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Community Water System Survey

Volume II: Detailed Survey Result Tables and Methodology Report

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INTRODUCTION TO
DETAILED SURVEY RESULT TABLES

OVERVIEW OF PART 1 AND PART 2 SURVEY TABLES

Part 1 and Part 2 of the Community Water System Survey Final Report, Volume II, present extensive and detailed tabulations of the wide variety of data collected by the survey. The tables in these two parts summarize the survey results at very fine levels, breaking out the tabulated 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.

Part 1 consists of sixty-nine tables. Part 2 represents a selection of thirty-nine tables from Part 1. In Part 2, these tables have been expanded to present the confidence interval for each calculation presented on the respective table in Part 1. In these tables, each confidence interval appears immediately below the calculation to which it applies.

The tabulations presented in this report are based on data collected from a sample of U.S. water systems, not from a census of every water system in the United States. A confidence interval is one way to gauge how precisely a given tabulation of survey data can be generalized to the entirety of U.S. systems represented by the surveyed sample whose data go into tabulation. 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 "plus/minus," that is, as an amount to be added to and subtracted from the calculated data point actually presented in the table.[1]

For example, Table 1-50 shows as a survey result that the average publicly owned water system serving over 100,000 people has annual expenses of 82 dollars per person served. Table 2-31 corresponds to table 1-50, and, in addition to presenting this calculation, also shows the confidence interval for this number to be ± 6. This means that the amount of 6 dollars should be added to and subtracted from the survey result of 82 dollars, to define the ends of the range where the "true" average annual per capita expense is expected to fall for publicly owned systems serving over 100,000 people. Thus, based on the sampled publicly owned water systems serving over 100,000 who responded to the CWS survey, the average annual per capita expenses of all U.S. systems in this size/ownership category is expected to be somewhere between 76 and 88 dollars.

These tables always express the confidence interval in the same units as the calculation to which it applies. Thus, in Table 2-2 the confidence interval numbers for average daily water production 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 production derived from different water 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.

Following the General Notes of Detailed Survey Result Tables is a crosswalk table informing the reader which tables in Part 1 have counterparts in Part 2, i.e., have confidence interval information available for

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[1] For readers interested in technical aspects of the confidence intervals presented in these tables, it should be stated that each interval presented is the 95% confidence interval for the actual statistic calculated in the corresponding table cell immediately above the confidence interval. The confidence intervals were calculated using WesVarPC, a software package that automates the process of producing variance estimates for the estimation technique used for this report. (This technique, known as jackknife estimation, employs a series of replicate sample weights. The creation of the replicate weights is described in Volume II, Part 3, Section 2.2.4.)

the results presented in Part 1. This crosswalk also lists the number of the table in Part 2 that corresponds to each such table in Part 1.

DETAILED SURVEY RESULT TABLES
GENERAL NOTES

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 reflect the fact that the data come 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 the systems in the final sample will equal the total number of U.S. Community Water Systems that meet the eligibility definition used for the survey (e.g., Federal and state-owned systems were not included). Thus, for the tables to validly 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.

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 result appears. The survey data are tabulated so as to facilitate analysis of water systems. In general, this means that the CWS Survey 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 system's water come 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 CWS Survey report has adopted the former approach because this initial view of the data is intended primarily as an analysis of system-level characteristics. Tables II-22 and II-23 are the

only exceptions to this approach; for these tables, the data are tabulated at the level of the treatment facility, rather than the system.

3. Percentages summing to 100%. **Some percentage tables may not present results that total to 100%, as would ordinarily be expected. Such tables would be among those that present absolute or percentage breakdowns of the whole into its components, e.g., breakdowns of total revenues into different customer categories, such as Table II-36.** 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 the 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.

4. Confidence intervals. 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. In general, this assumption is true. However, 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.

   Because of the foregoing issue, the reader should take note of results in Part 2 where the negative half of the confidence interval would produce a lower end of the range below zero, since 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. (In a few tables, a series of percentages may validly sum to greater than 100%, when more than one item may apply to the same system. This situation is always noted on the table. This situation is not related to the issue of confidence intervals extending an individual percentage beyond 100%.

