	7	7	5	3	2	2	5	1	25
Average Hours Per Employee Per Week	*	8.8	8.8	20.3	26.7	54.5	28.4	30.8	8.0	16.9
Confidence interval	*	+/- 7.5	+/- 7.5	+/- 8.0	+/- 12.5	+/- 11.0	+/- 21.2	+/- 7.6	+/- 0.0	+/- 6.9
Observations	*	7	7	5	3	2	3	5	1	26

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	0.5	0.5	0.5	0.8	1.9	2.8	5.6	16.6	101.5	3.1
Confidence interval	+/- 0.7	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.3	+/- 0.5	+/- 1.3	+/- 3.5	+/- 40.2	+/- 0.4
Observations	5	15	20	53	80	117	94	173	43	580
Average Hourly Salary or Wage (Dollars)	13.9	20.5	19.0	16.0	14.9	21.0	19.9	23.1	22.3	17.9
Confidence interval	+/- 6.5	+/- 16.6	+/- 13.0	+/- 4.2	+/- 1.2	+/- 2.7	+/- 1.7	+/- 0.9	+/- 1.1	+/- 2.2
Observations	5	15	20	51	76	113	92	169	43	564
Benefits as Percentage of Salary or Wage	31.4	26.6	27.2	25.7	31.3	34.1	37.2	40.7	44.6	30.7
Confidence interval	+/- 3.7	+/- 6.8	+/- 5.9	+/- 6.6	+/- 6.1	+/- 3.4	+/- 3.7	+/- 1.6	+/- 7.7	+/- 2.6
Observations	4	15	19	47	69	106	86	166	42	535
Part-time Employees										
Mean Number of Employees	1.0	1.1	1.1	1.1	1.1	1.7	1.3	2.9	29.0	1.2
Confidence interval	+/- 0.0	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.6	+/- 0.3	+/- 1.0	+/- 30.1	+/- 0.1
Observations	3	31	34	64	14	17	11	28	7	175
Average Hourly Salary or Wage (Dollars)	12.0	12.5	12.4	13.2	13.5	23.2	14.0	16.0	21.8	13.5
Confidence interval	+/- 7.2	+/- 3.3	+/- 3.0	+/- 2.3	+/- 4.8	+/- 10.8	+/- 2.8	+/- 2.4	+/- 4.8	+/- 1.8
Observations	3	28	31	60	13	16	11	28	8	167
Benefits as Percentage of Salary or Wage	0.2	10.0	8.2	18.5	10.2	19.4	17.6	17.5	26.7	14.3
Confidence interval	+/- 0.4	+/- 8.3	+/- 7.0	+/- 8.2	+/- 7.3	+/- 10.6	+/- 9.7	+/- 8.6	+/- 9.7	+/- 5.2
Observations	4	24	28	52	10	15	8	25	7	145
Average Hours Per Employee Per Week	5.8	7.7	7.5	13.5	15.4	18.2	22.3	24.6	24.8	12.0
Confidence interval	+/- 5.5	+/- 2.1	+/- 2.0	+/- 2.8	+/- 7.6	+/- 5.3	+/- 4.9	+/- 3.8	+/- 1.2	+/- 1.7
Observations	3	29	32	64	14	17	11	26	6	170
Contract Employees										
Mean Number of Employees	*	1.0	1.0	1.0	2.0	2.2	1.5	3.4	45.0	1.6
Confidence interval	*	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 1.3	+/- 0.9	+/- 0.9	+/- 51.7	+/- 0.5
Observations	*	4	4	3	1	3	2	10	4	27
Average Hourly Labor Cost (Dollars)	*	20.8	20.8	37.0	16.6	16.5	32.7	34.9	30.8	26.2
Confidence interval	*	+/- 27.5	+/- 27.5	+/- 25.2	+/- 0.0	+/- 5.6	+/- 3.9	+/- 11.1	+/- 8.0	+/- 18.0
Observations	*	4	4	3	1	3	2	10	4	27
Average Hours Per Employee Per Week	*	9.4	9.4	8.0	35.0	43.5	12.5	24.6	32.1	13.5
Confidence interval	*	+/- 7.5	+/- 7.5	+/- 6.8	+/- 0.0	+/- 22.2	+/- 13.8	+/- 6.6	+/- 9.9	+/- 7.5
Observations	*	4	4	3	1	3	2	9	4	26

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.6	0.3	0.5	0.7	1.1	1.5	7.7	19.5	10.6	1.1
Confidence interval	+/- 0.3	+/- 0.4	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.4	+/- 7.5	+/- 10.2	+/- 4.5	+/- 0.3
Observations	11	8	19	13	18	11	8	16	5	90
Average Hourly Salary or Wage (Dollars)	28.4	16.5	24.8	22.7	27.5	25.5	42.0	37.4	36.4	25.2
Confidence interval	+/- 16.3	+/- 5.5	+/- 11.3	+/- 5.6	+/- 6.0	+/- 3.4	+/- 7.0	+/- 4.0	+/- 4.1	+/- 5.5
Observations	9	6	15	13	14	11	8	16	5	82
Benefits as Percentage of Salary or Wage	21.7	8.2	17.2	24.3	21.3	25.3	35.1	50.7	46.2	21.2
Confidence interval	+/- 26.2	+/- 7.8	+/- 18.7	+/- 8.8	+/- 13.2	+/- 5.8	+/- 16.2	+/- 9.1	+/- 6.9	+/- 9.3
Observations	8	5	13	9	11	11	8	16	5	73
Part-time Employees										
Mean Number of Employees	0.9	1.0	0.9	1.0	1.5	2.0	2.0	*	*	1.0
Confidence interval	+/- 0.3	+/- 0.0	+/- 0.1	+/- 0.0	+/- 0.8	+/- 0.0	+/- 0.0	*	*	+/- 0.1
Observations	10	11	21	9	2	1	1	*	*	34
Average Hourly Salary or Wage (Dollars)	21.3	9.1	16.6	23.8	50.0	16.4	40.0	*	*	19.5
Confidence interval	+/- 11.4	+/- 6.7	+/- 9.2	+/- 11.3	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 7.4
Observations	6	6	12	6	2	1	1	*	*	22
Benefits as Percentage of Salary or Wage	6.2	0.3	3.1	23.8	85.0	34.0	30.0	*	*	7.1
Confidence interval	+/- 7.9	+/- 0.5	+/- 4.0	+/- 35.0	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 6.2
Observations	7	10	17	4	2	1	1	*	*	25
Average Hours Per Employee Per Week	2.5	7.7	5.3	12.8	4.0	10.0	5.0	*	*	7.4
Confidence interval	+/- 1.2	+/- 4.1	+/- 2.5	+/- 8.1	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 3.0
Observations	9	11	20	9	1	1	1	*	*	32
Contract Employees										
Mean Number of Employees	2.0	1.0	1.0	1.0	1.0	*	*	1.0	*	1.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	*	+/- 0.0	*	+/- 0.0
Observations	1	3	4	1	1	*	*	1	*	7
Average Hourly Labor Cost (Dollars)	10.0	27.9	27.7	20.0	40.0	*	*	*	*	27.6
Confidence interval	+/- 0.0	+/- 6.4	+/- 6.3	+/- 0.0	+/- 0.0	*	*	*	*	+/- 6.4
Observations	1	3	4	1	1	*	*	*	*	6
Average Hours Per Employee Per Week	0.5	5.9	5.9	5.0	40.0	*	*	40.0	*	10.1
Confidence interval	+/- 0.0	+/- 8.3	+/- 8.2	+/- 0.0	+/- 0.0	*	*	+/- 0.0	*	+/- 9.9
Observations	1	3	4	1	1	*	*	1	*	7

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.4	0.5	0.4	0.8	1.9	4.6	41.8	46.7	30.3	1.4
Confidence interval	+/- 0.3	+/- 0.4	+/- 0.3	+/- 0.4	+/- 0.7	+/- 1.9	+/- 59.5	+/- 18.2	+/- 17.8	+/- 0.6
Observations	15	29	44	20	13	10	7	16	5	115
Average Hourly Salary or Wage (Dollars)	17.3	17.0	17.1	17.7	19.7	16.9	22.1	23.1	22.9	17.6
Confidence interval	+/- 7.6	+/- 4.1	+/- 3.7	+/- 1.9	+/- 2.6	+/- 2.2	+/- 3.9	+/- 0.6	+/- 2.9	+/- 2.3
Observations	8	19	27	17	12	9	7	16	5	93
Benefits as Percentage of Salary or Wage	11.9	17.2	14.9	21.9	42.3	28.5	38.1	52.4	43.6	20.2
Confidence interval	+/- 12.1	+/- 8.8	+/- 7.5	+/- 18.7	+/- 17.1	+/- 10.3	+/- 13.6	+/- 8.2	+/- 7.0	+/- 6.8
Observations	9	14	23	12	9	9	7	16	5	81
Part-time Employees										
Mean Number of Employees	1.1	1.0	1.0	1.2	3.5	2.0	*	*	*	1.1
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.3	+/- 3.3	+/- 0.0	*	*	*	+/- 0.1
Observations	40	35	75	15	2	2	*	*	*	94
Average Hourly Salary or Wage (Dollars)	15.5	14.6	14.9	17.0	28.5	9.2	*	*	*	15.5
Confidence interval	+/- 5.9	+/- 3.2	+/- 2.8	+/- 4.8	+/- 23.0	+/- 3.2	*	*	*	+/- 2.4
Observations	20	27	47	15	2	2	*	*	*	66
Benefits as Percentage of Salary or Wage	2.7	6.6	4.7	2.8	0.0	8.7	*	*	*	4.4
Confidence interval	+/- 3.2	+/- 6.1	+/- 3.5	+/- 4.7	+/- 0.0	+/- 6.5	*	*	*	+/- 3.0
Observations	27	29	56	11	1	2	*	*	*	70
Average Hours Per Employee Per Week	5.5	9.3	7.5	8.4	9.1	16.0	*	*	*	7.7
Confidence interval	+/- 2.4	+/- 3.0	+/- 2.1	+/- 4.4	+/- 6.7	+/- 0.0	*	*	*	+/- 1.9
Observations	38	35	73	15	2	2	*	*	*	92
Contract Employees										
Mean Number of Employees	0.8	0.9	0.9	0.8	1.0	*	*	6.5	*	0.9
Confidence interval	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.0	*	*	+/- 4.7	*	+/- 0.1
Observations	32	44	76	9	1	*	*	2	*	88
Average Hourly Labor Cost (Dollars)	36.1	40.9	38.9	38.6	20.0	*	*	21.0	*	38.7
Confidence interval	+/- 12.7	+/- 13.1	+/- 9.3	+/- 21.8	+/- 0.0	*	*	+/- 1.0	*	+/- 8.5
Observations	34	40	74	8	1	*	*	2	*	85
Average Hours Per Employee Per Week	2.8	3.6	3.2	4.0	40.0	*	*	36.0	*	3.6
Confidence interval	+/- 1.3	+/- 1.5	+/- 1.0	+/- 2.6	+/- 0.0	*	*	+/- 4.1	*	+/- 1.1
Observations	37	44	81	8	1	*	*	2	*	92

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.6	0.6	0.6	0.5	3.1	7.3	15.3	69.9	79.0	1.8
Confidence interval	+/- 0.2	+/- 0.5	+/- 0.3	+/- 0.2	+/- 1.3	+/- 2.8	+/- 5.4	+/- 26.0	+/- 35.6	+/- 0.7
Observations	13	20	33	19	19	10	4	13	2	100
Average Hourly Salary or Wage (Dollars)	15.1	15.7	15.4	15.2	17.9	15.4	21.1	21.5	22.2	15.9
Confidence interval	+/- 3.7	+/- 2.5	+/- 2.2	+/- 0.9	+/- 1.8	+/- 2.6	+/- 4.4	+/- 0.9	+/- 4.2	+/- 1.3
Observations	8	13	21	16	18	9	5	14	2	85
Benefits as Percentage of Salary or Wage	18.5	13.3	16.1	24.6	26.1	33.5	42.7	53.2	34.0	20.8
Confidence interval	+/- 21.9	+/- 8.4	+/- 12.5	+/- 13.6	+/- 12.0	+/- 13.7	+/- 14.8	+/- 8.7	+/- 14.8	+/- 8.0
Observations	9	13	22	14	15	9	5	14	2	81
Part-time Employees										
Mean Number of Employees	0.9	1.4	1.2	1.1	*	1.0	3.0	*	2.0	1.2
Confidence interval	+/- 0.1	+/- 0.6	+/- 0.4	+/- 0.2	*	+/- 0.0	+/- 1.3	*	+/- 0.0	+/- 0.3
Observations	11	25	36	17	*	2	2	*	1	58
Average Hourly Salary or Wage (Dollars)	13.1	13.4	13.3	14.1	*	14.8	22.7	*	13.0	13.6
Confidence interval	+/- 3.9	+/- 3.7	+/- 3.0	+/- 3.1	*	+/- 0.5	+/- 5.6	*	+/- 0.0	+/- 2.3
Observations	5	20	25	17	*	2	2	*	1	47
Benefits as Percentage of Salary or Wage	0.0	6.6	4.1	9.1	*	0.0	34.2	*	0.0	5.2
Confidence interval	+/- 0.0	+/- 7.6	+/- 5.0	+/- 8.2	*	+/- 0.0	+/- 7.8	*	+/- 0.0	+/- 4.4
Observations	13	24	37	14	*	1	2	*	1	55
Average Hours Per Employee Per Week	0.8	7.3	5.5	8.5	*	6.3	17.5	*	40.0	6.4
Confidence interval	+/- 0.2	+/- 4.3	+/- 3.3	+/- 3.2	*	+/- 2.9	+/- 9.9	*	+/- 0.0	+/- 2.4
Observations	11	25	36	17	*	2	2	*	1	58
Contract Employees										
Mean Number of Employees	0.8	0.6	0.8	1.1	2.0	*	*	1.0	*	0.8
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.7	+/- 0.0	*	*	+/- 0.0	*	+/- 0.2
Observations	15	12	27	7	1	*	*	1	*	36
Average Hourly Labor Cost (Dollars)	34.4	50.6	42.1	27.3	20.0	*	*	13.0	*	38.8
Confidence interval	+/- 14.2	+/- 23.8	+/- 13.9	+/- 19.0	+/- 0.0	*	*	+/- 0.0	*	+/- 11.9
Observations	12	12	24	6	1	*	*	1	*	32
Average Hours Per Employee Per Week	2.1	3.0	2.4	7.6	40.0	*	*	40.0	*	3.9
Confidence interval	+/- 1.8	+/- 2.7	+/- 1.5	+/- 6.4	+/- 0.0	*	*	+/- 0.0	*	+/- 2.0
Observations	15	12	27	6	1	*	*	1	*	35

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Private Systems										
Administrative staff										
Full-time Employees										
Mean Number of Employees	0.4	0.3	0.4	0.8	1.9	3.5	11.9	13.9	33.1	1.4
Confidence interval	+/- 0.4	+/- 0.3	+/- 0.2	+/- 0.5	+/- 0.6	+/- 1.1	+/- 8.0	+/- 4.0	+/- 10.2	+/- 0.4
Observations	5	12	17	10	15	11	7	15	4	79
Average Hourly Salary or Wage (Dollars)	17.5	11.0	13.9	16.3	16.3	18.0	16.4	20.3	20.9	15.3
Confidence interval	+/- 1.6	+/- 1.6	+/- 2.5	+/- 2.1	+/- 1.8	+/- 7.6	+/- 2.3	+/- 1.7	+/- 1.8	+/- 1.4
Observations	4	9	13	9	12	10	7	15	4	70
Benefits as Percentage of Salary or Wage	7.1	6.6	6.8	17.7	31.5	27.7	37.5	52.3	38.0	17.0
Confidence interval	+/- 5.9	+/- 7.9	+/- 5.2	+/- 10.8	+/- 13.5	+/- 6.9	+/- 14.1	+/- 8.6	+/- 5.3	+/- 5.4
Observations	4	8	12	8	9	10	7	15	4	65
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.2	2.0	*	*	2.0	*	1.0
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.0	+/- 0.3	+/- 0.0	*	*	+/- 0.0	*	+/- 0.1
Observations	12	21	33	18	2	*	*	1	*	54
Average Hourly Salary or Wage (Dollars)	13.3	12.8	12.9	15.9	20.0	*	*	18.1	*	14.2
Confidence interval	+/- 8.1	+/- 4.2	+/- 4.1	+/- 3.8	+/- 0.0	*	*	+/- 0.0	*	+/- 2.9
Observations	7	13	20	17	2	*	*	1	*	40
Benefits as Percentage of Salary or Wage	2.0	1.4	1.7	8.1	85.0	*	*	22.0	*	3.7
Confidence interval	+/- 4.0	+/- 2.6	+/- 2.3	+/- 11.4	+/- 0.0	*	*	+/- 0.0	*	+/- 3.3
Observations	14	20	34	13	2	*	*	1	*	50
Average Hours Per Employee Per Week	4.8	7.4	6.7	9.9	7.0	*	*	20.0	*	7.6
Confidence interval	+/- 4.1	+/- 3.7	+/- 2.8	+/- 4.0	+/- 1.4	*	*	+/- 0.0	*	+/- 2.3
Observations	12	21	33	18	2	*	*	1	*	54
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.0	*	1.0	1.0	*	1.0
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	*	+/- 0.0	+/- 0.0	*	+/- 0.0
Observations	3	5	8	3	1	*	1	3	*	16
Average Hourly Labor Cost (Dollars)	11.3	22.5	18.7	20.0	20.0	*	*	20.3	*	19.3
Confidence interval	+/- 2.7	+/- 3.7	+/- 7.0	+/- 14.3	+/- 0.0	*	*	+/- 0.0	*	+/- 6.4
Observations	3	5	8	3	1	*	*	1	*	13
Average Hours Per Employee Per Week	0.2	2.2	1.5	8.6	40.0	*	13.2	21.9	*	6.8
Confidence interval	+/- 0.1	+/- 0.7	+/- 1.0	+/- 7.7	+/- 0.0	*	+/- 0.0	+/- 11.1	*	+/- 6.3
Observations	3	5	8	3	1	*	1	3	*	16

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems										
Managers										
Full-time Employees										
Mean Number of Employees	0.5	0.4	0.5	0.6	1.3	1.8	3.7	8.9	27.4	1.6
Confidence interval	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.1	+/- 0.4	+/- 0.3	+/- 0.7	+/- 1.9	+/- 9.0	+/- 0.2
Observations	17	22	39	68	111	139	107	194	49	707
Average Hourly Salary or Wage (Dollars)	30.0	21.0	25.4	21.3	27.5	30.7	35.8	38.2	40.5	26.7
Confidence interval	+/- 12.9	+/- 5.8	+/- 6.5	+/- 2.6	+/- 2.0	+/- 1.5	+/- 1.9	+/- 1.1	+/- 1.9	+/- 1.7
Observations	15	20	35	66	102	134	105	190	49	681
Benefits as Percentage of Salary or Wage	23.8	21.2	22.4	28.3	29.6	31.6	35.7	41.4	42.1	29.0
Confidence interval	+/- 19.5	+/- 7.9	+/- 10.3	+/- 7.3	+/- 5.2	+/- 2.8	+/- 3.7	+/- 2.1	+/- 6.6	+/- 3.1
Observations	14	18	32	55	89	127	101	185	48	637
Part-time Employees										
Mean Number of Employees	0.9	1.1	1.0	1.0	1.1	1.5	2.0	1.4	*	1.0
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.0	+/- 0.2	+/- 0.5	+/- 0.0	+/- 0.3	*	+/- 0.1
Observations	17	20	37	32	6	8	3	5	*	91
Average Hourly Salary or Wage (Dollars)	19.7	15.7	18.1	20.4	27.2	56.1	34.1	52.2	*	20.9
Confidence interval	+/- 5.6	+/- 10.2	+/- 5.3	+/- 3.5	+/- 7.2	+/- 37.9	+/- 6.8	+/- 18.8	*	+/- 3.7
Observations	13	12	25	27	6	8	3	5	*	74
Benefits as Percentage of Salary or Wage	7.0	3.6	5.4	23.9	36.1	33.5	27.7	12.0	*	12.7
Confidence interval	+/- 8.6	+/- 5.7	+/- 5.2	+/- 14.4	+/- 28.9	+/- 10.7	+/- 2.7	+/- 17.4	*	+/- 5.9
Observations	14	16	30	24	5	8	3	4	*	74
Average Hours Per Employee Per Week	3.1	7.7	5.5	10.1	8.0	21.5	21.7	27.1	*	7.8
Confidence interval	+/- 1.3	+/- 3.3	+/- 1.8	+/- 3.3	+/- 3.9	+/- 17.1	+/- 18.9	+/- 5.3	*	+/- 1.6
Observations	16	19	35	32	5	7	3	5	*	87
Contract Employees										
Mean Number of Employees	1.5	1.0	1.0	1.0	1.0	1.9	1.0	1.2	1.0	1.0
Confidence interval	+/- 1.0	+/- 0.0	+/- 0.0	+/- 0.3	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.2	+/- 0.0	+/- 0.1
Observations	2	4	6	5	5	3	2	9	1	31
Average Hourly Labor Cost (Dollars)	9.2	28.2	27.8	17.8	27.7	34.4	43.3	44.5	43.0	24.3
Confidence interval	+/- 1.8	+/- 6.3	+/- 6.2	+/- 5.7	+/- 13.2	+/- 4.1	+/- 11.9	+/- 17.7	+/- 0.0	+/- 4.1
Observations	2	4	6	5	3	3	2	4	1	24
Average Hours Per Employee Per Week	4.2	5.9	5.9	16.0	33.9	59.5	12.5	33.8	40.0	18.9
Confidence interval	+/- 8.0	+/- 8.0	+/- 7.8	+/- 8.9	+/- 13.0	+/- 17.7	+/- 12.4	+/- 6.9	+/- 0.0	+/- 5.1
Observations	2	4	6	5	4	3	2	7	1	28

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems										
Treatment Plant Operators										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	1.0	2.4	4.4	11.2	21.1	80.3	2.6
Confidence interval	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.4	+/- 0.7	+/- 4.3	+/- 3.3	+/- 18.9	+/- 0.3
Observations	25	57	82	107	100	122	93	176	43	723
Average Hourly Salary or Wage (Dollars)	19.6	16.4	17.3	16.3	18.1	19.1	19.9	23.3	24.2	17.7
Confidence interval	+/- 7.4	+/- 2.9	+/- 2.9	+/- 1.9	+/- 1.2	+/- 1.0	+/- 1.5	+/- 0.6	+/- 1.4	+/- 1.1
Observations	18	46	64	101	94	118	90	175	43	685
Benefits as Percentage of Salary or Wage	17.2	19.0	18.3	23.8	35.4	33.4	34.9	42.4	42.1	26.9
Confidence interval	+/- 12.8	+/- 6.5	+/- 6.4	+/- 5.3	+/- 5.8	+/- 3.5	+/- 3.5	+/- 2.2	+/- 2.8	+/- 2.9
Observations	18	37	55	89	80	111	85	170	43	633
Part-time Employees										
Mean Number of Employees	1.1	1.0	1.1	1.3	1.6	1.3	1.6	1.8	2.0	1.2
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.5	+/- 0.3	+/- 1.2	+/- 0.6	+/- 0.0	+/- 0.1
Observations	51	61	112	65	14	15	5	12	1	224
Average Hourly Salary or Wage (Dollars)	15.0	14.7	14.8	15.7	15.2	15.2	15.8	13.5	13.7	15.2
Confidence interval	+/- 3.7	+/- 2.3	+/- 1.9	+/- 2.1	+/- 3.6	+/- 7.2	+/- 3.7	+/- 2.1	+/- 0.0	+/- 1.3
Observations	31	51	82	64	14	13	5	11	1	190
Benefits as Percentage of Salary or Wage	5.9	9.8	8.0	19.0	13.5	8.9	21.6	3.8	0.0	12.1
Confidence interval	+/- 5.5	+/- 6.0	+/- 4.2	+/- 7.9	+/- 10.2	+/- 6.7	+/- 16.6	+/- 3.8	+/- 0.0	+/- 4.0
Observations	36	51	87	59	11	12	3	9	1	182
Average Hours Per Employee Per Week	5.4	9.5	7.6	9.5	14.7	22.3	29.4	21.5	20.0	8.9
Confidence interval	+/- 2.0	+/- 2.3	+/- 1.7	+/- 2.1	+/- 4.7	+/- 7.7	+/- 6.1	+/- 2.9	+/- 0.0	+/- 1.3
Observations	49	59	108	66	14	13	5	10	1	217
Contract Employees										
Mean Number of Employees	0.8	0.9	0.9	1.0	1.0	2.2	5.0	7.7	11.0	1.0
Confidence interval	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.0	+/- 2.6	+/- 5.1	+/- 2.8	+/- 12.2	+/- 0.1
Observations	33	54	87	21	5	4	3	10	2	132
Average Hourly Labor Cost (Dollars)	36.1	39.5	38.2	36.0	27.3	22.5	19.8	29.9	45.1	37.4
Confidence interval	+/- 12.7	+/- 11.6	+/- 8.7	+/- 12.2	+/- 7.1	+/- 12.0	+/- 9.2	+/- 9.4	+/- 2.6	+/- 7.0
Observations	35	50	85	20	4	3	2	9	2	125
Average Hours Per Employee Per Week	2.8	3.5	3.3	9.9	15.4	31.4	40.0	38.8	36.4	5.2
Confidence interval	+/- 1.3	+/- 1.4	+/- 1.0	+/- 6.9	+/- 13.1	+/- 7.2	+/- 0.0	+/- 3.4	+/- 4.5	+/- 1.6
Observations	38	54	92	22	5	3	3	10	2	137

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
All Systems										
Distribution System Operators										
Full-time Employees										
Mean Number of Employees	0.6	0.5	0.5	1.0	3.2	6.9	15.3	34.5	142.6	3.8
Confidence interval	+/- 0.2	+/- 0.3	+/- 0.2	+/- 0.3	+/- 0.5	+/- 0.8	+/- 1.9	+/- 5.7	+/- 35.4	+/- 0.3
Observations	19	48	67	106	120	139	96	171	43	742
Average Hourly Salary or Wage (Dollars)	18.3	15.6	16.4	15.5	17.1	18.6	19.1	21.2	23.0	16.8
Confidence interval	+/- 6.4	+/- 2.3	+/- 2.4	+/- 1.3	+/- 1.0	+/- 1.0	+/- 1.4	+/- 0.6	+/- 1.4	+/- 0.8
Observations	14	40	54	100	113	135	96	171	43	712
Benefits as Percentage of Salary or Wage	21.0	19.5	20.0	32.0	30.0	34.7	37.7	42.6	45.2	29.4
Confidence interval	+/- 17.6	+/- 5.7	+/- 7.2	+/- 6.3	+/- 4.6	+/- 3.1	+/- 3.7	+/- 2.2	+/- 7.6	+/- 3.0
Observations	15	36	51	90	102	128	94	166	42	673
Part-time Employees										
Mean Number of Employees	1.2	1.2	1.2	1.4	1.3	2.6	3.0	3.2	3.9	1.3
Confidence interval	+/- 0.3	+/- 0.3	+/- 0.3	+/- 0.2	+/- 0.3	+/- 1.1	+/- 1.2	+/- 0.8	+/- 2.6	+/- 0.2
Observations	19	49	68	54	11	19	14	16	3	185
Average Hourly Salary or Wage (Dollars)	14.1	15.0	14.8	14.9	11.6	12.8	13.8	12.4	11.4	14.6
Confidence interval	+/- 2.3	+/- 2.6	+/- 2.1	+/- 2.2	+/- 2.6	+/- 2.8	+/- 2.2	+/- 1.5	+/- 2.1	+/- 1.4
Observations	13	43	56	53	10	19	14	16	3	171
Benefits as Percentage of Salary or Wage	0.0	6.4	4.2	15.1	16.9	12.9	10.8	14.4	2.9	8.2
Confidence interval	+/- 0.1	+/- 5.2	+/- 3.6	+/- 8.2	+/- 11.4	+/- 10.4	+/- 9.2	+/- 8.2	+/- 4.4	+/- 3.6
Observations	20	44	64	46	7	15	12	15	3	162
Average Hours Per Employee Per Week	2.3	7.1	5.8	9.0	22.8	27.0	31.3	29.6	32.9	8.8
Confidence interval	+/- 1.4	+/- 2.6	+/- 1.9	+/- 1.7	+/- 6.2	+/- 6.4	+/- 4.8	+/- 5.9	+/- 9.0	+/- 1.2
Observations	19	49	68	55	11	18	14	16	3	185
Contract Employees										
Mean Number of Employees	0.8	0.8	0.8	1.2	2.0	15.6	3.7	2.8	10.0	1.1
Confidence interval	+/- 0.2	+/- 0.1	+/- 0.1	+/- 0.6	+/- 0.8	+/- 2.7	+/- 1.6	+/- 1.5	+/- 0.0	+/- 0.3
Observations	15	19	34	12	4	2	4	6	1	63
Average Hourly Labor Cost (Dollars)	34.4	38.0	36.5	23.4	40.2	20.2	25.6	25.9	16.0	33.7
Confidence interval	+/- 14.2	+/- 19.0	+/- 12.6	+/- 13.8	+/- 40.3	+/- 4.4	+/- 1.0	+/- 13.9	+/- 0.0	+/- 9.9
Observations	12	19	31	11	4	2	2	6	1	57
Average Hours Per Employee Per Week	2.1	5.0	3.5	11.9	30.0	54.5	28.4	32.3	8.0	7.1
Confidence interval	+/- 1.8	+/- 3.6	+/- 2.0	+/- 7.9	+/- 11.5	+/- 11.0	+/- 21.2	+/- 6.6	+/- 0.0	+/- 2.4
Observations	15	19	34	11	4	2	3	6	1	61

(Continued)

Table 85 (Cont.)
Number of Employees and Annual Labor Costs
By Ownership

System Ownership/Employee Category	System Service Population Category									
	100 or Less	101 - 500	Sub. 500 or less	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
All Systems										
Administrative Staff										
Full-time Employees										
Mean Number of Employees	0.4	0.4	0.4	0.8	1.9	2.9	6.0	16.3	93.1	2.7
Confidence interval	+/- 0.4	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.3	+/- 0.5	+/- 1.3	+/- 3.1	+/- 35.8	+/- 0.3
Observations	10	27	37	63	95	128	101	188	47	659
Average Hourly Salary or Wage (Dollars)	16.3	16.6	16.5	16.0	15.2	20.9	19.7	22.8	22.2	17.4
Confidence interval	+/- 3.3	+/- 10.2	+/- 6.8	+/- 3.4	+/- 1.0	+/- 2.6	+/- 1.6	+/- 0.9	+/- 1.1	+/- 1.8
Observations	9	24	33	60	88	123	99	184	47	634
Benefits as Percentage of Salary or Wage	13.3	19.3	17.7	24.4	31.3	33.7	37.2	42.1	43.8	28.0
Confidence interval	+/- 11.9	+/- 8.2	+/- 7.0	+/- 6.0	+/- 5.5	+/- 3.2	+/- 3.6	+/- 2.1	+/- 6.9	+/- 2.6
Observations	8	23	31	55	78	116	93	181	46	600
Part-time Employees										
Mean Number of Employees	1.0	1.0	1.0	1.2	1.2	1.7	1.3	2.9	29.0	1.2
Confidence interval	+/- 0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.6	+/- 0.3	+/- 1.0	+/- 30.1	+/- 0.1
Observations	15	52	67	82	16	17	11	29	7	229
Average Hourly Salary or Wage (Dollars)	12.9	12.6	12.7	13.9	13.8	23.2	14.0	16.1	21.8	13.7
Confidence interval	+/- 5.6	+/- 2.6	+/- 2.5	+/- 2.1	+/- 4.5	+/- 10.8	+/- 2.8	+/- 2.3	+/- 4.8	+/- 1.6
Observations	10	41	51	77	15	16	11	29	8	207
Benefits as Percentage of Salary or Wage	1.6	5.5	4.2	15.8	16.0	19.4	17.6	17.7	26.7	9.8
Confidence interval	+/- 3.1	+/- 4.5	+/- 3.3	+/- 7.1	+/- 8.5	+/- 10.6	+/- 9.7	+/- 8.4	+/- 9.7	+/- 3.5
Observations	18	44	62	65	12	15	8	26	7	195
Average Hours Per Employee Per Week	5.0	7.5	7.0	12.6	14.9	18.2	22.3	24.4	24.8	10.4
Confidence interval	+/- 3.4	+/- 2.1	+/- 1.8	+/- 2.5	+/- 7.3	+/- 5.3	+/- 4.9	+/- 3.7	+/- 1.2	+/- 1.5
Observations	15	50	65	82	16	17	11	27	6	224
Contract Employees										
Mean Number of Employees	1.0	1.0	1.0	1.0	1.5	2.2	1.3	2.8	45.0	1.3
Confidence interval	+/- 0.0	+/- 0.0	+/- 0.0	+/- 0.0	+/- 1.0	+/- 1.3	+/- 0.7	+/- 0.8	+/- 51.7	+/- 0.2
Observations	3	9	12	6	2	3	3	13	4	43
Average Hourly Labor Cost (Dollars)	11.3	21.5	19.7	29.0	18.3	16.5	32.7	33.6	30.8	23.0
Confidence interval	+/- 2.7	+/- 16.3	+/- 13.9	+/- 19.6	+/- 3.5	+/- 5.6	+/- 3.9	+/- 10.1	+/- 8.0	+/- 10.6
Observations	3	9	12	6	2	3	2	11	4	40
Average Hours Per Employee Per Week	0.2	6.4	5.4	8.3	37.5	43.5	12.7	23.9	32.1	10.3
Confidence interval	+/- 0.1	+/- 5.6	+/- 4.9	+/- 5.2	+/- 5.1	+/- 22.2	+/- 9.6	+/- 5.7	+/- 9.9	+/- 4.2
Observations	3	9	12	6	2	3	3	12	4	42

Data: Q.25

Notes: Labor costs includes wages, salaries, and fringe benefits.

Table 86
Percentage of Systems Making Major Capital Investments in the Past 5 Years
By Primary Water Source

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Percentage of Systems	35.6	35.0	56.8	43.1	58.8	55.6	64.1	35.9	42.4
Confidence interval	+/- 11.2	+/- 9.6	+/- 10.0	+/- 12.8	+/- 12.7	+/- 17.5	+/- 9.1	+/- 30.5	+/- 5.4
Observations	88	105	111	62	66	40	56	6	534
Primarily Surface Water Systems									
Percentage of Systems	36.4	45.0	64.7	50.9	57.0	70.5	77.1	87.2	56.8
Confidence interval	+/- 27.2	+/- 20.2	+/- 10.4	+/- 12.9	+/- 10.5	+/- 11.1	+/- 6.0	+/- 6.6	+/- 6.4
Observations	49	67	78	65	84	54	124	39	560
Primarily Purchased Water Systems									
Percentage of Systems	0.4	32.9	44.5	51.9	72.2	76.0	77.3	80.3	41.6
Confidence interval	+/- 0.9	+/- 21.6	+/- 13.1	+/- 21.1	+/- 18.6	+/- 14.0	+/- 10.8	+/- 14.1	+/- 9.2
Observations	8	23	48	26	25	30	45	13	218
All Systems									
Percentage of Systems	33.3	35.1	54.1	46.6	61.0	66.4	74.0	78.9	43.5
Confidence interval	+/- 10.3	+/- 8.5	+/- 7.8	+/- 9.2	+/- 8.2	+/- 8.1	+/- 4.6	+/- 9.3	+/- 4.3
Observations	145	195	237	153	175	124	225	58	1,312

Data: Q.27

Notes:

Table 87
Percentage of Systems Making Major Capital Investments in the Past 5 Years
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
Mean	40.9	45.4	54.1	48.5	62.0	69.1	77.0	87.3	52.2
Confidence interval	+/- 24.0	+/- 13.8	+/- 8.5	+/- 10.3	+/- 8.6	+/- 8.3	+/- 4.2	+/- 5.4	+/- 5.3
Observations	27	84	181	127	155	111	204	52	941
Private Systems									
Mean	32.1	28.6	54.2	39.3	50.5	41.5	51.9	24.4	34.6
Confidence interval	+/- 11.2	+/- 9.7	+/- 13.5	+/- 21.0	+/- 25.9	+/- 24.4	+/- 24.3	+/- 23.9	+/- 6.4
Observations	118	111	56	26	20	13	21	6	371

Data: Q.27

Notes:

Table 88
Amount of Major Capital Investment in the Past 5 Years
By Primary Water Source
(Thousands of Dollars)

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Mean Invested in the Past 5 Years	75	180	598	982	3,382	14,420	45,405	134,434	1,089
<i>Confidence interval</i>	+/- 67	+/- 193	+/- 305	+/- 595	+/- 1,307	+/- 3,471	+/- 23,488	+/- 117,730	+/- 269
Median	6	23	113	400	2,385	17,500	11,800	134,434	99
Observations	16	23	54	20	35	15	26	2	191
Primarily Surface Water Systems									
Mean Invested in the Past 5 Years	24	455	756	2,358	5,244	17,576	54,344	392,845	18,122
<i>Confidence interval</i>	+/- 20	+/- 307	+/- 313	+/- 1,128	+/- 1,543	+/- 5,306	+/- 10,723	+/- 92,720	+/- 3,397
Median	9	240	210	971	3,500	13,050	43,635	273,640	1,300
Observations	11	22	46	23	42	33	86	31	294
Primarily Purchased Water Systems									
Mean Invested in the Past 5 Years	*	1,008	593	997	6,520	7,243	40,921	154,008	3,260
<i>Confidence interval</i>	*	+/- 774	+/- 366	+/- 575	+/- 9,106	+/- 2,316	+/- 11,726	+/- 105,378	+/- 1,424
Median	*	681	181	922	645	4,401	26,609	61,802	380
Observations	*	9	20	11	15	20	31	9	115
All Systems									
Mean Invested in the Past 5 Years	74	375	612	1,221	4,609	13,616	50,003	322,231	3,724
<i>Confidence interval</i>	+/- 65	+/- 260	+/- 210	+/- 414	+/- 2,346	+/- 2,624	+/- 8,197	+/- 80,491	+/- 512
Median	6	46	161	542	2,382	12,500	32,327	171,900	180
Observations	27	54	120	54	92	68	143	42	600

Data:

Q.27A

Notes:

Excludes systems that have not made major capital improvements in the past five years.
Excludes systems that did not report positive revenue or expenses.

Table 89
Amount of Major Capital Investment in the Past 5 Years
By Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Mean Invested in the Past 5 Years	217	545	722	1,193	4,703	13,680	47,126	331,084	4,847
Confidence interval	+/- 159	+/- 375	+/- 282	+/- 458	+/- 2,473	+/- 2,756	+/- 7,815	+/- 84,367	+/- 792
Median	99	92	189	486	2,382	12,908	31,926	171,900	361
Observations	8	34	96	46	85	62	133	40	504
Private Systems									
Mean Invested in the Past 5 Years	33	49	284	1,344	2,983	12,803	76,798	137,250	954
Confidence interval	+/- 49	+/- 26	+/- 241	+/- 925	+/- 2,736	+/- 8,612	+/- 22,085	+/- 36,407	+/- 580
Median	5	15	31	922	2,581	3,171	102,373	137,250	30
Observations	19	20	24	8	7	6	10	2	96

Data: Q.27

Notes: Excludes systems that have not made major capital improvements in the past five years.
Excludes systems that did not report positive revenue or expenses.

Table 90
Percentage of Systems Making Major Capital Investments in the Past 5 Years
By Type of Investment and Primary Water Source
(Percentage of Systems Funding Each Investment Category)

Primary Water Source	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Primarily Ground Water Systems									
Land	0.1	2.7	8.1	1.1	25.3	48.0	41.4	66.7	5.8
Water Source	59.8	50.5	50.8	45.7	58.3	71.1	57.9	100.0	53.2
Transmission and Distribution System	30.5	49.0	54.7	88.8	84.1	87.7	83.0	100.0	52.2
Treatment	30.8	25.5	24.7	33.2	50.8	81.2	68.8	100.0	29.4
Storage	29.5	24.7	35.2	33.3	55.7	77.5	69.0	33.3	32.6
Security	14.0	3.0	4.7	40.0	42.1	63.1	44.9	66.7	12.2
Other	3.6	5.7	11.5	17.9	45.0	67.8	49.4	66.7	11.3
Observations	35	38	62	26	40	21	36	3	261
Primarily Surface Water Systems									
Land	0.0	0.0	3.5	16.7	26.7	17.9	50.6	52.9	16.1
Water Source	24.9	34.8	20.3	25.0	26.2	34.7	59.3	67.6	29.5
Transmission and Distribution System	40.1	52.7	61.7	80.6	90.1	93.2	95.3	97.1	74.6
Treatment	72.3	51.8	39.6	69.4	60.9	81.7	90.5	97.1	60.7
Storage	27.5	17.0	34.4	50.0	37.6	65.3	68.4	73.5	41.3
Security	0.0	5.3	5.8	50.0	26.2	30.3	34.1	23.5	22.0
Other	5.5	7.9	9.8	25.0	46.2	45.4	64.6	91.2	28.4
Observations	28	36	49	36	49	39	94	34	365
Primarily Purchased Water Systems									
Land	0.0	0.0	9.6	17.0	29.2	9.2	35.7	49.0	12.1
Water Source	0.0	31.7	9.5	2.2	16.2	5.9	50.0	24.5	14.6
Transmission and Distribution System	0.0	98.7	90.5	100.0	84.7	95.4	97.4	100.0	93.1
Treatment	0.0	17.2	5.8	10.7	16.1	27.2	54.8	49.0	12.2
Storage	100.0	33.2	19.2	39.3	45.3	26.4	71.9	49.0	30.3
Security	0.0	0.0	0.0	17.0	44.5	41.5	47.1	40.5	11.1
Other	0.0	1.0	4.8	17.0	22.6	36.9	61.2	41.0	10.6
Observations	1	9	21	13	19	23	36	10	132
All Systems									
Land	0.1	2.2	8.0	8.5	26.6	24.6	45.5	52.8	8.1
Water Source	58.6	47.1	38.7	30.0	39.9	37.6	57.0	59.0	43.9
Transmission and Distribution System	30.8	56.1	63.4	90.1	85.8	92.2	93.1	97.9	61.7
Treatment	32.1	25.7	21.9	34.7	45.0	66.1	78.5	85.5	30.1
Storage	29.5	25.5	31.6	38.3	48.5	58.0	69.3	65.2	33.2
Security	13.5	2.7	3.8	36.0	38.6	43.5	39.1	30.2	13.2
Other	3.7	5.2	9.9	19.1	39.9	49.9	60.7	77.5	13.2
Observations	64	83	132	75	108	83	166	47	758

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.

Table reports the percentage of systems that funded each investment type.

It is not the percentage of funds invested in each category.

Table 94 reports the percentage of funds invested in each category for the average system.

Table 96 reports the percentage of funds invested in each category nationally.

Table 91
Percentage of Systems Making Major Capital Investments in the Past 5 Years
By Type of Investment and Ownership
(Percentage of Systems Funding Each Investment Category)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Land	0.6	0.0	8.1	10.3	23.8	25.7	42.3	52.9	10.3
Water Source	62.0	46.9	35.1	29.5	38.9	38.1	54.9	57.3	39.3
Transmission and Distribution System	22.8	56.2	63.1	89.7	84.7	93.0	92.5	97.9	68.3
Treatment	23.9	26.5	16.8	37.4	42.9	66.7	77.1	84.9	29.0
Storage	15.8	31.8	33.5	41.5	47.5	56.7	67.1	65.9	37.1
Security	0.3	0.3	3.7	39.7	40.7	46.3	37.2	31.5	15.3
Other	0.9	5.1	7.7	21.9	40.2	51.2	62.6	76.6	16.5
Observations	13	43	103	64	99	77	156	45	600
Private Systems									
Land	0.0	4.4	7.9	0.0	63.7	8.1	80.4	50.0	4.6
Water Source	57.9	47.3	48.5	32.3	53.7	29.7	80.4	100.0	51.1
Transmission and Distribution System	32.3	56.0	64.1	91.7	100.0	78.4	100.0	100.0	51.5
Treatment	33.7	24.9	35.7	22.2	74.4	56.9	93.5	100.0	31.8
Storage	32.1	19.3	26.5	23.7	62.2	78.4	93.5	50.0	27.2
Security	16.1	5.1	3.9	19.0	10.0	0.0	60.8	0.0	9.9
Other	4.2	5.2	15.7	6.4	36.3	29.7	39.2	100.0	8.1
Observations	51	40	29	11	9	6	10	2	158

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.
Table reports the percentage of systems that funded each investment type.
It is not the percentage of funds invested in each category.
Table 95 reports the percentage of funds invested in each category for the average system.
Table 97 reports the percentage of funds invested in each category nationally.

Table 92
Average Amount of Major Capital Investment Allocated in the Past 5 Years
By Type of Investment and Primary Water Source
(Thousands of Dollars)

Primary Water Source	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	
Primarily Ground Water Systems									
Land	0	0	5	3	22	441	555	500	10
Water Source	17	50	151	91	356	2,556	2,379	16,213	134
Transmission and Distribution System	20	75	219	423	2,033	3,569	12,499	37,767	364
Treatment	13	23	54	310	437	3,204	15,268	11,142	182
Storage	15	13	140	62	656	1,249	2,115	3,717	122
Security	1	0	0	11	10	65	60	767	3
Other	0	1	3	52	173	1,902	5,163	32,284	67
Observations	35	38	62	26	40	21	36	3	261
Primarily Surface Water Systems									
Land	0	0	1	6	53	201	1,203	4,537	226
Water Source	31	40	34	88	270	895	3,460	35,060	1,212
Transmission and Distribution System	183	97	378	982	1,776	8,219	23,526	156,023	6,629
Treatment	240	235	239	1,585	2,455	4,522	15,058	108,680	4,863
Storage	6	34	129	433	587	1,839	2,828	12,660	877
Security	0	0	1	11	10	80	560	1,317	85
Other	0	1	8	25	287	1,494	7,694	54,836	2,021
Observations	28	36	49	36	49	39	94	34	365
Primarily Purchased Water Systems									
Land	0	0	12	2	19	44	622	2,700	37
Water Source	0	8	32	8	290	59	5,036	2,802	176
Transmission and Distribution System	0	908	455	983	4,409	4,110	23,794	96,312	2,262
Treatment	0	1	12	2	618	284	8,833	12,702	346
Storage	15	83	57	175	512	1,290	4,822	37,024	473
Security	0	0	0	30	35	65	235	1,055	22
Other	0	7	18	15	355	716	4,928	12,645	250
Observations	1	9	21	13	19	23	36	10	132
All Systems									
Land	0	0	6	3	29	229	944	3,854	39
Water Source	18	44	113	69	318	1,165	3,562	26,112	266
Transmission and Distribution System	25	192	287	685	2,540	5,633	21,256	134,579	1,409
Treatment	20	31	62	492	999	2,917	13,799	79,628	751
Storage	15	24	120	168	604	1,503	3,095	18,062	269
Security	1	0	0	16	16	71	386	1,221	16
Other	0	2	7	37	246	1,398	6,581	43,255	323
Observations	64	83	132	75	108	83	166	47	758

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.