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

   Blank cells: Throughout the tables, some individual cells or blocks of continuous cells are blank. Any blank 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 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 1-27, Source Water Protection -- Management Area Delineation, the cell for the length of the fixed radius around the well that defines the management area is blank for surface systems serving 100 or fewer people. This is because no such systems delineate their management area by a fixed radius around the well, as evidenced by the cell immediately above, which shows that 0% of these systems use this approach.

- 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 1-41, none of the ancillary systems provided data on their wholesale, governmental, or agricultural customers, so these cells are blank 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, as in the case of Table 1-27 described above. 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 1-41 above, it was noted that certain cells are blank for customer categories of ancillary systems. However, other customer category cells in the same group specifically report a zero result. This illustrates an important distinction when interpreting the tables. *Blank cells and cells reporting a zero result are not the same thing, 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 zero. For example, in Table 1-41, the ancillary systems serving 101 to 1,000 people provided sufficient data to explicitly determine that they have no commercial/industrial customer connections, but did not respond explicitly about wholesale, governmental, or agricultural customers. Even if one surmised that such systems are unlikely to have these customer categories, it would be an invalid use of the survey data to so report in the tables.

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.

6. 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 unweighted observations. The report of the number of observations can be used as a very approximate indication of the sampling precision of the tabulated result, especially when confidence intervals have not been calculated for a table. Results based on a small number of observations may not be precise estimates of the universe of water systems represented by the sampled systems. They are included because they may be useful indicators of areas worth further investigation.

7. Individual table notes. Additional specific notes and definitions appear on individual tables. The specific CWS Survey questionnaire item(s) on which each tabulation is based are cited below the table. The citation refers to the corresponding question number(s) on the CWS Survey mail 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 all three questionnaire versions.

8. 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:

Service Population Categories: from Q. 11B (or, if not reported in the mail survey, from service population information developed from CATI Screener question S7; or, if not reported in the screener survey, from FRDS frame data)

Primary Water Source: from Q. 4 (or, if not reported in the mail survey, from water source information developed from CATI Screener questions S5/S6; or, if not reported in the screener survey, from FRDS frame data in earlier sampling phases)

Ownership Type: from CATI Screener question S8 (or, if not reported in the screener survey, from FRDS data from earlier sampling phase). 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 Community Water System 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)

Private Ownership Categories: from CATI Screener question S10

CROSSWALK BETWEEN TABLES IN PART 1 AND PART 2

Part 1	Part 2
Table 1 - 1	Table 2 - 1
Table 1 - 2	Table 2 - 2
Table 1 - 3	Table 2 - 3
Table 1 - 4	Table 2 - 4
Table 1 - 5	Table 2 - 5
Table 1 - 6	Table 2 - 6
Table 1 - 7	Table 2 - 7
Table 1 - 8	X
Table 1 - 9	X
Table 1 - 10	X
Table 1 - 11	X
Table 1 - 12	X
Table 1 - 13	Table 2 - 8
Table 1 - 14	Table 2 - 9
Table 1 - 15	X
Table 1 - 16	X
Table 1 - 17	X
Table 1 - 18	Table 2 - 10
Table 1 - 19	Table 2 - 11
Table 1 - 20	Table 2 - 12
Table 1 - 21	Table 2 - 13
Table 1 - 22	X
Table 1 - 23	X
Table 1 - 24	Table 2 - 14
Table 1 - 25	X
Table 1 - 26	X
Table 1 - 27	Table 2 - 15
Table 1 - 28	X
Table 1 - 29	X
Table 1 - 30	X
Table 1 - 31	Table 2 - 16
Table 1 - 32	Table 2 - 17
Table 1 - 33	Table 2 - 18
Table 1 - 34	Table 2 - 19
Table 1 - 35	Table 2 - 20
Table 1 - 36	Table 2 - 21
Table 1 - 37	Table 2 - 22
Table 1 - 38	Table 2 - 23
Table 1 - 39	Table 2 - 24
Table 1 - 40	Table 2 - 25
Table 1 - 41	Table 2 - 26
Table 1 - 42	X
Table 1 - 43	X

CROSSWALK BETWEEN TABLES IN PART 1 AND PART 2 (continued)