Table 93
Average Amount of Major Capital Investment Allocated in the Past 5 Years
By Type of Investment and Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Land	0	0	8	4	30	240	990	3,990	63
Water Source	89	68	129	48	331	1,043	3,729	26,438	402
Transmission and Distribution System	57	351	339	637	2,600	5,494	18,582	138,314	2,103
Treatment	86	53	72	479	1,049	3,072	13,748	81,591	1,168
Storage	11	40	154	183	592	1,555	3,072	18,807	413
Security	1	0	0	15	17	76	137	1,273	18
Other	0	3	8	43	251	1,443	6,873	43,556	512
Observations	13	43	103	64	99	77	156	45	600
Private Systems									
Land	0	0	2	0	19	61	446	662	3
Water Source	4	20	70	165	130	3,063	1,739	18,497	56
Transmission and Distribution System	19	36	147	908	1,731	7,797	50,410	47,381	341
Treatment	8	9	35	555	324	501	14,349	33,813	109
Storage	15	8	30	102	762	688	3,347	664	47
Security	0	0	1	20	1	0	3,108	0	12
Other	0	0	4	10	177	693	3,400	36,233	32
Observations	51	40	29	11	9	6	10	2	158

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.

Table 94
Allocation of Major Capital Investments of Average Systems in the Past 5 Years
By Type of Investment and Primary Water Source
(Percentage of Funds Allocated to Each Investment Category)

Primary Water Source	System Service Population Category							
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000 All Sizes
Primarily Ground Water Systems								
Land	0.0	0.0	2.0	0.1	1.8	2.6	1.5	0.8
Water Source	43.2	36.1	31.1	14.3	16.4	16.5	9.8	33.0
Transmission and Distribution System	14.5	34.7	35.4	52.2	43.8	27.9	41.0	32.0
Treatment	17.3	13.8	11.0	13.7	10.0	22.1	23.5	13.6
Storage	15.7	12.2	15.6	8.4	12.4	12.7	10.4	13.9
Security	9.0	0.3	0.5	5.0	6.7	4.9	3.4	3.3
Other	0.4	2.9	4.4	6.4	8.9	13.3	10.4	3.5
Observations	35	38	62	26	40	21	36	261
Primarily Surface Water Systems								
Land	0.0	0.0	0.1	1.2	2.4	0.7	2.1	1.0
Water Source	12.5	16.6	14.1	7.7	3.4	3.0	7.2	9.4
Transmission and Distribution System	26.9	35.9	41.4	36.9	48.9	49.7	42.3	41.5
Treatment	53.0	33.9	25.6	34.0	26.1	25.2	29.6	29.9
Storage	4.8	8.8	14.8	17.7	9.4	11.4	5.5	11.8
Security	0.0	0.0	2.4	0.9	2.5	0.8	0.9	1.5
Other	2.8	4.8	1.7	1.7	7.2	9.2	12.4	4.9
Observations	28	36	49	36	49	39	94	365
Primarily Purchased Water Systems								
Land	0.0	0.0	0.4	0.1	14.1	0.2	1.1	2.1
Water Source	0.0	4.4	5.5	1.2	0.5	1.4	10.2	3.9
Transmission and Distribution System	0.0	80.1	83.2	80.2	56.8	71.5	56.6	77.5
Treatment	0.0	1.5	0.6	0.2	8.0	3.5	11.9	2.1
Storage	100.0	13.3	9.5	13.6	15.2	14.5	7.8	11.9
Security	0.0	0.0	0.0	2.3	1.4	0.6	0.9	0.6
Other	0.0	0.7	0.8	2.5	4.0	8.3	11.4	2.0
Observations	1	9	21	13	19	23	36	132
All Systems								
Land	0.0	0.0	1.4	0.3	5.0	1.1	1.8	1.0
Water Source	42.2	30.7	23.8	9.5	9.2	6.6	8.4	25.3
Transmission and Distribution System	14.9	41.1	46.6	56.4	48.2	49.2	45.0	40.8
Treatment	18.4	13.1	10.0	14.3	13.7	18.1	24.6	13.5
Storage	15.4	12.2	14.2	11.7	12.3	12.7	7.0	13.3
Security	8.7	0.2	0.6	3.4	4.3	2.0	1.4	2.6
Other	0.4	2.7	3.3	4.4	7.3	10.2	11.8	3.4
Observations	64	83	132	75	108	83	166	758

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.
Table reports the percentage of funds invested in each category for the average system.
It is not the percentage of funds invested in each category nationally or the percentage of systems that funded each investment category.
Table 90 reports the percentage of systems that funded each investment category.
Table 96 reports the percentage of funds invested in each category nationally.

Table 95
Allocation of Major Capital Investments of Average Systems in the Past 5 Years
By Type of Investment and Ownership
(Percentage of Funds Allocated to Each Investment Category)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Land	0.0	0.0	0.7	0.4	5.1	1.2	1.9	1.1	1.2
Water Source	58.2	32.3	23.5	8.3	9.6	6.7	8.9	5.0	21.9
Transmission and Distribution System	4.0	38.4	45.8	54.7	48.0	48.7	43.4	49.9	43.9
Treatment	22.6	14.5	9.9	14.7	13.7	18.7	25.2	25.2	13.4
Storage	15.0	14.3	15.6	12.9	11.6	11.9	7.2	5.6	14.0
Security	0.0	0.0	0.8	4.0	4.7	2.1	1.3	0.5	1.6
Other	0.2	0.5	3.7	5.0	7.4	10.7	12.2	12.7	4.0
Observations	13	43	103	64	99	77	156	45	600
Private Systems									
Land	0.0	0.0	3.4	0.0	3.3	0.1	0.5	0.4	0.9
Water Source	39.0	29.1	24.5	14.9	4.3	6.6	2.6	12.3	30.6
Transmission and Distribution System	17.0	43.8	48.9	64.3	51.0	57.5	62.7	37.8	36.0
Treatment	17.6	11.7	10.3	12.7	13.3	8.3	18.4	20.2	13.7
Storage	15.5	10.1	10.3	6.2	21.5	24.9	5.1	0.7	12.2
Security	10.4	0.4	0.1	0.6	0.1	0.0	3.1	0.0	4.1
Other	0.5	4.9	2.5	1.4	6.4	2.6	7.5	28.7	2.5
Observations	51	40	29	11	9	6	10	2	158
All Systems									
Land	0.0	0.0	1.4	0.3	5.0	1.1	1.8	1.1	1.0
Water Source	42.2	30.7	23.8	9.5	9.2	6.6	8.4	5.3	25.3
Transmission and Distribution System	14.9	41.1	46.6	56.4	48.2	49.2	45.0	49.4	40.8
Treatment	18.4	13.1	10.0	14.3	13.7	18.1	24.6	25.0	13.5
Storage	15.4	12.2	14.2	11.7	12.3	12.7	7.0	5.4	13.3
Security	8.7	0.2	0.6	3.4	4.3	2.0	1.4	0.5	2.6
Other	0.4	2.7	3.3	4.4	7.3	10.2	11.8	13.3	3.4
Observations	64	83	132	75	108	83	166	47	758

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.

Table 96
Allocation of Major Capital Investments Nationally in the Past 5 Years
By Type of Investment and Primary Water Source
(Percentage of Funds Allocated to Each Investment Category)

Primary Water Source	System Service Population Category							
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000
Primarily Ground Water Systems								
Land	0.0	0.0	0.9	0.3	0.6	3.4	1.5	0.5
Water Source	26.2	30.8	26.4	9.6	9.6	19.7	6.3	15.8
Transmission and Distribution System	29.9	46.2	38.2	44.4	55.2	27.5	32.9	36.9
Treatment	20.0	14.3	9.4	32.6	11.9	24.7	40.1	10.9
Storage	22.8	8.0	24.4	6.5	17.8	9.6	5.6	3.6
Security	0.9	0.2	0.1	1.1	0.3	0.5	0.2	0.7
Other	0.1	0.5	0.5	5.5	4.7	14.6	13.6	31.5
Observations	35	38	62	26	40	21	36	3
Primarily Surface Water Systems								
Land	0.0	0.0	0.1	0.2	1.0	1.2	2.2	1.2
Water Source	6.7	9.8	4.3	2.8	5.0	5.2	6.4	9.4
Transmission and Distribution System	39.8	23.8	47.9	31.4	32.7	47.6	43.3	41.8
Treatment	52.2	57.7	30.3	50.6	45.1	26.2	27.7	29.1
Storage	1.3	8.4	16.3	13.8	10.8	10.7	5.2	3.4
Security	0.0	0.0	0.1	0.4	0.2	0.5	1.0	0.4
Other	0.0	0.3	1.0	0.8	5.3	8.7	14.2	14.7
Observations	28	36	49	36	49	39	94	34
Primarily Purchased Water Systems								
Land	0.0	0.0	2.1	0.2	0.3	0.7	1.3	1.6
Water Source	0.0	0.8	5.4	0.7	4.6	0.9	10.4	1.7
Transmission and Distribution System	0.0	90.1	77.6	80.8	70.7	62.6	49.3	58.3
Treatment	0.0	0.1	2.1	0.2	9.9	4.3	18.3	7.7
Storage	100.0	8.2	9.7	14.4	8.2	19.6	10.0	22.4
Security	0.0	0.0	0.0	2.5	0.6	1.0	0.5	0.6
Other	0.0	0.7	3.1	1.3	5.7	10.9	10.2	7.7
Observations	1	9	21	13	19	23	36	10
All Systems								
Land	0.0	0.0	1.1	0.2	0.6	1.8	1.9	1.3
Water Source	22.5	14.9	19.0	4.7	6.7	9.0	7.2	8.5
Transmission and Distribution System	31.8	65.6	48.1	46.6	53.5	43.6	42.8	43.9
Treatment	26.1	10.6	10.5	33.5	21.0	22.6	27.8	26.0
Storage	18.7	8.2	20.2	11.5	12.7	11.6	6.2	5.9
Security	0.8	0.1	0.1	1.1	0.3	0.6	0.8	0.4
Other	0.1	0.6	1.2	2.5	5.2	10.8	13.3	14.1
Observations	64	83	132	75	108	83	166	47

Data: Q.27A

Notes:

Excludes systems that have not made major capital improvements in the past five years.

Table reports the percentage of funds invested in each category nationally.

It is not the percentage of funds invested in each category for the average system or the percentage of systems that funded each investment category.

Table 90 reports the percentage of systems that funded each investment category.

Table 94 reports the percentage of funds invested in each category for the average system.

Table 97
Allocation of Major Capital Investments Nationally in the Past 5 Years
By Type of Investment and Ownership
(Percentage of Funds Allocated to Each Investment Category)

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	
Public Systems									
Land	0.0	0.0	1.1	0.3	0.6	1.9	2.1	1.3	1.3
Water Source	36.3	13.2	18.2	3.4	6.8	8.1	7.9	8.4	8.6
Transmission and Distribution System	23.2	68.1	47.6	45.2	53.4	42.5	39.4	44.1	44.9
Treatment	35.1	10.4	10.2	34.0	21.5	23.8	29.2	26.0	25.0
Storage	4.6	7.7	21.7	13.0	12.2	12.0	6.5	6.0	8.8
Security	0.5	0.0	0.0	1.1	0.3	0.6	0.3	0.4	0.4
Other	0.2	0.6	1.1	3.0	5.2	11.2	14.6	13.9	11.0
Observations	13	43	103	64	99	77	156	45	600
Private Systems									
Land	0.0	0.1	0.7	0.0	0.6	0.5	0.6	0.5	0.5
Water Source	8.2	26.7	24.4	9.4	4.1	23.9	2.3	13.5	9.3
Transmission and Distribution System	40.6	48.5	50.9	51.6	55.1	60.9	65.6	34.5	56.8
Treatment	16.9	12.4	12.2	31.5	10.3	3.9	18.7	24.6	18.3
Storage	33.2	11.4	10.3	5.8	24.2	5.4	4.4	0.5	7.8
Security	1.1	0.6	0.2	1.1	0.0	0.0	4.0	0.0	2.1
Other	0.0	0.2	1.3	0.6	5.6	5.4	4.4	26.4	5.4
Observations	51	40	29	11	9	6	10	2	158
All Systems									
Land	0.0	0.0	1.1	0.2	0.6	1.8	1.9	1.3	1.3
Water Source	22.5	14.9	19.0	4.7	6.7	9.0	7.2	8.5	8.7
Transmission and Distribution System	31.8	65.6	48.1	46.6	53.5	43.6	42.8	43.9	45.9
Treatment	26.1	10.6	10.5	33.5	21.0	22.6	27.8	26.0	24.4
Storage	18.7	8.2	20.2	11.5	12.7	11.6	6.2	5.9	8.7
Security	0.8	0.1	0.1	1.1	0.3	0.6	0.8	0.4	0.5
Other	0.1	0.6	1.2	2.5	5.2	10.8	13.3	14.1	10.5
Observations	64	83	132	75	108	83	166	47	758

Data: Q.27A

Notes: Excludes systems that have not made major capital improvements in the past five years.
Table reports the percentage of funds invested in each category nationally.
It is not the percentage of funds invested in each category for the average system or the percentage of systems that funded each investment category.
Table 91 reports the percentage of systems that funded each investment category.
Table 95 reports the percentage of funds invested in each category for the average system.

Table 98
Percentage of Systems Making Major Capital Investments in the Past 5 Years
By Investment Purpose and Ownership
(Percentage of Systems Funding Each Investment Category)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Compliance with Regulations	62.4	8.9	22.8	36.9	51.5	49.7	49.3	61.4	28.9
Replacement or Major Repair	57.3	77.0	64.9	78.6	83.7	82.0	87.3	96.9	72.6
System Expansion	1.6	36.8	44.5	76.3	77.4	78.1	83.8	80.5	51.5
Observations	12	44	102	66	91	64	97	29	505
Private Systems									
Compliance with Regulations	27.5	44.4	14.8	50.9	23.9	0.0	50.0	*	30.7
Replacement or Major Repair	76.9	56.3	74.3	51.3	21.9	70.4	100.0	*	68.2
System Expansion	11.1	24.6	43.1	64.9	100.0	100.0	50.0	*	26.4
Observations	51	39	30	11	8	4	2	*	145
All Systems									
Compliance with Regulations	32.9	26.0	20.7	39.3	49.9	47.1	49.3	61.4	29.6
Replacement or Major Repair	74.0	67.1	67.4	74.1	80.1	81.4	87.6	96.9	70.9
System Expansion	9.7	30.9	44.1	74.4	78.7	79.3	83.2	80.5	41.5
Observations	63	83	132	77	99	68	99	29	650

Data:

Q.27B

Notes:

Excludes systems that have not made major capital improvements in the past five years.

Table reports the percentage of systems that funded each investment category.

It is not the percentage of funds invested in each category.

Table 100 reports the percentage of funds invested in each category for the average system.

Table 101 reports the percentage of funds invested in each category nationally.

Table 99
Amount of Major Capital Investment Allocated in the Past 5 Years
By Investment Purpose and Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Compliance with Regulations	46	10	91	175	451	2,481	4,439	20,880	346
Replacement or Major Repair	96	178	190	371	1,661	4,910	15,812	136,720	1,330
System Expansion	76	327	436	750	3,060	5,055	25,376	134,942	1,860
Observations	12	43	100	61	89	63	95	29	492
Private Systems									
Compliance with Regulations	4	37	21	743	38	0	9,536	*	58
Replacement or Major Repair	16	23	134	168	218	6,229	10,527	*	75
System Expansion	26	23	120	862	3,052	8,118	4,059	*	148
Observations	49	37	28	10	8	4	2	*	138
All Systems									
Compliance with Regulations	11	23	72	275	426	2,348	4,535	20,880	234
Replacement or Major Repair	29	105	176	335	1,574	4,981	15,713	136,720	843
System Expansion	34	185	352	770	3,059	5,220	24,976	134,942	1,195
Observations	61	80	128	71	97	67	97	29	630

Data: Q.27

Notes: Excludes systems that have not made major capital improvements in the past five years.

Table 100
Allocation of Major Capital Investments of Average Systems in the Past 5 Years
By Investment Purpose and Ownership
(Percentage of Funds Allocated to Each Investment Category)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Compliance with Regulations	1.4	28.5	38.1	50.5	48.1	41.9	44.4	41.1	37.5
Replacement or Major Repair	56.3	70.3	51.3	41.6	42.5	44.3	43.6	47.3	52.7
System Expansion	42.3	1.2	10.7	8.0	9.4	13.8	12.0	11.6	9.8
Observations	12	43	100	61	89	63	95	29	492
Private Systems									
Compliance with Regulations	7.8	17.8	34.8	41.0	89.5	50.9	25.5	*	19.9
Replacement or Major Repair	72.2	52.1	57.7	25.9	9.2	49.1	45.0	*	59.7
System Expansion	19.9	30.2	7.5	33.1	1.3	0.0	29.5	*	20.3
Observations	49	37	28	10	8	4	2	*	138
All Systems									
Compliance with Regulations	6.8	23.5	37.2	48.8	50.6	42.4	44.1	41.1	30.7
Replacement or Major Repair	69.6	61.8	53.0	38.8	40.5	44.6	43.6	47.3	55.5
System Expansion	23.6	14.8	9.8	12.4	8.9	13.1	12.4	11.6	13.9
Observations	61	80	128	71	97	67	97	29	630

Data: Q.27B

Notes: Excludes systems that have not made major capital improvements in the past five years.
Table reports the percentage of funds invested in each category for the average system.
It is not the percentage of funds invested in each category nationally or the percentage of systems that funded each investment category.
Table 98 reports the percentage of systems that funded each investment category.
Table 101 reports the percentage of funds invested in each category nationally.

Table 101
Allocation of Major Capital Investments Nationally in the Past 5 Years
By Investment Purpose and Ownership
(Percentage of Funds Allocated to Each Investment Category)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Compliance with Regulations	21.2	1.9	12.6	13.5	8.7	19.9	9.7	7.1	9.8
Replacement or Major Repair	44.1	34.6	26.5	28.6	32.1	39.5	34.7	46.7	37.6
System Expansion	34.7	63.5	60.8	57.9	59.2	40.6	55.6	46.1	52.6
Observations	12	43	100	61	89	63	95	29	492
Private Systems									
Compliance with Regulations	8.4	44.8	7.7	41.9	1.2	0.0	39.5	*	20.6
Replacement or Major Repair	34.9	27.2	48.7	9.5	6.6	43.4	43.6	*	26.7
System Expansion	56.7	28.0	43.6	48.6	92.3	56.6	16.8	*	52.8
Observations	49	37	28	10	8	4	2	*	138
All Systems									
Compliance with Regulations	14.5	7.2	12.0	19.9	8.4	18.7	10.0	7.1	10.3
Replacement or Major Repair	39.3	33.7	29.2	24.3	31.1	39.7	34.7	46.7	37.1
System Expansion	46.2	59.1	58.7	55.8	60.5	41.6	55.2	46.1	52.6
Observations	61	80	128	71	97	67	97	29	630

Data: Q.27B

Notes:

Excludes systems that have not made major capital improvements in the past five years.

Table reports the percentage of funds invested in each category nationally.

It is not the percentage of funds invested in each category for the average system or the percentage of systems that funded each investment category.

Table 98 reports the percentage of systems that funded each investment category.

Table 100 reports the percentage of funds invested in each category for the average system.

Table 102
Percentage of Systems Acquiring Capital Funds from Each Source in the Past 5 Years
By Source of Funds and Ownership
(Percentage of Systems Using Each Source of Funds)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Current Revenues	58.5	64.9	48.3	74.5	77.1	75.1	63.6	55.3	61.1
Equity or other funds from private investors	0.5	0.3	3.4	8.8	2.5	3.8	3.1	0.0	3.2
Borrowing from private sector sources	0.3	15.0	12.0	23.9	22.2	28.6	41.4	35.7	16.5
Department of Homeland Security grants	0.0	0.0	1.5	2.8	5.4	5.9	5.1	8.6	2.1
Other government grants	39.9	34.8	29.9	28.5	15.2	23.7	15.0	21.5	28.5
DWSRF principal repayment forgiveness	0.0	0.3	3.9	0.0	0.0	0.0	0.0	0.0	1.6
DWSRF Loans	0.6	20.0	24.6	19.2	9.5	15.5	12.9	19.1	19.0
Other borrowing from public sector sources	19.1	9.1	7.2	7.5	8.6	18.0	11.6	8.6	8.9
Other	0.0	5.5	4.1	10.7	5.2	14.9	8.6	4.2	5.7
Observations	13	43	103	64	99	77	156	45	600
Private Systems									
Current Revenues	59.7	83.8	73.1	72.8	53.3	51.3	13.1	0.0	70.8
Equity or other funds from private investors	11.5	13.4	23.7	3.2	0.0	21.6	13.1	50.0	14.5
Borrowing from private sector sources	3.6	1.4	21.7	29.1	10.0	21.6	13.1	50.0	8.5
Department of Homeland Security grants	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0
Other government grants	4.1	9.3	3.9	0.0	24.1	0.0	0.0	0.0	5.9
DWSRF principal repayment forgiveness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DWSRF Loans	0.0	0.0	0.8	39.5	10.0	8.1	60.8	0.0	2.4
Other borrowing from public sector sources	0.1	4.4	7.9	12.5	22.6	8.1	0.0	0.0	4.2
Other	16.7	6.4	8.6	0.0	0.0	21.6	54.3	0.0	10.6
Observations	51	40	29	11	9	6	10	2	158
All Systems									
Current Revenues	59.5	74.4	55.0	74.2	75.4	73.7	59.3	53.1	64.9
Equity or other funds from private investors	9.7	6.9	9.0	7.8	2.4	4.9	3.9	2.1	7.7
Borrowing from private sector sources	3.1	8.1	14.6	24.9	21.4	28.1	39.1	36.3	13.4
Department of Homeland Security grants	0.0	0.0	1.1	2.3	5.1	5.6	5.2	8.2	1.3
Other government grants	9.9	22.0	22.8	23.5	15.8	22.2	13.8	20.6	19.6
DWSRF principal repayment forgiveness	0.0	0.1	2.8	0.0	0.0	0.0	0.0	0.0	1.0
DWSRF Loans	0.1	10.0	18.1	22.8	9.6	15.1	16.9	18.3	12.5
Other borrowing from public sector sources	3.2	6.8	7.4	8.4	9.6	17.5	10.6	8.2	7.0
Other	14.0	6.0	5.3	8.8	4.8	15.3	12.4	4.0	7.6
Observations	64	83	132	75	108	83	166	47	758

Data: Q.27C

Notes: Excludes systems that have not made major capital improvements in the past five years. Systems can fund by more than one source, therefore column totals may be greater than or less than 100.
A small number of privately owned systems serving populations of 3,301-10,000 and 100,001-500,000 relied heavily on the DWSRF. They have a large impact on the results; therefore, they are not included in the analysis in volume I.

Table 103
Amount of Capital Funds Acquired from Each Source in the Past 5 Years
By Source of Funds and Ownership
(Thousands of Dollars)

Ownership Type	System Service Population Category								All Sizes
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	
Public Systems									
Current Revenues	93	44	45	372	3,009	5,001	20,300	62,674	1,258
Equity or other funds from private investors	76	0	121	13	12	190	110	0	64
Borrowing from private sector sources	20	109	48	225	764	2,479	15,962	172,373	1,245
Department of Homeland Security grants	0	0	1	1	17	72	22	374	7
Other government grants	19	201	124	380	339	1,775	844	4,599	273
DWSRF principal repayment forgiveness	0	2	21	0	0	0	0	0	9
DWSRF Loans	0	114	214	296	533	884	2,033	25,075	389
Other borrowing from public sector sources	37	40	136	94	300	1,101	3,168	35,836	354
Other	0	5	23	69	25	1,035	3,024	204	107
Observations	13	43	97	61	86	63	108	29	500
Private Systems									
Current Revenues	4	17	74	336	1,567	2,603	3,022	0	75
Equity or other funds from private investors	29	5	71	14	0	845	2,823	55,003	51
Borrowing from private sector sources	1	3	33	540	261	1,763	2,233	40,356	56
Department of Homeland Security grants	0	0	0	0	0	0	1	0	0
Other government grants	11	36	42	0	161	0	0	0	28
DWSRF principal repayment forgiveness	0	0	0	0	0	0	0	0	0
DWSRF Loans	0	0	0	797	169	1,524	37,700	0	144
Other borrowing from public sector sources	0	6	64	87	1,150	3,919	0	0	46
Other	5	6	5	0	0	2,330	41,358	0	123
Observations	48	39	29	10	8	5	6	1	146
All Systems									
Current Revenues	19	30	53	366	2,922	4,860	18,792	60,700	786
Equity or other funds from private investors	37	3	107	13	12	229	347	1,733	59
Borrowing from private sector sources	4	56	43	283	734	2,436	14,764	168,214	770
Department of Homeland Security grants	0	0	0	1	16	68	20	362	4
Other government grants	12	118	101	310	328	1,670	770	4,454	175
DWSRF principal repayment forgiveness	0	1	15	0	0	0	0	0	6
DWSRF Loans	0	57	154	388	511	922	5,145	24,285	291
Other borrowing from public sector sources	6	23	116	93	351	1,268	2,892	34,707	231
Other	4	5	18	56	23	1,112	6,369	197	113
Observations	61	82	126	71	94	68	114	30	646

Data: Q.27C

Notes: Excludes systems that have not made major capital improvements in the past five years.
A small number of privately owned systems serving populations of 3,301-10,000 and 100,001-500,000 relied heavily on the DWSRF. They have a large impact on the results; therefore, they are not included in the analysis in volume I.

Table 104
Allocation of Sources of Funds for Major Capital Investments of the Average System in the Past 5 Years
By Source of Funds and Ownership
(Percentage of Funds from Each Source)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Current Revenues	42.5	50.7	36.9	54.5	67.4	49.3	54.1	43.6	47.4
Equity or other funds from private investors	0.5	0.2	3.0	1.0	0.3	1.9	0.6	0.0	1.6
Borrowing from private sector sources	0.3	11.8	11.3	13.2	16.2	20.3	27.8	38.7	12.4
Department of Homeland Security grants	0.0	0.0	0.5	0.0	0.2	0.5	1.0	0.1	0.3
Other government grants	39.9	22.4	18.6	13.5	4.3	11.4	1.7	6.4	17.3
DWSRF principal repayment forgiveness	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.3
DWSRF Loans	0.6	11.5	19.6	7.8	7.3	6.8	5.3	6.1	13.0
Other borrowing from public sector sources	16.3	1.8	7.2	3.6	3.8	6.1	5.3	4.8	5.5
Other	0.0	1.4	2.2	6.2	0.4	3.6	4.1	0.2	2.3
Observations	13	43	97	61	86	63	108	29	500
Private Systems									
Current Revenues	64.8	71.6	50.4	37.3	52.1	46.0	5.4	0.0	61.9
Equity or other funds from private investors	10.5	13.3	17.6	1.0	0.0	26.6	8.7	57.7	12.6
Borrowing from private sector sources	2.0	1.3	17.5	23.1	8.4	7.5	6.9	42.3	6.6
Department of Homeland Security grants	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other government grants	4.5	7.3	1.6	0.0	3.6	0.0	0.0	0.0	4.5
DWSRF principal repayment forgiveness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DWSRF Loans	0.0	0.0	0.2	32.1	10.2	2.8	38.5	0.0	1.7
Other borrowing from public sector sources	0.1	0.7	5.3	6.5	25.7	7.2	0.0	0.0	2.2
Other	18.1	5.9	7.4	0.0	0.0	9.9	40.4	0.0	10.5
Observations	48	39	29	10	8	5	6	1	146
All Systems									
Current Revenues	60.9	61.2	40.7	51.4	66.4	49.1	49.9	42.2	53.2
Equity or other funds from private investors	8.8	6.8	7.1	1.0	0.3	3.3	1.3	1.8	6.0
Borrowing from private sector sources	1.7	6.5	13.0	15.0	15.8	19.6	26.0	38.9	10.1
Department of Homeland Security grants	0.0	0.0	0.4	0.0	0.2	0.5	1.0	0.1	0.2
Other government grants	10.6	14.8	13.8	11.0	4.3	10.7	1.6	6.2	12.2
DWSRF principal repayment forgiveness	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.2
DWSRF Loans	0.1	5.7	14.1	12.3	7.5	6.5	8.2	6.0	8.5
Other borrowing from public sector sources	2.9	1.3	6.6	4.1	5.2	6.2	4.8	4.6	4.2
Other	15.0	3.7	3.7	5.0	0.4	4.0	7.2	0.2	5.5
Observations	61	82	126	71	94	68	114	30	646

Data: Q.27C

Notes: Excludes systems that have not made major capital improvements in the past five years. Table reports the percentage of funds acquired from each source on average by each system. It is not the percentage of funds acquired from each category for the nation and the aggregate. That number is reported in Table 105.

A small number of privately owned systems serving populations of 3,301-10,000 and 100,001-500,000 relied heavily on the DWSRF. They have a large impact on the results; therefore, they are not included in the analysis in volume I.

Table 105
Allocation of Sources of Funds for Major Capital Investments Nationally in the Past 5 Years
By Source of Funds and Ownership
(Percentage of Funds from Each Source)

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Current Revenues	38.0	8.6	6.1	25.6	60.2	39.9	44.7	20.8	34.0
Equity or other funds from private investors	30.9	0.1	16.6	0.9	0.2	1.5	0.2	0.0	1.7
Borrowing from private sector sources	8.2	21.2	6.5	15.5	15.3	19.8	35.1	57.2	33.6
Department of Homeland Security grants	0.0	0.0	0.1	0.1	0.3	0.6	0.0	0.1	0.2
Other government grants	7.9	38.9	17.0	26.2	6.8	14.2	1.9	1.5	7.4
DWSRF principal repayment forgiveness	0.0	0.4	2.9	0.0	0.0	0.0	0.0	0.0	0.2
DWSRF Loans	0.0	22.1	29.3	20.4	10.7	7.1	4.5	8.3	10.5
Other borrowing from public sector sources	15.0	7.7	18.5	6.5	6.0	8.8	7.0	11.9	9.5
Other	0.0	1.0	3.1	4.8	0.5	8.3	6.7	0.1	2.9
Observations	13	43	97	61	86	63	108	29	500
Private Systems									
Current Revenues	7.3	22.9	25.4	19.0	47.4	20.0	3.5	0.0	14.4
Equity or other funds from private investors	58.6	7.4	24.4	0.8	0.0	6.5	3.2	57.7	9.7
Borrowing from private sector sources	1.2	4.5	11.3	30.4	7.9	13.6	2.6	42.3	10.6
Department of Homeland Security grants	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other government grants	22.6	49.1	14.7	0.0	4.9	0.0	0.0	0.0	5.4
DWSRF principal repayment forgiveness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DWSRF Loans	0.0	0.0	0.1	44.9	5.1	11.7	43.3	0.0	27.6
Other borrowing from public sector sources	0.0	7.8	22.2	4.9	34.8	30.2	0.0	0.0	8.8
Other	10.3	8.3	1.8	0.0	0.0	17.9	47.5	0.0	23.5
Observations	48	39	29	10	8	5	6	1	146
All Systems									
Current Revenues	23.0	10.4	8.7	24.2	59.7	38.7	38.3	20.6	32.3
Equity or other funds from private investors	44.4	1.0	17.6	0.9	0.2	1.8	0.7	0.6	2.4
Borrowing from private sector sources	4.8	19.1	7.1	18.7	15.0	19.4	30.1	57.1	31.6
Department of Homeland Security grants	0.0	0.0	0.1	0.1	0.3	0.5	0.0	0.1	0.2
Other government grants	15.1	40.2	16.6	20.6	6.7	13.3	1.6	1.5	7.2
DWSRF principal repayment forgiveness	0.0	0.4	2.5	0.0	0.0	0.0	0.0	0.0	0.2
DWSRF Loans	0.0	19.3	25.4	25.7	10.4	7.3	10.5	8.2	12.0
Other borrowing from public sector sources	7.7	7.7	19.0	6.2	7.2	10.1	5.9	11.8	9.5
Other	5.0	1.9	2.9	3.7	0.5	8.8	13.0	0.1	4.7
Observations	61	82	126	71	94	68	114	30	646

Data: Q.27

Notes: Excludes systems that have not made major capital improvements in the past five years. Table reports the percentage of funds acquired from each source for the nation and the aggregate. It is not the percentage of funds acquired from each category on average by each system. That number is reported in Table 104.

A small number of privately owned systems serving populations of 3,301-10,000 and 100,001-500,000 relied heavily on the DWSRF. They have a large impact on the results; therefore, they are not included in the analysis in volume I.

Table 106
Average Interest Rates for Capital Funds
By Ownership and Lender

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	All Sizes
Public Systems									
DWSRF	1.0	2.4	1.8	3.3	3.5	2.9	3.2	3.1	2.3
Other Public Sector	0.5	4.4	3.8	3.1	3.9	4.3	3.3	4.0	3.5
Private Sector	5.0	4.2	4.7	4.9	4.5	4.4	4.3	4.6	4.6
Other	*	*	0.0	4.5	4.8	4.9	1.4	1.0	3.9
Observations	4	12	37	25	39	31	61	19	228
Private Systems									
DWSRF	*	*	1.5	6.0	6.4	0.8	6.2	*	5.6
Other Public Sector	3.1	4.5	5.5	4.6	5.3	4.8	4.6	*	4.4
Private Sector	*	7.7	6.7	6.0	4.3	7.5	5.8	6.2	6.5
Other	6.0	10.0	*	*	*	0.0	0.0	*	5.9
Observations	3	6	8	8	3	2	6	1	37
All Systems									
DWSRF	1.0	2.4	1.8	4.3	3.5	2.8	4.2	3.1	2.6
Other Public Sector	1.9	4.4	4.5	3.6	3.9	4.4	3.3	4.0	3.8
Private Sector	5.0	4.8	5.5	5.3	4.5	4.6	4.3	4.7	5.2
Other	6.0	10.0	0.0	4.5	4.8	2.3	1.4		4.3
Observations	7	18	45	33	42	33	67	20	265

Data:

Q.27

Notes:

Table 107
Percentage of Systems with Asset Management Plans or other Formal Written Strategy for Infrastructure Rehabilitation and Replacement
By Ownership

Ownership Type	System Service Population Category								
	100 or Less	101 - 500	501 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001- 500,000	Over 500,000	All Sizes
Public Systems									
Percentage of Systems	24.6	38.5	31.1	24.0	33.2	39.1	32.0	38.7	31.9
Confidence Interval	+/- 23.6	+/- 13.5	+/- 9.2	+/- 8.4	+/- 8.6	+/- 10.3	+/- 4.9	+/- 8.9	+/- 5.4
Observations	27	84	181	127	156	111	204	52	942
Private Systems									
Percentage of Systems	9.8	17.2	13.6	26.5	14.8	17.9	10.5	12.2	14.0
Confidence Interval	+/- 6.9	+/- 8.6	+/- 12.6	+/- 17.9	+/- 20.3	+/- 20.0	+/- 9.1	+/- 16.0	+/- 4.8
Observations	118	111	56	27	20	13	21	6	372
All Systems									
Percentage of Systems	11.7	25.4	26.3	24.6	31.7	37.1	29.4	35.2	23.0
Confidence Interval	+/- 6.6	+/- 7.7	+/- 8.0	+/- 7.6	+/- 8.1	+/- 9.6	+/- 4.7	+/- 8.4	+/- 3.7
Observations	145	195	237	154	176	124	225	58	1,314

Data: Q.28

Notes:

Part 2: Methodology Report

1. Introduction

1.1 Study Background

In compliance with Executive Order 12866, the Regulatory Flexibility Act, and the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency's Office of Ground Water and Drinking Water (OGWDW), Standards and Risk Management Division (SRMD) conducts periodic surveys of the financial and operating characteristics of community water systems. These Community Water System (CWS) Surveys supply information that is essential to support economic analyses of the costs and benefits of new regulations and changes to existing regulations on consumers, the water supply industry, and the nation. The information also will be used to measure the financial burden of EPA's regulations on consumers and the industry. Furthermore, data from the survey will help EPA evaluate program and policy initiatives and develop guidance on Best Management Practices used in water treatment and distribution systems. Previous CWS Surveys captured information for the years 1976, 1982, 1986, 1995, and 2000. This survey gathered information for the year 2006.

1.2 Survey Overview

This section is intended to provide the reader with an overview of the design and conduct of the CWS Survey. The topics presented in this section will then be discussed at greater length in the following chapters.

According to the latest inventory data, nearly 156,000 public water systems provide water to over 300 million persons throughout the United States. (Factoids: Drinking Water and Ground Water Statistics for 2007, EPA 816-K-07-004.) Public water systems are both community and non-community water systems. Community water systems are public water systems that supply water to the same population year-round. They serve approximately 280 million persons. The CWS Survey was designed to collect operating and financial information from a representative sample of community water systems.

In order to reduce the burden of the survey on small systems, the data were collected from systems serving 3,300 or fewer people through site visits by water system professionals. Systems serving over 3,300 people received a letter informing them of their selection in the survey and instructions on how to obtain the questionnaire form either electronically or through the mail. Water system professionals were assigned to the systems that received the mailed questionnaire to help them respond to the survey's questions. A toll-free telephone number and an e-mail address also were sent to the systems to provide technical support.

The CWS Survey was based on a nationally representative sample of CWSs. The sample was drawn from a list of approximately 50,000 systems in the 50 states and the District of Columbia in the federal version of the Safe Drinking Water Information System (SDWIS/FED). The survey used a stratified random sample design to ensure the sample is representative. The sample was stratified by several characteristics of water systems to increase the efficiency of estimates based on the sample. To limit the travel costs involved in visiting each small system in the sample, they were selected in geographic clusters in a two-stage design. A sample of 2,210 systems was selected, including a census of all systems serving populations of 100,000 or more.

A separate version of the questionnaire was developed for three categories of systems: systems serving 25 to 100,000 people, those serving more than 100,000 and up to 500,000 people, and those serving more than 500,000 people. Some targeted questions were asked of systems in each size categories. E.g., additional questions were asked of very large systems serving more than 500,000 people regarding

concentrations of several contaminants in raw and finished water. Similarly, questions that would not apply to very large systems were excluded from their version of the questionnaire.

Water system professionals contacted the small systems in the sample to schedule appointments for the site visits. Upon mail out, each medium and large system was notified by telephone that they would receive a letter with information about the survey in the mail. The letter described the survey goals and a number of methods to complete the survey. All medium and large systems were given the option to complete a paper version or an electronic version of the questionnaire. With the toll-free number, a system could request a paper version or an Excel spreadsheet version of the questionnaire to be mailed directly to them with return instructions and a postage paid envelope. An alternative to obtain the survey was through the CWS Survey Web site where a system could download the spreadsheet or hardcopy version of the questionnaire. Or, if desired, the water system could complete the survey through a Web-based version of the questionnaire. The electronic formats of the survey were new to the survey in 2006. The spreadsheet questionnaire matched the layout of the hardcopy questionnaire identically, but most water systems preferred this method because of the ease of completing a survey in Excel and its near universal availability at a water system. Respondents could send the questionnaire to numerous departments for verification via email quickly and easily. The Web-based version maintained a similar layout, but structured as an online form. Phone calls were made throughout the data collection period to encourage non-respondents to participate and to provide technical support when needed. Requests to send completion instructions or the questionnaire were received through the toll-free support line and during the phone calls to the system; the information was sent as the requests were received.

As completed questionnaires were returned, they were logged into a receipt control system using an on-line data tracking system. The completed questionnaires went through an extensive data quality review. The electronic versions of the questionnaire included automated validation checks. Water system analysts reviewed each questionnaire and contacted the systems to clarify answers, correct anomalous items, or collect missing responses. The questionnaires were then reviewed by senior staff. The senior staff also reviewed the site visits reports for each small system. Paper versions of the questionnaires were then key-entered using independent double-key entry. Finally, the electronic form of the data was run through automated cleaning and editing programs.

A series of sample weights, non-response adjustments, and other statistical techniques were created and applied to the final set of sampled respondents. These weights allow for extrapolation from the sampled systems to the universe of CWSs in the nation. The sample design and weights also allow for the calculation of confidence intervals for each estimate.

Planning and design of the survey began in February of 2006. A pre-test of the questionnaire was conducted in May of 2006. The pilot test was conducted in February 2007, and the final design was developed in March 2007. Data collection took place from March through December, 2007. Data processing and analysis continued through April 2008.

EPA determined the information to be gathered and the scope of the survey. While providing overall management of this effort, EPA secured the services of several contractors who performed a variety of tasks in support of the survey design, survey administration, data processing, and analysis. The Cadmus Group, Inc., was the prime contractor. The site visits were conducted through subcontracts with several experienced water system professionals. Cadmus' primary responsibilities were for overall project management; design of the questionnaire; sample design; selection of the sample; design, administration, and management of the data collection; development and maintenance of the on-line data tracking system, technical support to water systems in the sample; editing and preparation of the data for data entry; calculation of sample weights; expert quality assurance review of the survey data; data tabulations; and report preparation.

EPA also requested comments on the survey from several independent reviewers. Barry Nussbaum of EPA's Office of Environmental Information, A. Richard Bolstein of George Mason University, and John Gaughan of Temple University reviewed the sampling plan. Bimal Sinha from the University of Maryland also provided comments. Barry L. Liner, PE and David Binning, PE Scott J. Rubin, JD, and Janice Beecher, Ph.D. reviewed the final report.

2. Sample Design and Weighting

2.1 Sample Design and Selection

This section describes the sample design for the 2006 CWS Survey. It includes a description of the sampling frame, target sample size, stratification variables, and sampling methods.

The survey relied on a probability sample of CWSs. For small systems (those serving populations of 3,300 or less), a two-stage cluster sample was used. A stratified random sample was used for systems serving populations of between 3,301 and 100,000. Systems serving populations of over 100,000 were selected with certainty. The strata were defined by the combinations of the size of the residential population served by the water systems and the source of water (ground or surface).

2.1.1 SDWIS Sampling Frame and Coverage

The sampling frame was developed from the federal Safe Drinking Water Information System (SDWIS/FED). The system has been revised and is now known as SDWIS/ODS). SDWIS is a centralized database of information on public water systems, including their compliance with monitoring requirements, maximum contaminant levels (MCLs), and other requirements of the Safe Drinking Water Act (SDWA) Amendments of 1996. The following information was extracted from SDWIS for the statistical survey:

- Name of system
- Address of system
- Population served
- Primary source (surface water or ground water)
- Public water system identification number (PWSID)
- Ownership type
- Consecutive systems (i.e., does system purchase or sell water)

From these data, EPA developed a sample list from which it (1) calculated summary statistics for use in calculating sample size, and (2) randomly chose systems within the design strata which will take part in the survey.

SDWIS/FED was the appropriate sampling frame because:

- It fully covered the target population.
- It contains no duplication.
- It contains no foreign elements (i.e., elements that are not members of the population).
- It contains information for identifying and contacting the units selected in the sample.
- It contains other information that will improve the efficiency of the sample design.

SDWIS/FED was the best choice for a sample frame because of its inclusive coverage of all units of observation for this survey. In addition, SDWIS/FED has two other advantages: it contains information that will facilitate contacting the respondents, and it contains other information that is useful in stratifying the sample, thereby improving the efficiency of the sample design. However, SDWIS/FED was not designed to be such a sample frame; many properties of SDWIS/FED, and some lingering problems of

system classification in SDWIS/FED, can result in many inaccuracies for such sample frame applications and sample selection.

The extracted data outlined above was sent to each state for review and verification. States verified the information for their systems so that the census and sample were drawn from a valid universe of systems. EPA updated the list based on the revisions provided by the states. A typical revision may consist of adjusting population served to include the population served by all consecutive connections. This revised list serves as the frame for the survey. The frame included 50,465 community water systems in the 50 states and the District of Columbia.

2.1.2 Sample Design and Selection

Sample Eligibility

To be eligible for the CWS Survey, a water system must meet several criteria. First, it must meet the CFR definition of a community water system; principally, a water system providing drinking water to 25 or more permanent residents or to 15 permanent connections. (See 40 CFR 141.2 for the complete definition.) In addition, the CWS Survey excluded federal- and state-owned or operated systems because these are not affected by regulatory and economic forces in the same way as other systems. The survey also excluded systems in Puerto Rico, Virgin Islands, and the Pacific Islands. To the extent possible, all ineligible systems were identified in SDWIS/FED and removed from the frame; however, many ineligible systems could not be identified and were therefore left in the frame. If systems were clearly identified as ineligible during data collection (e.g., they are no longer an active water system, they no longer meet the CFR definition of a Community Water System, or they are owned by the federal or a state government), the data were excluded from analyses based on the sample.

Sample Design

The CWS Survey analytical plan specified precision level targets for subpopulations of systems, which required minimum sample sizes be achieved for each subpopulation. The precision targets for each subpopulation were 95 percent confidence intervals of ± 10 percentage points for estimated proportions. The 2006 CWS Survey used site visitors to collect data from systems serving 3,300 or fewer people. The 2006 CWS Survey was fielded at the same time as the 2007 Drinking Water Infrastructure Needs Survey and Assessment (DWINSA), which also relied on site visitors to collect its data. To minimize costs and to reduce the burden on systems serving 3,300 or fewer people, the two surveys combined their site visits of small systems. The DWINSA data quality objective for systems serving 3,300 or fewer people is to estimate a 95 percent confidence interval of the need for each stratum with a margin of error plus or minus 30 percent of the need of systems in each stratum. The sample sizes required for each stratum for the CWS Survey was compared to that of the DWINSA. The larger of the two samples was used in each stratum to ensure the data quality objectives of both surveys were met.

The domains of the population of interest for EPA are based on two characteristics of the systems:

1. **The source of water.** Using the SDWIS source classifications, systems that rely on any surface water were distinguished from systems that rely completely on ground water.
2. **The size of the population served by the system.** Eight size categories were used: systems that serve less than 100 people; systems that serve 101 to 500 people; systems that serve from 501 to 3,300 people; systems that serve from 3,301 to 10,000 people; systems that serve from 10,001 to 50,000 people; systems that serve 50,001 to 100,000 people; systems that serve from 100,001 to 500,000 people; and systems serving more than 500,000 people.