Part 1	Part 2
Table 1 - 44	X
Table 1 - 45	X
Table 1 - 46	Table 2 - 27
Table 1 - 47	Table 2 - 28
Table 1 - 48	Table 2 - 29
Table 1 - 49	Table 2 - 30
Table 1 - 50	Table 2 - 31
Table 1 - 51	X
Table 1 - 52	X
Table 1 - 53	X
Table 1 - 54	X
Table 1 - 55	X
Table 1 - 56	Table 2 - 32
Table 1 - 57	Table 2 - 33
Table 1 - 58	Table 2 - 34
Table 1 - 59	Table 2 - 35
Table 1 - 60	Table 2 - 36
Table 1 - 61	Table 2 - 37
Table 1 - 62	Table 2 - 38
Table 1 - 63	X
Table 1 - 64	X
Table 1 - 65	X
Table 1 - 66	Table 2 - 39
Table 1 - 67	X
Table 1 - 68	X
Table 1 - 69	X

PART 1

DETAILED SURVEY RESULT TABLES

Table 1 - 1
Residential Population Served
by Ownership Type and Primary Water Source

Ownership Type/ Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public								
Primarily Ground	66	276	772	1,928	5,989	22,461	64,973	316,159
Primarily Surface	57	287	750	2,160	6,221	24,708	73,930	417,896
Primarily Purchased	66	293	755	1,989	6,092	22,291	68,241	186,945
Private								
Primarily Ground	62	250	714	1,770	5,311	24,543	70,078	238,900
Primarily Surface	61	255	861	1,820	6,371	24,446	70,524	456,903
Primarily Purchased	69	321	714	2,116	5,378	28,020	64,769	145,341
Ancillary								
Primarily Ground	61	228	660	1,200				
Primarily Surface	66	240	750					
Primarily Purchased	57	195						

Data: Q. 11A

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 2
Average Daily Production and Percentage Produced
by Source of Water
(MGD)

Source of Water/ Production Data	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Ground									
Average Daily Production	0.006	0.026	0.072	0.209	0.512	1.929	4.275	14.919	0.364
Percent of Total	95.2%	84.1%	76.1%	68.5%	55.9%	52.7%	37.7%	28.3%	77.5%
Surface									
Average Daily Production	0.000	0.004	0.007	0.056	0.210	1.452	4.765	32.544	0.418
Percent of Total	2.3%	4.0%	5.9%	14.9%	21.0%	34.0%	38.6%	48.4%	9.7%
Purchased									
Average Daily Production	0.000	0.009	0.016	0.040	0.156	0.545	2.268	7.717	0.140
Percent of Total	2.5%	11.9%	17.9%	16.6%	23.2%	13.4%	23.7%	23.3%	12.7%
All									
Average Daily Production	0.008	0.042	0.097	0.305	0.886	3.948	11.755	55.180	0.996
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	206	367	260	269	277	222	139	119	1,859

Data: Q. 4

Notes: Tabulations represent the average daily production across systems from each type of source

Table 1 - 3
Water Source Profile: Number and Percentage of Systems
by Primary Water Source

Primary Water Source		Service Population Category								Row Total
		100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Primarily Ground										
100%	Number	9,042	10,367	4,443	4,422	2,035	1,094	120	56	31,579
	Percent	65.5%	67.2%	68.3%	63.2%	49.4%	42.4%	24.8%	14.7%	62.8%
Mostly	Number	4,163	2,773	537	347	340	276	50	38	8,526
	Percent	30.2%	18.0%	8.3%	5.0%	8.2%	10.7%	10.3%	10.1%	17.0%
Primarily Surface										
100%	Number	218	432	330	845	679	626	103	104	3,337
	Percent	1.6%	2.8%	5.1%	12.1%	16.5%	24.3%	21.3%	27.4%	6.6%
Mostly	Number	142	388	99	290	137	265	101	103	1,524
	Percent	1.0%	2.5%	1.5%	4.1%	3.3%	10.3%	20.7%	27.1%	3.0%
Primarily Purchased										
100%	Number	230	1,435	983	1,049	804	251	75	45	4,874
	Percent	1.7%	9.3%	15.1%	15.0%	19.5%	9.7%	15.5%	11.9%	9.7%
Mostly	Number	0	28	117	41	129	67	36	33	450
	Percent	0.0%	0.2%	1.8%	0.6%	3.1%	2.6%	7.3%	8.8%	0.9%
Column Total	Number	13,795	15,422	6,510	6,995	4,123	2,579	486	379	50,289
	Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Data: Q. 4

Definitions: 100%: system obtains all water from indicated type of source
Mostly: system obtains highest percentage of water from indicated type of source