The two water sources and the eight system sizes produce sixteen strata.

A system is classified as a surface water system in SDWIS if any of its water is surface water. Ground water under the direct influence of surface water is classified as surface water. Systems that rely on purchased water are included in the ground water strata because we assume the characteristics of the water and the treatment requirements will be more similar to ground water than to surface water. (While some untreated surface water is purchased, the majority is treated and therefore more similar to ground water than surface water.)

The sample is stratified to achieve two goals. First, stratifying the data allows us to draw inferences about specific population domains. For example, EPA may wish to draw conclusions about systems serving populations 10,000 or less. We can ensure that estimates of the sub-populations will meet the required levels of precision by drawing the necessary number of observations for each stratum.

The second goal achieved by stratifying the data is that we can increase the efficiency of our estimates by grouping systems into relatively homogeneous strata. The strata were chosen to minimize the differences among systems within strata, and to maximize the differences among strata. The results of previous surveys indicate there are important differences in the way systems are operated and in their finances across the strata selected. The operating characteristics and treatment requirements of ground water systems tend to be different from surface water systems. The operating and financial characteristics of large systems tend to be more complex than small systems. System management, and the resources available to it, also may vary by system size. The regulatory impact models require reasonably precise parameter estimates from each of these domains. The sample size in each domain should be large enough to provide a sufficient number of completed questionnaires to obtain estimates with reasonable precision.

Table 2-1 shows the number of systems in the sample frame and the minimum sample size required to obtain an estimate for a proportion of 50 percent with an error not exceeding ± 10 percentage points (except for a 1 in 20 chance) in each domain. (A 50 percent statistic was used because the standard error is largest when the population percentage is 50 percent. The error will be smaller for other population percentages.) Systems with populations served of over 100,000 were selected with certainty.

Sample Selection

For CWSs serving 3,300 or fewer people (small CWSs), a two-stage sampling design was used to reduce field data collection costs. Field data collectors were sent to the clusters of five systems at a time to collect data. The primary sampling unit (PSU) was a county or a group of counties. (Each county with fewer than five small systems was combined with geographically adjacent counties to form the primary sampling units.) At the first stage of sampling, a sample of 120 PSUs was selected with probabilities proportional to size. The measure of size was the number of small systems in the PSU. States were provided with a list of small CWSs in the counties selected, and EPA asked states to verify that the systems on the list are active and serve populations of 3,300 or fewer.

To select the second stage sample of small systems, the overall selection rate for each small system stratum was calculated as the target initial sample size in the stratum divided by number of systems in the stratum. The expected frequency of selection was calculated for each PSU in the first stage sample. For each PSU selected, the second stage selection rate for a stratum equaled the overall selection rate for the stratum divided by the first-stage expected frequency of selection. That second stage selection rate for a stratum was applied to the count of systems in that county to determine the fractional sample size. The fractional sample sizes were converted to integer sample sizes using stochastic rounding and with the constraint that the total integer sample size for a county hit equals six systems. To measure composite sample size in selecting counties or PSUs, an overall stratum selection rate was multiplied by the number

Table 2-1. Frame and Sample Sizes by Strata

Source of Water	Population Served	Frame Size	Required Sample
Ground	100 or less	12,487	96
	101-500	14,800	103
	501 - 3,300	12,049	158
	3,301 - 10,000	3,665	94
	10,001-50,000	2,325	93
	50,001 - 100,000	350	76
	100,001 - 500,000	184	184
	More than 500,000	23	23
Surface	100 or less	256	70
	101-500	525	82
	501 - 3,300	1,146	89
	3,301 - 10,000	954	88
	10,001-50,000	1,038	88
	50,001 - 100,000	295	73
	100,001 - 500,000	297	297
	More than 500,000	71	71
All		50,465	1,685

of systems in the stratum in that PSU, and summed over all strata in each primary sampling unit (county or group of counties).

For systems serving populations of 3,301 to 100,000, the sample was obtained by drawing a random sample of systems from the cleaned frame, within each sampling stratum serving populations of this size. Systems in these strata were over-sampled to account for non-response. The over-sampling rate was based on EPA's experience with the 1995 and 2000 CWS Surveys. Systems serving populations of more than 100,000 were selected with certainty. The resulting increase in sample size is warranted for the following reasons:

- Each of the larger systems has a more significant impact on the total costs and benefits of regulations.
- Because of the small numbers of systems in many of the larger strata, precision can be increased at comparatively lower cost than it can be for smaller systems. Other things being equal, doubling precision will quadruple sample size in strata with 5,000 systems or more. Many of the larger strata, however, have only hundreds of systems. In a stratum of 750 systems, one could double precision by only tripling sample size. In a stratum of 200 systems, one could double precision by doubling sample size.

A total of 2,210 systems were selected. This is a larger number of systems than required (and shown in table 2-1) because of the need for over-sampling discussed above. The sample size by strata and the sampling rate are shown in table 2-2. The 2006 sample also is larger than the 2000 sample despite the reduction in the number of systems in the country. While the overall number of community water systems declined, the number of systems serving more than 100,000 people increased. Because these systems are selected with certainty, the total sample size increased in 2006.

Table 2-2. Sample Size and Sampling Rate by Strata

Source of Water	Population Served	Sample Size	Sampling Rate (%)
Ground	100 or less	101	0.8
	101-500	124	0.8
	501 - 3,300	154	1.3
	3,301 - 10,000	206	5.6
	10,001-50,000	211	9.0
	50,001 - 100,000	151	43.0
	100,001 - 500,000	184	100.0
	More than 500,000	23	100.0
Surface	100 or less	62	21.5
	101-500	75	12.7
	501 - 3,300	84	7.0
	3,301 - 10,000	183	18.7
	10,001-50,000	165	15.3
	50,001 - 100,000	119	39.0
	100,001 - 500,000	297	100.0
	More than 500,000	71	100.0
All		2,210	4.3

2.1.3 Stratum Migration

Errors in the frame classification of the water systems by population served and water source introduces inefficiency in the sample design through a loss of sample size and/or by introducing unequal sampling rates. Among the respondents, 91 percent reported the same population served category as indicated by the frame. Over 95 percent reported the same source as the frame.

Population Served by the System

Table 2-3 compares the classification of systems by their population served using the population data from the frame and from the systems' responses to the survey. In all size categories, 91 percent of systems confirmed their original size category. Within each size category, over 96 percent of systems were either in their original size category or in the adjacent class.

Source of Water

Table 2-4 shows the cross-tabulation of the frame-based and response-based water source classifications. Approximately 94 percent of the systems classified as ground water systems in the frame confirmed that status in the sample. Ninety-four percent of surface water systems in the frame were also classified as surface water systems in the sample.

Table 2-3. Survey Respondents by the Frame-Based and Sample-Based Size Categories

Sample-Based Population Served Categories		Frame-Based Population Served Category							
		25-100	101-500	501-3,300	3,301-10,000	10,001-50,000	50,001-100,000	100,001-500,000	Over 500,000
25-100	Count	133	20	0	0	0	0	0	0
	Percent	87	13	0	0	0	0	0	0
101-500	Count	9	168	9	0	1	0	0	0
	Percent	5	90	5	0	1	0	0	0
501-3,300	Count	2	6	219	4	0	0	0	0
	Percent	1	3	95	2	0	0	0	0
3,301-10,000	Count	0	1	7	137	8	0	1	0
	Percent	0	1	5	89	5	0	1	0
10,001-50,000	Count	0	0	1	11	147	1	1	0
	Percent	0	0	1	7	91	1	1	0
50,001-100,000	Count	0	0	1	1	12	112	3	1
	Percent	0	0	1	1	9	86	2	1
100,001-500,000	Count	1	0	0	1	8	11	218	1
	Percent	0	0	0	0	3	5	91	0
Over 500,000	Count	0	0	0	0	0	0	2	56
	Percent	0	0	0	0	0	0	3	97

Table 2-4. Survey Respondents by the Frame-Based and the Sample-Based Source Categories

Sample-Based Water Source		Frame-Based Water Source							
		Small		Medium		Large		All	
		Ground	Surface	Ground	Surface	Ground	Surface	Ground	Surface
Ground	Count	364	19	209	15	89	8	662	42
	Percent	95	5	93	7	92	8	94	6
Surface	Count	4	189	12	217	5	183	21	589
	Percent	2	98	5	95	3	97	6	94

Impact of Strata Migration on the Accuracy of Domain Estimates

The sample was designed to estimate a 50 percent statistic with a 95 percent confidence interval of ± 10 percentage points. One measure of the impact of the strata migration on the efficiency estimates is to calculate the size of the confidence interval given the number of observations in each stratum for the sample collected. Table 2-5 shows the minimum sample required to estimate a 50 percent statistic with a 95 percent confidence interval of ± 10 percentage points under two scenarios.¹ First, it shows the sample size needed given the inaccuracies in the frame. In other words, it accounts for the migration across strata

1. The sample of systems serving 3,301 or fewer persons was designed to estimate a 50 percent statistic with a confidence interval of ± 10 percent. It also was designed to estimate the national future investment need of these systems with a margin of error of ± 10 percent of their need. Therefore, the planned sample produces a confidence interval for a proportion that is smaller than ± 10 percent. See section 2.1.2 for the description of the sampling plan.

that occurred. Second, it shows the sample selected. (It is the same as the sample shown in table 2.1.) The table also shows the half-width of the 95 percent confidence interval that results from the actual sample selected, given the sample's estimate of the number of systems in each sub domain. The impact of strata migration on the confidence interval for small ground water systems was negligible. Strata migration resulted in a slight increase in the size of the confidence interval for small surface water systems. Because the sample was designed to collect data on all systems with populations of more than 100,000, the width of the confidence interval for these systems would have been zero. Strata migration substantially increased the width of the confidence interval for ground water systems serving more than 500,000 persons and slightly for surface water systems serving greater than 100,001 to 500,000 persons because the number of systems in these strata is larger than expected.

Table 2.5. Sample Sizes and the Impact on Precision of Estimates of Strata Migration

Source	Population Served	Sample Needed Given Strata Migration	Sample Selected	Half width of 95% Confidence Interval
Ground	100 or less	96	96	0.100
	101 – 500	103	103	0.096
	501 - 3,300	158	158	0.077
	3,301 - 10,000	94	94	0.100
	10,001 - 50,000	92	93	0.099
	50,001 - 100,000	75	76	0.099
100,000	1-500,000	173	184	0.000
Over	500,000	32	23	0.109
Surface	100 or less	75	70	0.105
	101 - 500	83	82	0.101
	501 - 3,300	89	89	0.100
	3,301 - 10,000	88	88	0.100
	10,001 - 50,000	89	88	0.101
	50,001 - 100,000	70	73	0.097
100,000	1-500,000	305	297	0.009
Over	500,000	68	71	0.000

2.2 Weighting and Estimation

A sampling weight is attached to each responding water system record to (1) account for differential selection probabilities, and (2) reduce the potential bias resulting from non-response. The sampling weights are necessary for estimation of the population characteristics of interest. The sample variance is then used to calculate 95 percent confidence intervals for the estimates.

2.2.1 Derivation of Base Weight and Non-response Adjustment

The calculation of the sample weight reflects the complex nature of the sampling design. The community water system sample consists of a stratified element sample of medium and large water systems. Systems were stratified by water source and their population served. For small water systems a two-stage cluster sample design was used.

1. At the first stage geographic clusters (counties or county groupings) were sampled using probability proportional to size sampling. The measure of size was a function of the number of small systems in the cluster.
2. Within clusters a stratified element sample of small systems was drawn.

The response rate for systems serving 3,301 to 100,000 was below the target after an initial round of data collection. An additional 162 systems were selected in a second round of sampling to increase the sample size in these strata.

Sixteen sampling strata were defined based on systems' population served and source of water; all weight calculations use this sample stratum variable.

Base weights

The first step was the calculation of a base sampling weight for each sample system. The medium and large system samples are simple random samples within each stratum. The two-stage small system sample is designed to be self-weighting within each stratum. Therefore, for all systems the base sampling weight equals the number of systems in the stratum divided by the number sampled from that stratum. In other words the base weight for the h^{th} stratum, B_h , is:

$$(1) \quad B_h = \frac{N_h}{n_h}$$

where N_h represents the number of systems in the stratum in SDWIS, and n_h represents the number of systems sampled from the stratum.

Non-response adjustment

The second step in the weighting methodology was to make a unit non-response adjustment to the base sampling weights. For each medium and large system stratum, the non-response adjustment factor is equal to the ratio of the number of systems that completed the survey plus the number of non-respondents to the number of systems that completed the survey (i.e., the reciprocal of the stratum response rate). Ineligible systems are not incorporated into the unit non-response adjustment. The adjustment factor for the h^{th} stratum is given by δ_h :

$$(2) \quad \delta_h = \frac{n_h + r_h}{n_h}$$

where r_h is the number of refusals and other non-respondents in the h^{th} stratum.

For the small system sample the unit non-response adjustment was not implemented within each cluster because the sample sizes were too small. Rather the adjustment was carried out within each small system stratum at the total sample (i.e., national) level.

Final weights

The non-response adjustment factor δ_h was multiplied by the base sampling weight, B_h , to obtain the non-response adjusted base sampling weight. The non-response adjusted base sampling weight for the

medium and large systems that completed the survey is the final weight for use in analysis. The non-response adjusted weights can be written as:

$$(3) \quad W_h^f = B_h \delta_h$$

for medium and large systems, and

$$(4) \quad W_{mh} = B_{mh} \delta_h$$

for small systems.

The final step in the weight calculations for small systems was a ratio adjustment to the frame count of small systems in each small stratum at the national level. This step was carried out because the two-stage sample of small systems, drawn from 120 sample clusters, may not have the same stratum distribution as the entire frame of small systems. For each small system stratum, the sum of the non-response adjusted base sampling weights for systems with a completed survey was added to the sum of the base sampling weights for the ineligible systems. The count of small systems in the frame was then divided by this sum. This yielded a ratio adjustment factor for each small system stratum, ρ_h :

$$(5) \quad \rho_h = \frac{N_h}{\sum_{j \in R_h} W_{mhj} + \sum_{j \in I_h} B_{mhj}}$$

where: R_h is the set of systems that responded to the survey, and
 I_h is the set of systems sampled that were ineligible.
 j designates the j^{th} sample system.

For the small systems with a completed survey their non-response adjusted base sampling weight was multiplied by the ratio adjustment factor to yield a final weight for use in analysis:

$$(6) \quad W_{mh}^f = W_{mh} \rho_h$$

2.2.2 Variance Estimation

The estimate of the variance must account for the sampling design. Weights are used to produce estimates for the population as a whole—or example, the proportion of treatment facilities that use a particular treatment practice, or the mean water-sales revenue of a system. Weights also affect the standard error of the estimates, and therefore the confidence intervals.

The 2006 CWS Survey sampling design was relatively complex; medium and large systems were selected by strata; small systems were selected in clusters of counties (or, in some cases, groups of counties) using a probability proportional to size sampling. This sampling design also affects the estimate of the standard error. The stratification of the systems by water source and population served will tend to reduce the overall sample variance, as systems within a stratum tend to be similar to each other and different from systems in other strata. The clustering will likely increase the sampling variance, as systems within a cluster may be similar to each other. This effect of clustering may not be large; while systems within a county share some characteristics, the often are a diverse group in terms of population served and water source, as well as revenue, expenses, and operating characteristics. But ignoring the clustering may lead to an underestimate of the sampling variance, so it must be taken into account.

The treatment facilities in the sample were not selected independently; rather, they were selected in clusters in a two-stage process. For medium and large systems, the stratified random sample of systems was selected in the first stage; every treatment facility in each system was selected in the second stage. Facilities in small systems were selected in a three-stage process: counties (or groups of counties) were selected in the first stage; a sample of systems within each county was selected in the second stage; every facility within each system was selected in the third stage. The calculation of the sample variance of estimates regarding treatment facilities also must take into account this sampling design.

Variance Estimator

The variance is estimated using a first-order Taylor expansion. The variance is calculated in Stata. The variance estimator is given by:

$$(7) \quad \hat{V}(\hat{R}) = \frac{1}{\hat{X}^2} \left\{ \hat{V}(\hat{Y}) - 2\hat{R}Cov(\hat{Y}, \hat{X}) + \hat{R}^2\hat{V}(\hat{X}) \right\}$$

where $\hat{R} = \hat{Y}/\hat{X}$, the ratio of estimates of two population totals. \hat{Y} is equal to $\sum_{h=1}^L \sum_{i=1}^{m_h} \sum_{j=1}^{n_{gi}} w_{hij} y_{hij}$, and

\hat{X} is equal to $\sum_{h=1}^L \sum_{i=1}^{m_h} \sum_{j=1}^{n_{gi}} w_{hij} x_{hij}$. L is the number of strata, m_h is the number of primary sampling units in strata h , and n_{hi} is the number of elements in the i^{th} primary sampling unit in the h^{th} strata.

Most of the estimates produced in this volume are either means or proportions. A mean is simply a ratio in which x_{hij} is equal 1. A proportion is simply a mean in which y_{hij} is equal to a 0/1 variable.²

Finite Population Correction

A finite population correction factor was derived for medium and large systems in the sample. The factor is the ratio of systems in the sample to the number of systems in each stratum. Because the primary sampling units for small systems were selected with replacement, the finite population correction factor is set equal to zero for small systems.

To estimate the variance, we first define the following ratio residual:

$$(8) \quad d_{hij} = \frac{1}{\hat{X}} (y_{hij} - \hat{R}x_{hij})$$

We then define the weighted total of the ratio residual as

$$(9) \quad z_{dhi} = \sum_{j=1}^{n_{hi}} w_{hij} d_{hij}$$

and the weighted average of the residual as:

²See Cochran, W.G. 1977, *Sampling Techniques*, New York: John Wiley & Sons for more information about variance estimates.

$$(10) \quad \bar{z}_{dh} = \frac{1}{m_h} \sum_{i=1}^{m_h} z_{dhi}$$

We can then define the variance estimate as:

$$(11) \quad \hat{V}(\hat{R}) = \sum_{h=1}^L (1 - f_h) \frac{m_h}{m_h - 1} \sum_{i=1}^{n_h} (z_{dhi} - \bar{z}_{dh})^2$$

where f_h is the finite population correction.

The estimate of the variance is used to estimate 95 percent confidence intervals in the detailed tables of this report. An implicit assumption is that the average values presented in each table are normally distributed. When the estimate is based on a large number of systems, this will generally be true; in cases where the estimate is based on a small number of systems, the assumption may not hold. The confidence interval in these cases may be larger than the mean itself. The confidence interval is not adjusted in these cases; to compute the correct confidence interval requires examination of the empirical distributions for each variable in the calculation and is beyond the scope of this study.

3. Survey Design and Response

The survey was administered through site visits to small systems (those serving populations of 3,300 or less), and through a mail survey to medium and large systems (those serving more than 3,300 people). This chapter discusses the survey instrument, the processes for conducting the site visits and distributing the questionnaires, as well as the process to assure sufficient response rates and the handling of returned questionnaires.

3.1 Questionnaire Design

EPA staff responsible for regulatory development developed the questionnaire with the assistance of the Cadmus Group, Inc. The process began with a meeting of EPA staff to discuss their data needs, distinguishing core needs required for regulatory development from other data needs. Based on these discussions, some of the questions that were in the 2000 CWS Survey were eliminated from the 2006 questionnaire. Other questions—especially those focusing on treatment—were further developed. A slightly modified version of the questionnaire was developed for systems that serve populations of over 500,000; this version of the questionnaire included additional questions on source and finished water contaminant concentrations, and excluded questions that only would apply to small systems. The questionnaire in the Appendix is a composite of the three questionnaires used; the questions that are asked of systems serving up to 100,000 people, more than 100,000 and up to 500,000 people, and over 500,000 people are noted.

EPA worked with Cadmus on the wording and organization of the questionnaire. Cadmus was responsible for the design and layout of the questionnaire form, and for documenting and incorporating all revisions to the several design and test versions of the questionnaire. Throughout the design process, the EPA project officer consulted with the full range of EPA regulatory and analytical staff, representing expert advisors and future users of the data, to identify and correctly present the broad survey topics and specific survey questions to be included in the survey instrument. These covered such areas as water production, storage, distribution, treatment, and treatment system security, as well as financial information regarding water sales revenue, customer data, operating expenses, and capital investment.

EPA went to great lengths to attempt to reduce the burden to respondents while collecting complete, accurate, detailed data. EPA decided to conduct site visits to small systems because of the difficulties they faced in responding to past Community Water System Surveys prior to 2000. Data for the 2007 Drinking Water Infrastructure Needs Survey and Assessment were collected at the same site visit, minimizing the impact of the two surveys on small systems. EPA also coordinated its data collection efforts with that of the Water Treatment Plant Questionnaire, another survey conducted by the Agency. Both surveys required systems to report basic financial information; systems that responded to the Water Treatment Plant Questionnaire did not need to respond to the financial section of the CWS Survey. EPA also established a process to provide extensive technical assistance and guidance to medium and large systems. As discussed in chapter 4, EPA conducted a pre-test of the questionnaire to identify questions that posed potential problems for respondents. EPA also conducted a pilot test of the data collection methods. In response to both tests, EPA made several changes to the questionnaire, reducing the scope of several questions. For example, as a result of the pre-test, the number of age and diameter categories was reduced in the question regarding the length of the distribution system.

3.2 Data Verification

EPA forwarded the list of water systems selected in the sample to the states. The states were asked to verify that the systems were active systems, as well as the address, telephone, and the contact information.

3.3 The Pilot Test

Approximately 50 systems were selected from the sample for a pilot test. Two clusters of small systems were selected for site visits by senior Cadmus water system professionals. Ten small systems participated in the pilot test. Approximately 40 systems serving more than 3,300 people received the questionnaire by mail. The pilot tested the site visit and mail-out process, and the technical support system. The pilot systems were included in the full sample.

3.4 Site Visit Operations.

Contractors with extensive water system experience conducted the site visits. In addition to Cadmus, the contractors were:

- Southwest Environmental Engineering, and
- McNenny Environmental Engineering and Consulting.
- Abel
- CH2M Hill
- Schott Engineering
- South Hills Consulting
- Suarez Engineering
- Sunrise
- TCB, Inc.

Cadmus trained the site visit staff. The training covered the survey, the information required from the systems, and the data collection protocol. The training included on-site inspections with Cadmus staff of a cluster of systems in the sample, as well as detailed instructions on the conduct of the visit.

The states were contacted ahead of time to confirm the systems in the sample and to review information on the system contacts. Site visitors were told to let state contacts know they were in their area and what they were doing, as a courtesy. The surveyor extended the opportunity to the states to attend the survey. Otherwise, the surveyors were told to not burden the states with requests for assistance.

As part of the training, site visitors were instructed as follows:

- The survey is voluntary and not to be misrepresented as mandatory. It is an opportunity to provide information to be used by EPA to make sound, informed decisions and regulations.
- Obtain the operating and financial information for the same time period of time, if at all possible
- If information is not available for the separate classes of system (for example, water deliveries by customer class), then collect the totals (e.g., total deliveries).
- Indicate the system has a treatment objective only if the facility was “designed” for that purpose. For example, if the facility was designed for particulate removal and removed arsenic in the process, the surveyors were to only check particulate removal.
- Complete the sequence of treatment after a walk-through of the treatment plant. If available, collect a schematic.

- Related questions should be checked for consistency. For example, questions on water produced should be consistent with deliveries and unaccounted for water. Water delivered should be consistent with the number of customers and connections.
- The importance of the financial data was emphasized. Again, if the information was not available in a manner that it could be broken down into components, get totals.
- Collect financial reports if they are available and if the system will not break down the costs as requested.
- Collect data on municipal tax and other non-water system revenue of publicly owned municipal water systems.

Several issues arose during the site visits that required consistent responses. They included:

- If the system indicated that it merged with another system, the site survey was conducted.
- If a system decreased in size so it was no longer a community water system, the site visit was conducted to confirm the status.
- If the system grew so it was no longer a small system, the site visit was conducted and data collected.

Each site visitor was given a list of systems to visit. The site visitors contacted the systems to schedule the on-site interviews; the site visitors were required at times to contact the state to confirm contact information. Once on-site or in some cases prior to the site visit, the systems were provided with a letter introducing the site visitor and explaining the survey. The site visitor toured the system, interviewed the staff, photographed the system (from source to delivery), and filled out the questionnaire. The completed questionnaire, inclusive of the pictures, site map, and collected information and reports, was then submitted to Cadmus. Senior staff at Cadmus reviewed all surveys submitted by the site visitors to ensure the site visitors were filling out the questionnaire correctly and to ensure consistent responses from the site surveyors. The questionnaires were then logged into the tracking system as received and completed.

During the site visits, Cadmus senior staff communicated with the site visitors via telephone and e-mail to ensure consistent and complete results. Group email was used to provide answers and clarification to the site visitors' questions. All site visitors received the same information.

3.5 Self-administered Survey Administration

In an effort to minimize respondent burden and maximize the response rate, systems had three options for responding to the survey. A system could complete an electronic spreadsheet version, a Web-based version, or a paper version of the questionnaire. Each was available through a secured Web site. Also, systems could request that copies of the spreadsheet or paper questionnaire be sent to them directly. Cadmus sent each system a packet that included a letter from the EPA WAM and flier that explained how to respond to the survey. The flier included instructions on how to access the Web site and a toll-free telephone number the system could use if it had any questions. The fliers included unique log-in identifiers and passwords for each system. Information for the mailing label was extracted from the sample frame and attached to the envelope for mailing.

The packets were mailed to approximately 1,400 community water systems over a 2 day period. Each system then received a telephone call from the analyst at Cadmus responsible for that system. The call

informed the system of the survey, told them they would receive the packet (if they had not already done so), and gave the systems a name and telephone number to call with any questions. If a system did not receive the packet, the analyst responsible for that system sent them another copy via FedEx or by e-mail. The analyst continued to follow-up with each system until the system either responded to the survey or refused to participate. The analysts provided technical assistance as necessary, and in some cases filled-out the questionnaire through a telephone interview.

As systems uploaded questionnaires, the tracking system automatically logged them in as received. As questionnaires were received from the water systems by mail or e-mail, Cadmus logged them into the on-line tracking system. The analyst responsible for the questionnaire reviewed it for data quality and to identify potential problems. Questionnaires submitted electronically were printed for the analysts to review. When necessary, senior engineering or financial staff was consulted regarding potential problems. If a problem or question could not be resolved by Cadmus staff, the analyst contacted the water system itself. When this initial review was completed, the questionnaire was forwarded to senior staff for additional review. All changes to the questionnaires were recorded in a permanent log. After the senior review was completed, revisions to the electronic data were made by the analysts. For paper questionnaires, the completed questionnaire was entered into an electronic spreadsheet version by two Cadmus analysts. A process was developed to ensure every response field was entered identically. Once the results were confirmed, the questionnaire was uploaded to the Web site.

3.6 Data Entry

Upon review by the senior staff, all questionnaires were logged as completed. If systems filled-out paper questionnaires, the questionnaires were key-entered using 100 percent verified double-key entry. After entry, the data were run through automated cleaning and editing programs that checked each variable for proper values and ranges. Items failing these checks were examined and either confirmed or corrected. Questionnaires that reached this stage were considered to be entered and cleaned. (The data were subject to further intensive checks as part of the quality assurance process, discussed in chapter 4.)

Status reports were sent to the EPA project manager every two weeks during the data collection effort. The report showed the number of questionnaires with each of the following status codes:

- Site visit appointments scheduled or questionnaires mailed
- Questionnaires re-mailed
- Inactive systems
- Questionnaires undeliverable
- Refusals
- Site visits completed/questionnaire returned
- Questionnaires reviewed and ready to enter into database
- Completed questionnaires entered into database

Table 3-1 presents an example of the information provided to EPA.

Exhibit 2: 2006 Community Water System Survey Status by Sampling Stratum

Status	Small Systems				Medium and Large Systems						Total
	25 – 100	101 – 500	501 - 3,300	Sub- total	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	Sub- total	
Ground Water Systems											
Mail out Sample Needed to Meet Precision Targets	101	124	154	380	206	211	151	184	23	774	1,154
Initial contact	96	103	158	357	94	93	76	184	23	470	827
Inactive	101	124	154	380	170	167	133	174	20	663	1,043
Undeliverable	3	2	1	6	1	2	1		1	5	11
Refusal	3	1	2	6	28	33	11	24	1	97	103
Received from System	95	121	151	368	60	61	54	82	12	268	636
Completed Analyst Review	77	102	119	299	50	48	48	70	11	226	525
Completed Senior QA	52	59	63	174	21	12	17	32	4	86	260
Sent for Data Entry	42	51	59	152	14	15	11	13		53	205
Received from Data Entry	42	51	59	152	12	15	11	12		50	202
Completed Questionnaire	42	51	59	152	6	4	4	17	1	32	184
Surface Water Systems											
Mail out Sample Needed to Meet Precision Targets	62	75	84	221	183	165	119	297	71	835	1,056
Initial contact	70	82	89	241	88	88	73	297	71	617	858
Inactive	62	75	84	221	162	157	113	283	69	784	1,005
Undeliverable	1	1	2		1		1	1		3	5
Refusal	2	7	3	12	19	17	13	27	10	86	98
Received from System	59	67	81	207	67	81	58	144	42	392	599
Completed Analyst Review	44	59	66	169	54	63	48	122	36	323	492
Completed Senior QA	20	22	31	73	30	22	18	50	10	130	203
Sent for Data Entry	14	20	25	59	12	19	11	16	4	62	121
Received from Data Entry	14	20	25	59	10	18	11	15	3	57	116
Completed Questionnaire	14	20	25	59	16	12	7	18	8	61	120

Exhibit 2: 2006 Community Water System Survey Status by Sampling Stratum

Status	Small Systems				Medium and Large Systems						Total
	25 – 100	101 – 500	501 - 3,300	Sub- total	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	Over 500,000	Sub- total	
Surface and Ground Water Systems											
Mail out	163	199	238	600	389	376	370	481	94	1610	2,210
Sample Needed to Meet Precision Targets	166	185	247	598	182	181	149	481	94	1,087	1,685
Initial contact	163	200	238	601	332	324	245	457	89	1,447	2,048
Inactive	4	3	1	8	1	3	2	1	1	8	16
Undeliverable											
Refusal	5	8	5	18	47	50	24	51	11	183	201
Received from System	154	189	232	575	127	142	111	226	54	660	1,235
Completed Analyst Review	121	162	185	468	104	111	95	192	47	549	1,017
Completed Senior QA	72	81	94	247	51	34	35	82	14	216	463
Sent for Data Entry	56	71	84	211	26	34	22	29	4	115	326
Received from Data Entry	56	71	84	211	22	33	22	27	3	107	318
Completed Questionnaire	56	71	84	211	22	16	11	35	9	93	304

3.7 Survey Response

The data collection effort was closed out December 31, 2007. Of the 2,210 systems sampled, 1,314 responded to the survey. The overall response rate was 59.5 percent. Table 3.2 shows the response rate by strata.

Table 3-2. CWS Survey Responses and Response Rate by Strata

Source of Water	Population Served	Completed Questionnaires	Response Rate (%)
Ground	100 or less	94	93.1
	101-500	120	96.8
	501 - 3,300	150	97.4
	3,301 - 10,000	77	37.4
	10,001-50,000	74	35.1
	50,001 - 100,000	67	44.4
	100,001 - 500,000	87	47.3
	More than 500,000	14	60.9
Surface	100 or less	59	95.2
	101-500	67	89.3
	501 - 3,300	81	96.4
	3,301 - 10,000	77	42.1
	10,001-50,000	87	52.7
	50,001 - 100,000	64	53.8
	100,001 - 500,000	152	51.2
	More than 500,000	44	62.0
All		1,314	59.5

Non-response may introduce a source of bias into estimates based on the survey. Non-respondents may be different than respondents; in some cases, these differences may be the reason for their refusal to participate in the survey. Non-response may have an impact on the survey's estimates. Two areas of potential concern are systems' estimates of system finance and systems' treatment practices.

The potential impact on system finances of non-response bias can be positive or negative. On the one hand, systems that are not doing well financially may not want to report their finances to the survey. On the other hand, systems reporting significant profits may not want to report their revenue and expenses. Therefore, both the sign (whether the bias is positive or negative) and relative magnitude of non-response bias on net revenue, for example, is uncertain.

However, there is reason to believe that such bias as might exist is minimal. For one reason, the finances of many water systems are already public information. Most systems are publicly owned. In fact, the overwhelming majority of systems serving over 3,300 people are publicly owned, and it is these larger systems where the response rate has been problematic in the current survey. Public ownership means that their revenue and expenses are matters of public record. In addition, many privately owned systems are regulated by state public utility commissions, and their finances also are matters of public record. Most systems cannot hide unusual profits or losses simply by refusing to respond to the survey; therefore, the potential impact of non-response on the estimates of system finance likely is small.

Another reason to suspect that the impact of the non-response bias on the financial estimates is relatively small has to do with previous response rates among small systems. In 1995, EPA assumed that many small systems were having financial difficulty. The response rate among these systems was relatively low, below 40 percent in some categories. If non-respondents had poorer financial performances than respondents, the 1995 survey would overstate the financial well being of small systems. In part due to this concern, EPA conducted site visits to small systems in 2000 and response rates increased dramatically, exceeding 90 percent. The overall financial performance of these systems did not change between the two surveys. In fact, the success of the site visitors indicated that the low response rate of small systems was due to the difficulty they faced in filling out the questionnaire, not an attempt to hide possible financial problems.

The survey also collects detailed information about systems treatment practices. Systems that are out of compliance with primary drinking water regulations may be reluctant to report their treatment practices. The magnitude of bias is uncertain. Further analysis could indicate the potential impact of the bias. For example, we could assume that some or all non-respondents do not treat their water to determine the potential impact of non-response bias. (Some of the non-respondents are large systems that almost certainly provide treatment. These systems could be excluded from this analysis.) This analysis could be used to estimate the upper bound of the impact of non-response bias and its impact on the 95 percent confidence interval. Further analysis may be warranted.

4. Quality Assurance and Peer Review

All work under this contract was conducted in accordance with an approved Quality Assurance Project Plan. In addition, a Supplemental Quality Assurance Project Plan was developed specifically for this survey and was approved prior to the start of data collection. The supplemental plan for the CWS Survey encompassed specific measures to check and ensure the validity of the survey data from data collection through data processing and analysis, as well as measures to assure the quality of other survey components. The report results and statistical methods also were peer reviewed by subject matter experts.

Section 4.1 discusses the questionnaire pre-test and the survey pilot test. Section 4.2 presents the measures taken to assure the quality of the statistical sample. Section 4.3 discusses the quality assurance procedures used during the data collection effort. Section 4.4 describes the expert review of questionnaire responses. Section 4.5 describes data processing quality assurance procedures. Section 4.6 describes the quality assurance steps taken during the preparation of this report. Section 4.7 describes the peer review process.

4.1 Draft Questionnaire Pre-test and Survey Pilot Test

A significant component of the survey quality assurance plan was to thoroughly test the questionnaire design, the survey design, and data collection procedures prior to implementing the full study. Efforts to confirm the validity and effectiveness of these designs and revising them when the tests reveal problems, errors, or difficulties, led to design and process improvements in such areas as data reliability, data completeness, accuracy of the sample frame, and response rates.

4.1.1 Pre-test

When the initial data collection objectives had been identified and the questionnaire shaped into a working draft instrument, EPA conducted a pre-test of this draft with seven water systems in New England of various sizes, including ground and surface water systems. The pre-test participants were recruited with the assistance of Ray Raposa of the New England Water Works Association. The main objective of the pre-test was to gauge the respondents' reactions to the questionnaire itself. The test did not address any of the actual survey operations and response rate issues that would later be tested in the full-scale pilot test.

The recruited systems received the questionnaire in June, 2006. EPA then convened a focus group meeting of the seven water systems, facilitated by survey research staff from Cadmus. The focus group explored questions regarding comprehensibility, use of clear and appropriate terminology, provision of suitable response categories, and questionnaire layout. The focus group also discussed respondents' ease or difficulty in providing answers, their immediate knowledge of or access to information requested by the questionnaire, and their overall reaction to the survey.

Overall, the focus group felt the questionnaire was clear and relatively easy to follow. As a result of the pre-test, some questions were re-worded, and others were shortened. Otherwise, the pre-test found no systematic problems in the respondents' ability to provide answers to the questions.

4.1.2 Pilot Test

A full scale pilot test was conducted in February and March 2007. The pilot tested the questionnaire and the major operational components of the survey design. The results of the pilot, along with the final version of the questionnaires were delivered to EPA in March 2007. The full on-line tracking system was developed during the pilot, and the mail-out and receipt logging procedures were finalized.

Ten small systems and 40 medium and large systems were selected from the full sample for use in the pilot. All of the small systems and 15 of the medium and large systems responded by the end of March.

As a result of the pilot, modest changes were made to the mail-out process and the instructions for systems. The pilot also resulted in changes to several questions in the questionnaires. Questions 12 (length of distribution mains) and 27 (capital improvements) were simplified. Modest changes were made to several other questions to clarify the question. The pilot also finalized the site visit protocols, and identified issues that needed to be addressed when training the site visitors.

4.2 Sampling Quality Assurance

Quality assurance of the sampling process for the CWS Survey involved three principal areas:

- Development of the sample frame
- Sampling specifications, and
- Use of software designed to draw complex samples.

Development of the Sample Frame. EPA conducted an extensive review of the data used for the sample frame. By starting with the data used for the 2007 DWINSA frame, the 2006 CWS Survey was able to take advantage of the extensive data verification effort undertaken for the 2007 DWINSA. The 2007 DWINSA frame was developed with SDWIS data from the third quarter of 2005. State representatives working on the DWINSA were sent their respective lists of systems from the data freeze and asked to make changes to population and source categories. The sample frame was then built using the data from the states. The development of the frame is discussed in detail in section 2.1.

Sampling Specifications. In order to carry out the sampling processes, the survey statisticians prepared detailed specifications that served as directions for performing the sampling and as a permanent documentation of the process. The sampling plan was documented in both the supporting materials for the Information Collection Request submitted to the Office of Management and Budget, and in the Quality Assurance Project Plan. The specifications ensured the sample was drawn in conformity with the sample design and in a statistically valid manner. Barry Nussbaum of EPA's Office of Environmental Information, A. Richard Bolstein of George Mason University, and John Gaughan of Temple University reviewed the sampling plan. Bimal Sinha from the University of Maryland also provided comments on the sampling plan.

Sampling Software. The CWS Survey sample of systems serving up to 3,300 people was drawn using a SAS program designed to draw two-stage cluster samples of this type. The sample of systems serving populations of 3,301 to 100,000 was a stratified random sample and was drawn using a Stata-based program to select random samples.

4.3 Data Collection Quality Assurance

Each component of the CWS Survey was implemented with precision and quality assurance.

Questionnaire Design

- The various drafts of the questionnaires were the product of close review and comments by EPA, Cadmus, and outside reviewers. Improvements also were made as a result of the pre-test and pilot test.

- Questionnaire version control was maintained through the various drafts by allowing for one master copy and strictly enforcing version-control procedures. After changes were made to each version of the questionnaire, a new electronic folder with the date of the changes made was created. The most recent dated folder was used to add create any future changes. One Cadmus employee was responsible for making all changes and could track back previous versions of the questionnaire.
- The questionnaire form was designed to clarify and simplify for respondents the provision of the highly detailed and complex data required for the survey. Graphic devices were used to make the form clearer and simpler to use. The devices included type fonts and sizes, borders, and text boxes.
- Because of the difficulties many small systems have with filling out complex questionnaires like the CWS Survey, site visitors were sent to small systems to ensure the questionnaires were filled out correctly.

Mail Data Collection

- Analysts preparing the material for mailing were provided with specifications for the job and were supervised by a senior staff involved in a number of previous mailings.
- Analysts worked to produce the letter and envelope to be mailed to each respondent. All labels were printed with verified SDWIS address information. All letters were tailored to each water system with their identification information using the mail merge function in Microsoft Word and a database of address information as well login information to the Web site. Consistency checks between the information printed on the letter and the label were constantly ongoing throughout the mail out.
- Each recipient of the mailed questionnaire was assigned an analyst who maintained contact with the water system throughout the survey. The analysts provided reminder calls and technical support to the systems. They also reviewed the data as it was received, following up with the system if there were any questions.
- Senior survey managers reviewed all surveys to ensure analysts were using consistent procedures for each survey.
- The online tracking system ensured proper tracking and control of all questionnaires from the point of sampling until the data were entered and cleaned. In addition to supporting overall management of the project, the periodic status reports identified response rate problem areas which enabled Cadmus to take appropriate follow-up measures.

Site Visits

- Extensive training was provided to the site visitors, including a two day training session in Boulder, Colorado that included example site visits.
- Detailed instructions were provided to each site visitor regarding the conduct of the on-site surveys.

- Regular contact was maintained with all site visitors. Site visitor questions and Cadmus responses were sent to all site visitors to ensure each site visitor received complete and consistent information.
- Each completed survey was reviewed by Cadmus staff as it was received. Follow-up instructions were provided as needed.

4.4 Expert Review of Responses

As was done with responses to the 2000 CWS Survey, each questionnaire was subjected to a multi-level, detailed review by Cadmus staff as it was returned by the systems. Cadmus reviewed the questionnaire for completeness and internal consistency. Systems were called if key questions were not answered or if answers were inconsistent or unclear.

Upon receipt of the completed questionnaire, the Cadmus analyst responsible for the system reviewed the survey. They identified missing information and questions or potential problems with responses. The analysts were provided training on how to evaluate a completed questionnaire, as well as written guidance for reviewing the responses. The written guidance included rules-of-thumb for internal consistency checks; these guidelines helped the analyst compare questions and identify inconsistent answers. For example, guidelines were provided on average annual water consumption per household, which were used to compare annual water production with the number of connections reported.

Guidelines were provided regarding follow-up questions for the system. If essential data on system finance, treatment, and production were missing, or if inconsistencies could not be resolved, analysts contacted the system. If detailed information was not available (e.g., revenue by customer class), analysts attempted to collect more aggregate-level data (e.g., total water sales revenue.) Analysts worked with the systems to resolve inconsistencies. Senior staff contacted systems when difficult issues arose. Changes to the questionnaire were documented and logged.

The analysts' review of the surveys was itself reviewed by senior survey staff. Senior staff evaluated the reviews and provided feedback to the analysts. Senior staff and water system experts provided information and answered questions throughout the data collection period.

Upon the completion of an analyst's review of a questionnaire, the completed questionnaire was then reviewed by Cadmus water system experts. Each question in the survey was subject to review. The expert review focused on the validity of the responses to each question (e.g., checking that the treatment sequence is logical), consistency across questions (e.g., the treatment practice is consistent with the treatment objectives), and that questions were answered and reviewed consistently across by water systems. Any further changes were documented and logged.

4.5 Data Processing Quality Assurance

The completed surveys were edited and entered into an electronic database. The electronic data were then imported into a hierarchical database for distribution, and a statistical package for detailed analysis. Procedures were in place at every step to maintain the integrity and quality of the data.

4.5.1 Data Entry

Most water systems chose to fill out the questionnaire using the Excel spreadsheet. After completing the survey, the water system then uploaded it directly into the database. Throughout the entire process, validations checks were established to assure the highest quality responses. Automatic checks were in

built into the spreadsheet to make sure water systems input valid information. For example, water systems were asked to input percentages as a whole number, 25 percent was entered as 25, not .25. If a water system entered in the number .25, a message would appear asking the water system to verify the accuracy of the inputted number. In this manner the responses were controlled as the water system entered data.

When a completed questionnaire was uploaded into the database by the water system, the data were subjected to a second set of automated checks. A report was created for the water system about any data issues. They were then given the option to change data before submitting the questionnaire.

A paper copy of the completed questionnaire was printed out after the data were uploaded by the water system. The paper copy was reviewed by an analyst and changes were tracked directly on the paper. After senior staff approved the changes through an additional round of quality assurance, then the changes were made to the online database. This process allows for the database to maintain the most recent dataset and all responses can be tracked back to the original survey response.

4.5.2 Automated Data Validation Checks

In preparing the final database, EPA and Cadmus designed, produced, and analyzed a series of computer validation checks. These checks were run on the full survey database after the data were entered and passed the standard computer edits for values and ranges on a variable-by-variable basis. The checks included the following:

- Distribution frequencies for all categorical variables;
- Distribution frequencies for all continuous numerical variables formatted into four categories (non-zero responses, zero responses, legitimately skipped, and missing);
- Univariates for each continuous variable;
- Item-specific cross-tabulations of categorical variables;
- Item-specific cross-univariates of continuous data; and
- Item-specific advanced logic edits.

4.5.3 Database Quality Assurance

The final, clean survey database represented the product of the various review, editing, data entry, and data validation steps described above. Once the database was prepared, there were a number of subsequent data processing steps required to create a variety of files suitable for analyses and tabulations for the final delivery of a permanent database to EPA. The principal steps included:

- Appending needed variables from external files, including sample and contact information from SDWIS.
- Analyzing the hard copy questionnaires and the frequency distributions of continuous and categorical variables to devise rules for handling missing data.
- Zero-filling blank responses. A detailed series of rules was developed for assessing blank responses and determining whether to regard these as zeros or missing values. In general,

blank quantity fields were treated as zero, except when there was external evidence in a logically related item that the response should not be zero. A detailed set of programming specifications was designed to implement these rules.

- Creating new derived variables from the survey data to categorize systems into strata comparable to the original sampling strata but based on the final survey responses rather than the SDWIS data.
- Attaching the sample weights to the analytical file.
- For the final delivery of the database to EPA, deriving and attaching the numerous composite variables created for the production of the analytical tables in this report.

Each step was planned in advance. Detailed specifications were written to guide the programming and data processing needed to perform each step. These documents are crucial quality assurance tools to help ensure that systems analysts have a clear and common understanding of the entire process of data management, that the processing stages fit together in a logical order and accomplish the intended objectives, and that there is an unambiguous audit trail of the condition of the data at each stage.

Version control was maintained for all computer programs, and interim stages of all data files were permanently archived. This meant that when changes were made to a program or process, it was clear which the current version was and the sequential changes that had been made from one version to the next were apparent. It was always possible to restore any earlier version in full or to merge selected data from the old version to the new version.

The combination of the processing specifications, version control, and data archiving ensured that no process was irreversible, that it was always possible to recover from any deliberate or inadvertent changes to the data, and that the characteristics of the survey data were fully known at each processing stage.

4.5.4 Tabulation Quality Assurance

The tabulations of the results presented in the tables in this report are varied and complex. Rather than being a simple presentation of individual survey variables, each table usually presents the results of multiple calculations involving several survey variables. Many tables present several such results in a single table. There often were several different ways of defining or calculating an item of interest, and sometimes there were different direct or derived sources of data for the calculation available on the survey database. Hence, the following steps were taken to help assure that each table accurately summarized and presented the data contained in the final survey database.

- Identify important, relevant, and useful information that could be developed from analyses of the survey data;
- Design each table to effectively present the results or to juxtapose related results in the same table;
- Clearly describe the contents of each table;
- Define in detail the variables, values, formulas, and derivations that went into each calculation;

- Prepare clear and detailed data processing specifications for carrying out the tabulations according to the calculation definitions;
- Develop computer programs to process the data pursuant to the tabulation specifications;
- Review the initial tabular output for:
 - Consistency with the design of the table of contents;
 - Conformity with the definitional and programming specifications; and
 - Reasonable agreement with expected values-based on external measures and expert knowledge of water system operations and finance;
- Review definitions, specifications, programs, and underlying data for tabulations exhibiting data anomalies or outliers;
- Review any definitions, specifications, or programs if the review process identifies errors or the need for modifications to previous decisions; and
- Repeat previous tabulation quality assurance steps and re-run tabulations until no further unacceptable data anomalies are found.

The tabulation process was fully automated, from the underlying source data through all processing stages to the final formatted tables. There were no intermediate stages requiring manual transfer or entry of data from one stage to the next. This eliminated human transcription error. Of equal importance, it also expedited the process of successive iterations of the tabulations during the quality review process, as each time a table was produced the output data automatically were transferred into the same final table form as on the previous iteration. This ensured that any new anomalies identified in later iterations did not result from transcription errors, and allowed the review staff to focus their investigations on the table data, specifications, and programs.

4.6 Quality Assurance during Report Preparation

The Survey's quality assurance plan was followed throughout report preparation. Estimates in the report were produced in the statistical package Stata using a series of programs (called "do files"). The programs were reviewed by at least two analysts and all changes were tracked and documented. Estimates were internally reviewed and revisions were tracked. Decisions to exclude outliers or other data from analyses were documented. The reports were reviewed internally by Cadmus and by EPA. They also were reviewed by external experts, as discussed in the next section.

4.7 Peer Review

The sampling plan was reviewed by two independent external reviewers, A. Richard Bolstein of George Mason University and John Gaughan of the Temple University School of Medicine. Barry Nussbaum of EPA's Office for Environmental Information also reviewed the sampling plan. Bimal Sinha from the University of Maryland also provided comments. The peer reviewers were asked to assess the September 7, 2006 draft of the *Sampling Plan for the 2006 Community Water System Survey*. The peer reviewers were also provided with a copy of the survey instrument as background. The reviewers made recommended some minor changes to the sampling plan for small systems. The plan's approach for dealing with primary sampling units whose composite measure of size exceed five was modified based on

reviewers' comments. The reviewers also recommended revisions to the sampling plan description to clarify the survey's approach. The final report was reviewed by the following: Barry L. Liner, PE and David Binning, PE of AEM Corporation, Scott J. Rubin, JD, and Janice Beecher, Ph.D., Michigan State University.

Appendix:
Community Water System Survey Questionnaire

United States Environmental Protection Agency



SURVEY OF COMMUNITY WATER SYSTEMS

CWSS Questionnaire

When you complete the survey, please upload it to our Web site at:

www.CWSSurvey.com

Follow the instructions to upload your completed questionnaire. Please have your login ID available. This information was sent with your introductory letter from the Cadmus Group, Inc.

If you are missing your introductory letter and need your login ID or prefer to return this questionnaire by e-mail as an attachment please email:

CWSSurvey@cadmusgroup.com

**You also may print a copy of the completed questionnaire and send it to us in the pre-paid Federal Express envelope provided.
(Please call the toll free number sent with your introductory letter if you need a Federal Express envelope.)**

Or you may mail your printed copy of the completed questionnaire to:

EPA Community Water System Survey
c/o The Cadmus Group, Inc.
57 Water Street
Watertown, MA 02472

Participation in the survey is voluntary. However, as a matter of policy, EPA will not disclose the identity of any respondent to this questionnaire, nor the identity of any participating water system. While no respondent has ever claimed that the information asked for in this survey contains confidential business information (CBI), EPA will offer you the opportunity of claiming CBI in the event that we receive a Freedom of Information Act request for any data that would identify you or your system. It should be noted, however, that EPA has never received a Freedom of Information Act request for such information in prior surveys.

The public reporting and record-keeping burden for this collection of information is estimated to average 3.58 hours per response, or from 1 hour to 5 hours per respondent annually. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15. The OMB Control Number for the survey is 2040-0273 and the expiration date is 1/31/2010. The agency is required to display the OMB Control Number and inform respondents of its legal significance in accordance with 5 CFR 1320.5 (b).

If you wish, you may send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested method for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, DC 20503, Attention: Desk Officer for EPA. Include the control number in any correspondence. Do not send the completed survey to this address

**OMB No. 2040-0273
Expiration date: 1/31/2010**

CWSS Questionnaire

Dear Owners and Operators of Community Water Systems:

The United States Environmental Protection Agency (EPA) is conducting a national survey of drinking water systems, and yours is one of about 2,000 systems that have been randomly selected to participate. According to your state's database, you have been identified as the most appropriate person to provide information about your water system. Participation in the survey is voluntary.

What sort of information are we seeking? Information on a range of operating and financial characteristics, from the current treatment processes being used at your system, to your annual revenue and expenses. There are even a few questions that address security considerations.

Conducted about every five years, this survey represents the first time we've been able to offer a variety of ways to participate. A hard copy of the questionnaire will be available, as always. But you will also be able to download a spreadsheet version of the questionnaire, or complete the questionnaire at a specially designed web site. You will be contacted soon to determine which approach suits you best. If you would like to get started before you are contacted, detailed instructions about the questionnaire are included from the Cadmus Group, Inc., the contractor administering the survey for EPA.

This survey will accomplish a number of important objectives. It will give EPA current data to let us better consider the costs and benefits to water systems when we develop new national drinking water regulations. It also will allow us to measure the impact of drinking water regulations put in place since the last survey. This, in turn, will help us determine more affordable approaches to drinking water treatment. Furthermore, the answers you provide will help us develop more effective programs to safeguard our nation's drinking water, provide guidance to the states, and measure the effectiveness of existing federal programs, such as the Drinking Water State Revolving Fund. This survey is part of a larger data collection effort by EPA. You also may be asked to provide information about your future investment needs through the Drinking Water Infrastructure Needs Survey and Assessment. You will be contacted separately regarding the Needs Survey and Assessment.

As we have done in the past, EPA will only make use of the information you provide when it has been aggregated with the responses of many other water systems in the same size category as yours. We will never disclose your name or the name of your water system in any public documents. The questionnaire has more details on how your privacy will be protected. The agency is required to display the Office of Management and Budget (OMB) Control Number and inform respondents of its legal significance in accordance with 5 CFR 1320.5 (b). The OMB Control Number for the survey is 2040-0273. The expiration date for Control Number is January 31, 2010.

Answers to this questionnaire will help EPA understand your circumstances better than any other tool we have. *If you have ever wanted to have a larger say in the development of national rules that could directly affect you and your water system, providing answers to this questionnaire is an important contribution.* Because only 2,000 of you are being asked to speak for over 50,000 other systems, your voice is that much more important and will carry that much more weight. If you have ever felt that federal regulators don't understand your situation, then please take this opportunity to tell us, in detail, just what your situation is. It will make a difference.

Sincerely,

Brian C. Rourke
Program Analyst
Standards and Risk Management Division
Office of Water, US Environmental Protection Agency

GENERAL INSTRUCTIONS

This questionnaire asks about your system's operational and financial characteristics.

Questions 1 through 4 ask for general information about your system.

Questions 5 through 20 ask about your system's **operational characteristics**, including its water sources, treatment practices, storage and distribution system.

Questions 20 through 28 ask about your system's **financial characteristics**, including number of connections, revenue, expenses, and capital investment.

If you received and completed EPA's Water Treatment Plant Questionnaire AND and you are willing to give EPA access that information for purposes of this survey, you do not need to complete questions 21 to 24, and questions 26 to 28. You will be contacted to confirm that you are willing to share the results.

Please complete the questionnaire. Save your file early and often!

Additional copies of the questionnaire are available at www.CWSSurvey.com. To access the Web site, you will need to have your login ID and password available. The login ID and password were mailed to separately in an introductory letter from the Cadmus Group, Inc. This letter also contained a toll-free help-line for you to call if you needed any assistance. If you do not have this information, please contact The Cadmus Group, Inc. through e-mail at CWSSurvey@cadmusgroup.com.

You may upload the completed questionnaire to our Web site at www.CWSSurvey.com or send it to us via e-mail at CWSSurvey@cadmusgroup.com.

You also may print a copy and send it to us by FedEx or U.S. mail. We recommend uploading it to the Web site because you will be able to view and confirm your responses. See below for upload instructions.

You are also encouraged to send schematics, diagrams, financial reports, or other information that will help provide a complete picture of your water system.

If you have electronic copies of the documents, you may upload them to www.CWSSurvey.com. Please have your login ID available to upload files.

If you only have paper copies, you may request a pre-paid FedEx envelope by e-mailing us at CWSSurvey@cadmusgroup.com, or by the calling toll-free number on your introductory letter from the Cadmus Group, Inc.

To upload the survey to the Web site after completion:

Please save your file often! And before uploading the questionnaire, please save the file one additional time. The upload process will upload only the most recently saved file. If you make changes before saving and attempting the upload, the new information will not be uploaded. After using your login ID and password to access your water system's account at www.CWSSurvey.com, you will see an option to upload your survey to the Web site. Follow the instructions once you have logged in to upload the file from your computer.

After the upload you will have an opportunity to review any inconsistencies found in the questionnaire during the upload process. A report will be created that explains these inconsistencies. You may print out the report, correct any issues you agree with in the file on your computer, save the file, and upload the corrected questionnaire. If you make any changes, be sure to save this report before you upload the questionnaire again! Once you agree to all of your responses, you can finalize your responses by clicking the "Submit" button.

The upload process will automatically fill out the online questionnaire at the website. The report that highlights inconsistencies in the responses

GENERAL INSTRUCTIONS

will have hyperlinks to where this response appears in the online form. You will have the option to change your responses online. (Please note that the layout of the online form is different than that of the spreadsheet.)

To e-mail your survey as an attachment:

You may e-mail the questionnaire as an attachment to CWSSurvey@cadmusgroup.com. If you choose this method, please save your file before sending it! Your e-mail program will attach only the most recently saved version of the file. If you make any changes but do not save the file before sending, then incorrect information will be submitted. Please save early and often!

You may also e-mail copies of any your documents to the same e-mail address.

Note on printing and mailing the questionnaire:

Only the first page of every sheet is currently set to print. Any information you add outside of this print range will not print unless you adjust the print settings. Please ensure that you print out all information. If you need any help, please call the toll free number sent with your introductory letter from the Cadmus Group, Inc.. Someone will assist you in changing the print ranges. If you decide to print out the questionnaire before starting the questions, please call toll-free and we will send you a paper version of the questionnaire via FedEx to ensure that all questions are returned in the postage-paid envelope.

Other versions of the questionnaire:

If you prefer to have your work stored online, you may complete the questionnaire through the online form at www.CWSSurvey.com.

There is a paper version of the questionnaire available. It can be sent to you via FedEx, along with a postage-paid envelope for easy return.

Questions? Comments? Concerns? If you have any questions, please call The Cadmus Group, Inc., toll-free using the number on your introductory letter from Cadmus or e-mail Cadmus at CWSSurvey@cadmusgroup.com

CWSS Questionnaire

1 Please provide the name, title, and telephone number of the **most knowledgeable person** to contact for information.

A. Part I – Operating Characteristics

B. Part II – Financial Characteristics

(Write "SAME" if same as A)

Name:	_____	_____
Title:	_____	_____
Tel. No.	_____	_____
Fax No.	_____	_____
E-mail:	_____	_____

2 This survey will ask you to provide operating and financial information for your public water system for the most recent 12-month period for which data are available. Please specify below the **end dates** for which data are provided. For part B, you may use data from the most recently completed fiscal year or the most recent year for which audited financial reports are available.

A Operating information (**end date**):

____/____/____
mm dd yy

B Financial information (**end date**):

____/____/____
mm dd yy

CWSS Questionnaire

3 A Please classify your water system using the following criteria. *(Please check only one)*

Owned and operated by a government or public agency (not including government-owned systems that hire a private company to operate the system) ☐

Owned by a government or public agency and operated by a private contractor ☐

Owned privately and operated for profit primarily as a water business (e.g., American Water Company) ☐

Owned privately and not operated for profit (e.g., a homeowners association or a non-profit cooperative) ☐

Owned privately and operated as a necessary part of another business (e.g., a mobile home park) *Please specify your primary business in part B.* ☐

B If the system is owned privately and operated as a necessary part of another business, please specify the type of business:

4 A Do you have regular access to a computer for sending and receiving information?

☐ Yes

☐ No *(Skip to question 5)*

B Do any of your computers have the following software or peripherals? *(Please check all that apply)*

Microsoft Excel ☐

Microsoft Access ☐

CD drive ☐

DVD player ☐

C What access do you have to the Internet? *(Please check only one)*

High-speed Internet access (e.g., cable, DSL, wireless, or T1)

Dial-up modem access

No access

☐

☐

☐

CWSS Questionnaire

The following definitions of water system components are used in this survey. Figure 1 is an example of a schematic of a water system showing water sources, treatment plants, transmission lines, and the distribution system.

Please refer to these definitions and the schematic for an explanation of the terms used in questions 6 through 11. Please submit diagrams or schematics, using figure 1 as a guide.

Please note that the identifier numbers used in the questions do not refer to specific items in figure 1. For example, use 'S1' to refer to your first surface water source, regardless of whether it is a flowing stream, as depicted in the schematic, or another surface water source.

Term	Example Code	Definition	Figure 1: Sample diagram of intakes, treatment plants, and entry points
Surface water intake	S1, S2	Surface water intake refers to the structure at the surface water source (flowing stream, lake, reservoir, or ground water under the direct influence of surface water [GWUDI]) that permits the withdrawal of the water from that source.	
Ground water source	G1, G2, G3, G4	Ground water source refers to the connection of untreated water from one or more wells to a water treatment plant or directly into the distribution system. Where the water from multiple wells flows through a common pipe prior to entry to the treatment plant or distribution system, the combined flow is considered one ground water source. Do not include GWUDI.	
Purchased water connection	P1, P2	A purchased water connection refers to the transmission of water from the seller's water system to a water treatment plant or directly to the distribution system of the purchaser's water system.	
Water treatment plant	WTP 1, WTP 2	A water treatment plant is any facility where water is filtered, disinfected, or otherwise treated prior to its transmission to the distribution system (or its conveyance to another purchasing water system). For the purposes of this survey, simple disinfection only or pH adjustment prior to entry into the distribution system are considered to constitute a water treatment plant. Other examples include large-scale filtration plants and chemical feed on wells for disinfection. It does not include facilities within the distribution system that boost disinfection.	
Buyer	B1, B2, B3	A buyer refers to any public water system to which water is sold.	
Entry point	E1, E2, E3, E4	An entry point is where treated or untreated potable water enters the water system's distribution system.	

CWSS Questionnaire

5 Please provide a copy of the schematic of your system. (Remember: you may send an existing schematic if available)

Figure 1 is an example of the type of schematic requested. This information can be transmitted two ways.

1. If your files are stored on your computer:

A. Upload the schematic at the Web site www.CWSSurvey.com or,

B. E-mail the schematic as an attachment to CWSSurvey@cadmusgroup.com

To access the Web site you need to have your login ID and password available. The login ID and password were mailed to you separately. If you do not have your login information, please e-mail:

CWSSurvey@cadmusgroup.com

2. If you prefer to send a hard copy through the mail, please call the toll-free number from your introductory letter from the Cadmus Group, Inc to request a pre-paid FedEx envelope to return this information.

Figure 1 is an example of the type of schematic requested.

Please note that this can be e-mailed or uploaded at the same time as the financial information requested later in the survey.

CWSS Questionnaire

Provide the following information for the ground water sources, surface water intakes, or purchased water connections for this water system.

MG is millions of gallons of water.

MGD is millions of gallons per day.

If the source is used on a seasonal or emergency basis, the average daily amount is for the days the source is used.

6A Ground water sources.

[\(Click here to go to the definition on tab Fig 1.\)](#)

- 1 How many ground water sources (i.e., treatment plants or groups of wells tied directly to the distribution system) are in your water system?

Number of sources: _____

- 2 Please list each well or group of wells feeding into a single ground water entry point separately by line.

Notes for the table:

1. Treatment includes any process that alone or in combination with other processes has an objective of producing or maintaining potable water.

2. If you do not know the limit of your source, please leave this column blank.

Limits on the availability of water include source capacity, water quality requirements, state and local water resource plans, local economic development and growth projections, contractual obligations, permits, water rights, and legal constraints. Limits also include current equipment constraints imposed by system components, pumps, and water treatment plant capacity.

Ground water sources	How many individual wells supply this ground water source?	Is this a seasonal source? (Yes or No)	Is this an emergency source? (Yes or No)	If this is a seasonal or emergency source, how many months was it used in the 12-month period reported in question 2A?	Is the water from this source treated by your system? ¹ (Yes or No)	What is the total amount of water drawn from this source in the 12-month period reported in question 2A? (MG)	On average, how much water was drawn from this source on a typical day when it was used during the reporting period in question 2A? (MGD)	Estimate the maximum daily amount of water that can be drawn from this source that supplies each ground water entry point. ² (MGD)
G1								
G2								
G3								
G4								
G5								
G6								
G7								
G8								
G9								
G10								

CWSS Questionnaire

6B Surface water intake identifiers. [\(Click here to go to the definition on tab Fig 1.\)](#)

1 How many surface water intakes are in your water system?

Number of intakes: _____

2 Please list each surface water intake separately by line.

Notes for the table:

1. GWUDI is ground water under the direct influence of surface water.
2. Treatment includes any process that alone or in combination with other processes has an objective of producing or maintaining potable water.
3. If you do not know the limit of your source, please leave this column blank.

Limits on the availability of water include source capacity, water quality requirements, state and local water resource plans, local economic development and growth projections, contractual obligations, permits, water rights, and legal constraints. Limits also include constraints imposed by system components, pumps, and water treatment plant capacity.

Surface water intake identifiers	What is the source for this surface water intake? (Please select one) 1) Flowing stream, 2) Reservoir or lake, 3) GWUDI ¹	Is this a seasonal source? (Yes or No)	Is this an emergency source? (Yes or No)	If this is a seasonal or emergency source, how many months was it used in the 12-month period reported in question 2A?	Is the water from this intake treated by your system? ² (Yes or No)	What is the total amount of water drawn from this source in the 12-month period reported in question 2A? (MG)	On average, how much water was drawn from this source on a typical day when it was used during the reporting period in question 2A? (MGD)	Estimate the maximum daily amount of water that can be drawn from each surface water intake. ³ (MGD)
S1								
S2								
S3								
S4								
S5								
S6								
S7								
S8								
S9								
S10								

CWSS Questionnaire

6C Purchased water connections. [\(Click here to go to the definition on tab Fig 1.\)](#)

1 How many purchased water connections are in your water system?

Number of connections: _____

2 If your system purchases water from one source but has multiple connections or turnouts, please list each connection or turnout separately by line.

Notes for the table:

1. Treatment includes any process that alone or in combination with other processes has an objective of producing or maintaining potable water.
2. GWUDI is ground water under the direct influence of surface water.
3. If you do not know the limit of your source, please leave this column blank.

Limits on the availability of water include source capacity, water quality issues, state and local water resource plans, local economic development and growth projections, contractual obligations, permits, water rights, and legal constraints. Limits also include constraints imposed by system components, pipeline carrying capacity, and water treatment plant capacity.

Purchased water connections	Provide the PWSIDs or name of the sellers for each connection. A seller can appear more than once.	Is this a seasonal source? (Yes or No)	Is this an emergency source? (Yes or No)	If this is a seasonal or emergency source, how many months was it used in the 12-month period reported in question 2A?	When you purchase this water, is it one of the following? (Please select one) 1) Finished, 2) Partially treated ¹ , 3) Untreated, 4) Unknown	What is the source of the purchased water? (Please select one) 1) Ground, 2) Surface, 3) GWUDI, ² 4) Unknown	Do you boost disinfection of water from this source after it enters the distribution system? (Yes or No)	Do you provide any other treatment ¹ to this water besides booster disinfection? (Yes or No)	What is the total amount of water drawn from this source in the 12-month period reported in question 2A? (MG)	On average, how much water was drawn from this connection on a typical day when it was used during the reporting period in question 2A? (MGD)	Estimate the maximum daily amount of water that can be drawn from each purchased water connection. ³ (MGD)
P1											
P2											
P3											
P4											
P5											
P6											
P7											
P8											
P9											
P10											

CWSS Questionnaire

7 Provide the following information for each water treatment plant in this water system. A *water treatment plant* is any facility that treats or otherwise improves the quality of the water prior to its entry to the distribution system. Large-scale filtration plants, chemical feeds on wells for disinfection, and facilities that adjust pH prior to entry to the distribution system are included. Facilities within the distribution system that boost disinfection are not included.

A How many water treatment plants are in your water system?

Number of plants: _____

B Please provide the following information for each water treatment plant in this water system.

Notes for the table:

Average daily production is the total amount of water produced by the plant divided by the number of days the plant was in use during the 12-month reporting period in question 2A. Mathematically, it is the sum of all the daily flows divided by the number of daily flows. *Design capacity* refers to the maximum amount of water the plant can produce in a single 24-hour period with all treatment trains operating at capacity. *Peak daily production* refers to the maximum amount produced in a single day over the 12-month reporting period in question 2A.

Water treatment plant identifier	List all of the surface, ground, and purchased water sources from question 6 that feed into each water treatment plant.	What was the average daily production of each water treatment plant for the 12-month period reported in question 2A? (MGD)	What was the design capacity for each water treatment plant? (MGD)	What was the peak daily production for each water treatment plant for the 12-month period reported in question 2A? (MGD)
WTP1				
WTP2				
WTP3				
WTP4				
WTP5				
WTP6				
WTP7				
WTP8				
WTP9				
WTP10				

CWSS Questionnaire

Use the treatment process codes in table 1 and the objective codes in table 2 to describe the treatment processes used by each plant in question 8.

Table 1: Treatment Processes Codes

Treatment	Code	Treatment	Code
Disinfection		Filtration (continued)	
Chlorine	T1	Rapid sand filter	T21
Chlorine dioxide	T2	Deep bed mono-media	T22
Chloramines only	T3	Dual/multi media	T23
Chloramine with a free chlorine period (based on need in the distribution system and not routinely done)	T4		
Chloramine with seasonal (routine) free chlorine use	T5	Membranes	
Ozone	T6	Reverse osmosis	T24
Ultraviolet light	T7	Microfiltration	T25
Mixed oxidant	T8	Ultrafiltration	T26
		Nanofiltration	T27
		Other	
Filtration Processes		Aeration	T28
Coagulant addition/rapid mix	T9	Potassium permanganate	T29
Polymer addition	T10	Corrosion control	T30
Flocculation	T11	Ion exchange	T31
Settling/sedimentation	T12	Activated alumina	T32
Lime/soda ash softening	T13	Iron-based adsorptive media	T33
Recarbonation	T14	Sequestration	T34
		Fluoride addition	T35
Filtration		Dissolved air flotation	T36
Micro strainer	T15	Granular activated carbon	T37
Slow sand filter	T16	Centrally managed POU/POE	T38
Bag or cartridge	T17	Clearwell and/or contact vessel (e.g., basin, pipeline)	T39
Diatomaceous earth	T18	Other (1) see question 8	T40
Pressure filtration	T19	Other (2) see question 8	T41
Green sand	T20	Other (3) see question 8	T42

Table 2: Treatment Objectives Codes

Treatment	Code
Algae control	O1
Corrosion control	O2
Primary disinfection	O3
Secondary disinfection	O4
Disinfectant byproduct control	O5
Dechlorination	O6
Oxidation	O7
Iron removal	O8
Manganese removal	O9
Taste/odor control	O10
TOC removal	O11
Particulate/turbidity removal	O12
Softening (hardness removal)	O13
Recarbonation	O14
Organic chemical contaminant removal (e.g., VOCs, pesticides)	O15
Inorganic chemical contaminant removal (e.g., arsenic)	O16
Radionuclides contaminant removal	O17
Security	O18
Mussel control	O19
Fluoridation	O20
Other (1) see question 8	O21
Other (2) see question 8	O22
Other (3) see question 8	O23

CWSS Questionnaire

8A Using the water treatment plant identifiers from question 7, characterize the treatment practices used in each of your system's treatment plants.

- Please enter the treatment process and objective for each step of the treatment practice. Use the codes from tables 1 and 2 above.
- You may enter up to 30 steps. Each step may have up to three processes and six objectives.
- Do not include disinfection booster stations that are within the distribution system.

Two examples are provided. The first example is conventional filtration. The second is iron/manganese removal.

Roll your mouse here in order to see a list of processes and their codes

Roll your mouse here in order to see a list of objectives and their codes

WTP		Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10	Step 11	Step 12	Step 13	Step 14	Step 15
Ex. 1	Process	T10	T11	T12	T23	T1	T39									
	Objective	O12	O12	O12	O12	O3	O3									
Ex. 2	Process	T29	T20	T1												
	Objective	O7 O8 O9	O8 O9	O3												
WTP1	Process															
	Objective															
WTP2	Process															
	Objective															
WTP3	Process															
	Objective															
WTP4	Process															
	Objective															
WTP5	Process															
	Objective															
WTP6	Process															
	Objective															
WTP7	Process															
	Objective															
WTP8	Process															
	Objective															
WTP9	Process															
	Objective															
WTP10	Process															
	Objective															

CWSS Questionnaire

8B Specify the other treatment practices from the water treatment plant identifiers from question 7.

If, in the last table, you have other unspecified treatment processes or objectives (i.e., you used treatment codes T40, T41, or T42 or objective codes O21, O22, O23), please write them in here.

These treatment codes (T40, T41, and T42) are for any treatment process you use that is not listed in Table 1 on page 9. Please specify what each process is:

T40: Other (1) _____
T41: Other (2) _____
T42: Other (3) _____

These treatment codes (O21, O22, and O23) are for any objective you are trying to achieve that is not listed in Table 2 on page 9. Please specify what each objective is:

O21: Other (1) _____
O22: Other (2) _____
O23: Other (3) _____

CWSS Questionnaire

- 9 Using the water treatment plant identifiers from question 7, indicate if the specified residuals management practices are used and provide the requested information regarding potential discharge. *(Yes or No for each category)*

Notes for the table:

1. Systems that are allowed to discharge to a waterway, septic system, or sanitary sewer do not face any legal or permitting restrictions on such discharge.

Water treatment plant identifier	Do you use the following residual management process in the following water treatment plants? (Use the water treatment plant numbers from Question 7)															
	Dewatering		Disposal												Recycle filter back-wash	
	Mechanical dewatering (e.g., belt presses, centrifuges, pressure filters, and vacuum filters)	Non-mechanical dewatering (e.g., lagoons, drying beds, and freeze assisted drying beds)	Land application (e.g., beneficial use)	On-Site Storage	Deep well injection	Waste landfill		Waterway		Septic system		Sanitary sewer		Other (specify)		
						Hazardous waste landfill	Non-hazardous waste landfill	Are you allowed to discharge to a waterway (surface water)? ¹	If yes, do you discharge to a waterway?	Are you allowed to discharge to a septic system? ¹	If yes, do you discharge to a septic system?	Are you allowed to discharge to a sanitary sewer? ¹	If yes, do you discharge to a sanitary sewer?			
WTP1																
WTP2																
WTP3																
WTP4																
WTP5																
WTP6																
WTP7																
WTP8																
WTP9																
WTP10																

CWSS Questionnaire

- 10 A** Is your system currently treating (directly or indirectly) for any contaminants not regulated by the federal government?
(Directly means that the treatment in place is due to the presence of the unregulated contaminant.
Indirectly means that the unregulated contaminant is being addressed because of current treatment practices for a regulated contaminant.)

☒ Yes

☐ No *(Skip to question 11)*

- B** Please provide the following information about unregulated contaminants addressed by your treatment plants.

What are the unregulated contaminants that are being addressed by your treatment plants?	If known, please provide the concentration of the unregulated contaminant in the raw and finished water as it leaves the plant. Enter N/A if unknown. Enter ND if the contaminant was not detected. Please also provide the units as well (e.g., mg/L).				What water treatment plant treats for the unregulated contaminant? (Use plant identifiers from question 7.)	Is the plant treating directly for this contaminant, i.e., is treatment in place to treat specifically for this contaminant?		
	Raw water		Finished Water					
	Concentration	Units	Concentration	Units				

CWSS Questionnaire

11 A What is the total capacity of storage located past the first residential customer?
(in millions of gallons)

B Please indicate the number of each type of storage facility you have in your utility that is located past the first residential customer.

1 Fully or partially buried

2 Ground level

3 Elevated

4 Hydropneumatic

5 a. Standpipes

b. How many standpipes are operated as surge tanks?

6 Other

C Indicate the typical number of years between cleaning an individual storage vessel:

D Please provide the following information about the practices you use to maintain water quality in storage vessels. Also indicate additional information you need about each practice, regardless of whether you use a practice.

	1	2
	Do you use any of the following practices to maintain water quality in storage vessels in your system? <i>(Please check all that apply)</i>	Do you want additional information to help you implement or make better use of any of the following practices? <i>(Please check all that apply)</i>
a Modeling or other detention time evaluations	<input type="checkbox"/>	<input type="checkbox"/>
b Longer fill/draw cycles to increase mixing	<input type="checkbox"/>	<input type="checkbox"/>
c Inlet/outlet modifications	<input type="checkbox"/>	<input type="checkbox"/>
d Mechanical mixing	<input type="checkbox"/>	<input type="checkbox"/>
e Increase or switch disinfectant residual	<input type="checkbox"/>	<input type="checkbox"/>
f Operational modifications to maintain disinfectant residual	<input type="checkbox"/>	<input type="checkbox"/>
g Other <i>(please specify)</i>	<input type="checkbox"/>	<input type="checkbox"/>

CWSS Questionnaire

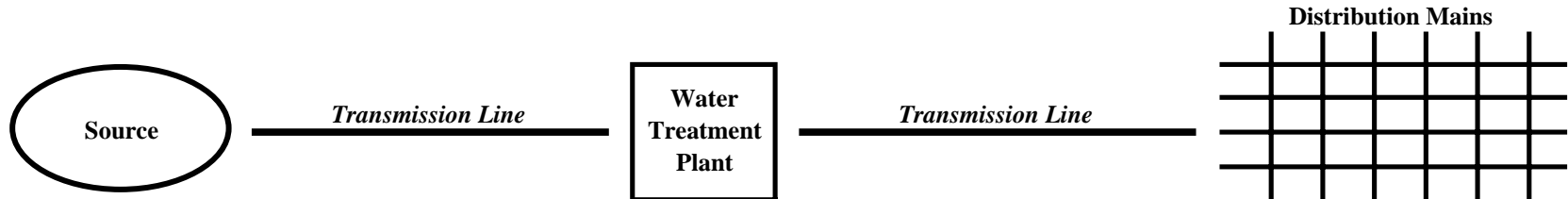
12 Estimate the length of the transmission lines and distribution mains in your system, and length of pipe replaced in the last **5** years.

A transmission line is defined as a pipeline that transports raw or partially treated water to a water treatment plant or that transports finished water to distribution mains.

A distribution main is defined as part of the pipeline network that distributes water to consumers.

Replaced pipe is pipe that has either been physically removed from the ground or has been subject to major rehabilitation efforts.

New pipe installed is new transmission lines or distribution mains that do not replace existing pipe.



Pipe Type and Diameter		Existing (or current) length of pipe (In Miles)	Length of pipe replaced in the past 5 years ¹ (In Miles)	Length of new pipe installed in the past 5 years ¹ (In Miles)
Transmission lines				
Mains	Less than 6"			
	6-10"			
	Greater than 10" and Less than 24"			
	24" or greater			

1. Ending on the date shown in your answer to question 2A

CWSS Questionnaire

13 A Please provide the following information about each pressure zone in your distribution system.

- 1 How many pressure zones do you have in your distribution system?
- 2 How many pressure zones have booster disinfection stations?
- 3 How many booster disinfection stations do you have throughout your distribution system?

B If your system has experienced a loss of pressure below 20 psi during the past operating year, please tell us the number of pressure losses that occurred for each of the following reasons:

- 1 Power outage
2 Fire
3 Main pipeline burst
4 Other (such as maintenance, flushing) *Please specify*

14 Do you flush your distribution system on a regular basis?

- ☐ Yes
- ☐ No (*Skip to question 17*)

15 What percentage of the distribution system is flushed each year on a regular basis?

(Please enter a whole number for the percentage, e.g., 50% is entered as 50, not .50)

_____ %

16 What approach is used when you flush your system on a regular basis? *(Please check all that apply)*

- A** (Uni-) Directional (Restricting water flow to one direction using closed valves to maximize velocity, generally from source/plant to the lowest elevation in the system)
- B** Conventional, random, or non-directional (Opening hydrants on lines without closing valves or restricting the direction of water flow)
- C** Dead end (opening a hydrant or flush valve on the dead-end line)
- D** Other (*Please specify*)

□ □ □ □

17 A If you do not flush your system on a regular basis, have you ever flushed your system?

- ☐ Yes
- ☐ No (*Skip to question 18*)

B 1 What was the last year in which you flushed your system?

2 In what year did you flush the system before that?
(Enter "NA" if you only flushed the system once.)

CWSS Questionnaire

18 A Do you use chemical disinfection at any of your water treatment plants?

☒ Yes

☐ No (*Skip to question 19*)

B Please provide the following data on disinfection residuals for one summer month (June, July, August, or September) and one winter month (December, January, or February) for the treatment plant in the system with the highest average daily flow.
(For the last part of the question asking for a percent, please enter the percent as a whole number instead of a decimal, e.g., 50% is entered as 50, not .5)

Season	Month	Treatment Plant			Distribution system		
		Average entry point disinfectant residual for the treatment plant with the highest average daily flow (mg/L as Cl ₂)			Average distribution system disinfectant residual (mg/L as Cl ₂)		Percentage of distribution system samples <0.2 mg/L, including non-detects
		Total Cl ₂	Free Cl ₂	Water Source	Total Cl ₂	Free Cl ₂	Total Cl ₂
Summer							%
Winter							%

CWSS Questionnaire

- 19** Please list the 5-digit ZIP codes in your service area. Please estimate the percentage of your residential customers that are in each ZIP code. This information will be used to identify the unique demographic characteristics of your service area so that EPA can better assess the financial and operating characteristics of the system.

(Please enter the percent as a whole number instead of a decimal, e.g., 50% is entered as 50, not .5)

ZIP Code		Approximate Percentage of the Water System's Residential Customers in this ZIP Code	ZIP Code		Approximate Percentage of the Water System's Residential Customers in this ZIP Code
1		%	11		%
2		%	12		%
3		%	13		%
4		%	14		%
5		%	15		%
6		%	16		%
7		%	17		%
8		%	18		%
9		%	19		%
10		%	20		%

CWSS Questionnaire

20 Please answer the following questions about water security.

Please Check if Answer is Yes

- A**
- 1 Has your water system attended any EPA-sponsored water security training? ☐
 - 2 Have you used EPA's Web-based water security technology product guides? ☐
 - 3 Have you heard of EPA's Response Protocol Toolbox? ☐
 - 4 Have you heard of the 14 features of an "active and effective" water security program? ☐
 - 5 What, if any, information do you need that would help you protect your system against security threats? *(Please write a brief answer below)*

- B**
- 1 Have you heard of mutual aid and assistance agreements or compacts? *(If No, skip to section C)* ☐
 - 2 Would you be interested in joining such an agreement or contract? ☐
 - 3 If not, please explain why not : _____

C What are the two greatest barriers to enhancing security at your system? *(Please select up to 2 from the menus)*

1

2

If you selected "Other", please specify on the line below:

Choices are:

Lack of interest at the system, public, or rate board level

Competing priorities (regulatory compliance, aging infrastructure, etc.)

Lack of funding

Lack of knowledge / guidance / training materials

Other (Please specify)

D Who do you prefer to get Water Security Information/Products from? *(Please select only one)*

- 1 Department of Homeland Security
- 2 EPA
- 3 Water Associations
- 4 No preference
- 5 Other *(Please specify)*

☐
☐
☐
☐
☐

If you received and completed EPA's Water Treatment Plant Questionnaire AND and you are willing to give EPA access to that information for purposes of this survey, you do not need to complete questions 21 to 24, and questions 26 to 28.

Are you willing to give EPA permission to use data from the Water Treatment Plant Questionnaire to complete the financial sections of the Community Water System Survey?

- ☐ Yes (*Skip to Question 25*)
- ☐ No (*Continue to Question 21*)

CWSS Questionnaire

- 21 A** Please complete the table below for the most recently completed fiscal year (the 12-month period indicated in question 2B). Financial information is needed to assess the financial condition of your water system, to assess possible future expenditures, and to see how costs are distributed among customers. No financial information provided will affect any EPA or other federal financial assistance program.

Column A: What was the amount of water produced and delivered to each of the following customer categories? Report the amount in millions of gallons per year (MGY). Unaccounted for water includes system losses and uncompensated uses (e.g., fire flow).

Columns B and C: How many connections and people did your drinking water system serve year-round? Please indicate the number of connections and number of people served by your water system for all customer types that apply. If you do not know the connections or people served, please provide your best estimate.

Column D: What were your drinking water system's revenues from water sales for each of the following customer categories? (Enter "0" if you do not have revenue from a source.)

	Column A Water Quantity Delivered	Column B Number of Connections Served	Column C Number of People Served	Column D Water Sales Revenue
1 Sold to other water suppliers				
a Finished water	_____ MGY	_____	_____	\$ _____
b Partially treated or untreated water	_____ MGY	_____	_____	\$ _____
2 Residential	_____ MGY	_____	_____	\$ _____
3 Non-residential (Commercial, Industrial, Agricultural)				
a Finished water	_____ MGY	_____	_____	\$ _____
b Partially treated or untreated water	_____ MGY	_____	_____	\$ _____
4 Unaccounted for water and uncompensated usage	_____ MGY			

- B** Please indicate your water system's revenue during the last year from other water-related sources.

- | | |
|---|----------|
| 1 Connection and development fees | \$ _____ |
| 2 Revenue from the Government (e.g. General fund of Municipal Government) | \$ _____ |
| 3 Other water-related revenue not reported above (e.g., fines, penalties, other fees) | \$ _____ |
- Please specify*
- _____

- C** Provide the PWSID or name of each public water supplier included in the response to part A1 above.

- 1 Finished water
- _____
- _____
- _____
- 2 Partially treated or untreated water
- _____
- _____
- _____

- D** Please indicate the revenue you received from non-drinking-water-related business, not included above, including rental income and the sale of other goods and services: \$ _____

- E** If you did not report any revenue under parts A, B, and D, how did you pay for your system's operations?

CWSS Questionnaire

22 Please identify your drinking water system's billing structure.
(Please check all that apply)

	Residential Customers	Non- residential Customers
A Metered charges		
1 Uniform rate	<input type="checkbox"/>	<input type="checkbox"/>
2 Declining block rate	<input type="checkbox"/>	<input type="checkbox"/>
3 Increasing block rate	<input type="checkbox"/>	<input type="checkbox"/>
4 Peak period rate (e.g., seasonal)	<input type="checkbox"/>	<input type="checkbox"/>
B Unmetered charges		
5 Separate flat fee for water	<input type="checkbox"/>	<input type="checkbox"/>
6 Annual connection fee	<input type="checkbox"/>	<input type="checkbox"/>
7 Combined flat fee for water and other services (e.g., rental fees, association fees, pad fees)	<input type="checkbox"/>	<input type="checkbox"/>
C Other billing methods <i>Please specify</i>	<input type="checkbox"/>	<input type="checkbox"/>

23 A Does your system have a program that lowers the cost of drinking water for low- or fixed-income households?

- ☐ Yes

☐ No (*Skip to question 24*)

B What are the eligibility requirements for this program?

C How many households qualify for the program?

24 A Does your system serve a residential population that changes on a seasonal basis? The seasonal population is considered the population that fluctuates within a system based on the seasons. For example, the population of a water system serving a winter or summer resort area has an influx during certain periods of the year.

- ☒ Yes

☐ No (*Skip to question 25*)

B Please indicate the average daily flow during peak season (*MGD*) :

C Please indicate the approximate number of days in the peak season (e.g. 30, 60, or 90 days):

CWSS Questionnaire

25 Please enter the following information about operators, managers, and administrative staff that work at the water system. Enter the wage for hourly employees. Exclude overtime pay from the hourly wage. For salaried employees, enter their hourly equivalent. For example, for full-time salaried employees, enter their salary divided by 2,080 hours.

Benefits include statutory benefits such as FICA and unemployment insurance, as well as pension and other retirement contributions, health insurance contributions, vacation, and sick leave. It also includes supplemental pay, including overtime pay for wage employees and holiday pay.

(If you do not know the exact information, please provide your best estimate)

A Full-time Employees

Enter the number of full-time employees, their average hourly wage rate or salary equivalent, and their benefits as a percentage of their salary or wages.

Staff	Number of full-time employees	Average hourly salary or wage (\$xx.xx)	Benefits as a percentage of salary or wages
1 Operators			
a Treatment Plant		\$	%
b Distribution System		\$	%
2 Managers		\$	%
3 Administrative staff		\$	%

CWSS Questionnaire

B Part-time Employees

Enter the number of part-time employees, the average hours worked per week by part-time employees, their average hourly wage rate or salary equivalent, and their benefits as a percentage of their salary or wage rate.

Staff	Number of part-time or employees	Average number of hours per employee per week	Average hourly wage (\$xx.xx)	Benefits as a percentage of salary or wages
1 Operators				
a Treatment Plant			\$	%
b Distribution System			\$	%
2 Managers			\$	%
3 Administrative staff			\$	%

C Contract Employees

For contract employees that operate the system, provide the number of employees, the number of hours worked and the average hourly cost to the system (including wages, salaries, benefits, and fees).

Staff	Number of contract employees	Average number of hours per employee per week	Average hourly labor cost (\$xx.xx)
1 Operators			
a Treatment Plant			\$
b Distribution System			\$
2 Managers			\$
3 Administrative staff			\$

CWSS Questionnaire

26 This question is intended to account for all of your drinking water expenses related to the revenues referred to in questions 21 A and B. Please provide financial data for the latest 12-month period for which they are available. Please do not compile new data specifically for the survey if data already exists. The categories below are intended to be mutually exclusive. For example, expenses for purchased water in part B should include the cost of the water only (an operating expense), not the capital required to bring it to the system.

A Please e-mail or upload available summaries of financial statements, including a balance sheet, income statement, and statement of cash flows. Please attach a depreciation schedule, if one is available (i.e., a program defining your process for depreciating the value of capital improvements). *Please follow the upload or e-mail process listed in question 5.*

B Please enter the following routine operating expenses in the past year:

- | | |
|---|----------|
| 1 Expenses for purchased water: | \$ _____ |
| 2 Security-related expenses (spending for security only, e.g., gates, locks, or guards): | \$ _____ |
| 3 Other routine operating expenses (including expenses for labor, chemicals, power, materials and supplies, and contractor services): | \$ _____ |
| 4 Depreciation expenses: | \$ _____ |
| 5 Income taxes: | \$ _____ |
| 6 Other payments to the general fund, e.g., payment in lieu of taxes: | \$ _____ |

C Please enter the amount of debt service expenditures in the past year:

- | | |
|-----------------------|----------|
| 7 Interest payments: | \$ _____ |
| 8 Principal payments: | \$ _____ |

D Other Expenses

- | | |
|-------------------------------|----------|
| 9 Capital improvements: | \$ _____ |
| 10 Payments to reserve funds: | \$ _____ |

27 A If you have paid for major capital improvements, repairs, or expansions in the 5 years ending on the date reported in question 2B, please indicate the total amount spent on these capital expenditures.

- | | |
|--|----------|
| 1 a Land: | \$ _____ |
| b How much land was purchased (acres): | _____ |
| 2 Water source: | \$ _____ |
| 3 Transmission and distribution system: | \$ _____ |
| 4 Treatment: | \$ _____ |
| 5 Storage: | \$ _____ |
| 6 Security (include security-related spending not included in other capital expenditures): | \$ _____ |
| 7 All other not included above: | \$ _____ |

B What percentage of the total capital expenditures identified in part A were used for the following? (must total 100 percent)

(Please enter the percent as a whole number instead of a decimal, e.g., 50% is entered as 50, not .5)

- | | |
|---|---------|
| 1 System expansion, regardless of whether expenditure includes replacement and repair of equipment or compliance with regulations: | _____ % |
| 2 Replacement and repair of equipment, regardless of whether it includes compliance with regulations but excluding spending for system expansion: | _____ % |
| 3 Compliance with regulations, excluding expenditures for system expansion and replacement and repair of equipment: | _____ % |

CWSS Questionnaire

C How were the major capital improvements, repairs, and expansions of the past 5 years from question 27A funded?

(Please enter the percent as a whole number instead of a decimal, e.g., 50% is entered as 50, not .5)

	Percentage of capital expenses funded from each source (should sum to 100 percent)	For borrowed funds, please provide the:	
	Average interest rate	Average length of loan period (Years)	
1 Current revenue (including payments from reserve funds):	_____ %		
2 Equity or other funds from private investors:	_____ %		
3 Department of Homeland Security Grant:	_____ %		
4 Other government grants:	_____ %		
5 Drinking Water State Revolving Fund			
a Principal Repayment Forgiveness:	_____ %		
b Loans:	_____ %	_____ %	_____
6 Other borrowing from public sector sources (e.g., state or regional authorities):	_____ %	_____ %	_____
7 Borrowing from private sector sources (e.g., banks or the bond market):	_____ %	_____ %	_____
8 Other <i>(Please specify)</i> :	_____ %	_____ %	_____

28 Do you have an asset management plan or other formal written strategy addressing your long-term (e.g., 20 years or more) needs for infrastructure rehabilitation and replacement?

☐ Yes

☐ No