Table 1 - 4
Average Daily Production (MGD)
by Primary Water Source

Primary Water Source/ Production Data		Service Population Category								Row Total
		100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Primarily Ground Systems										
100%	Avg. Daily Production	0.008	0.033	0.095	0.304	0.909	3.431	11.456	43.516	0.367
Mostly	Avg. Daily Production	0.028	0.040	0.105	0.337	1.154	4.823	12.606	61.442	2.725
	% Ground Water	94.4%	84.0%	86.0%	77.1%	72.2%	78.4%	81.0%	78.7%	81.3%
	% Surface Water	1.2%	3.4%	3.5%	11.8%	16.6%	13.0%	7.0%	8.8%	8.3%
	% Purchased Water	7.2%	12.6%	10.5%	11.2%	11.2%	8.7%	12.0%	12.5%	10.9%
Observations		159	214	141	142	153	118	53	40	1,020
Primarily Surface Systems										
100%	Avg. Daily Production	0.017	0.108	0.123	0.364	0.992	4.270	12.974	75.904	3.886
Mostly	Avg. Daily Production		0.066	0.116	0.456	0.963	4.683	12.979	56.808	9.980
	% Ground Water		6.8%	24.7%	6.2%	8.2%	11.7%	9.9%	16.3%	10.4%
	% Surface Water		88.2%	75.3%	86.2%	86.8%	83.0%	85.6%	73.8%	83.6%
	% Purchased Water		4.9%	0.0%	7.5%	5.0%	5.3%	4.5%	9.9%	6.0%
Observations		52	79	48	67	64	82	60	58	510
Primarily Purchased Systems										
100%	Avg. Daily Production	0.007	0.089	0.088	0.240	0.620	4.256	8.455	20.852	0.741
Mostly	Avg. Daily Production		0.047	0.154	0.123	1.071	2.804	12.135	45.814	5.142
	% Ground Water		4.0%	32.3%	19.3%	17.6%	13.0%	27.3%	18.9%	20.9%
	% Surface Water		0.0%	0.7%	0.0%	11.0%	12.4%	0.0%	1.9%	5.3%
	% Purchased Water		96.0%	67.0%	80.7%	71.4%	74.7%	72.7%	79.2%	73.8%
Observations		34	109	87	73	65	30	26	26	450

Data: Q. 4

Notes: To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each type of water source within each Mostly category may represent a slightly different set of systems overall; the sum of water source types by percent may not equal 100% (See General Note 3)

Definitions: 100%: system obtains all water from indicated type of source
Mostly: system obtains highest percentage of water from indicated type of source

Table 1 - 5
Average Number of Wells
by Primary Water Source

Primary Water Source/ Type of Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Wells								
Mean	1.5	2.0	2.3	3.1	4.6	9.8	16.1	49.9
Median	1.0	2.0	2.0	3.0	4.0	7.0	14.0	34.0
Observations	125	187	129	139	146	114	48	38
Primarily Surface Systems								
Wells								
Mean	0.0	0.1	0.2	0.1	0.4	0.5	3.1	14.1
Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	33	57	42	59	64	80	59	58
Primarily Purchased Systems								
Wells								
Mean	0.0	0.4	1.0	0.6	2.0	2.1	8.7	14.7
Median	0.0	0.0	1.0	0.0	0.0	1.0	5.0	5.0
Observations	2	15	9	11	16	16	13	17

Data: Q. 18, Q. 20

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 6
Comparison of Average Daily Treated Production to Maximum Daily Treatment Design Capacity by Primary Water Source (MGD)

Primary Water Source/ Maximum Daily Capacity & Average Daily Production	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Average Daily Treated Production	0.012	0.034	0.093	0.314	0.933	4.081	11.201	60.700	1.350
Maximum Daily Treatment Design Capacity	0.075	0.215	0.465	1.404	2.536	9.985	27.263	124.778	3.262
Ratio: Average to Maximum	0.27	0.32	0.32	0.36	0.41	0.46	0.45	0.51	0.34
Observations	74	145	129	149	168	180	94	82	1,021
Primarily Ground Systems									
Average Daily Treated Production	0.011	0.031	0.091	0.298	0.895	3.781	9.795	55.137	0.647
Maximum Daily Treatment Design Capacity	0.075	0.209	0.476	1.260	2.523	10.054	25.660	119.524	1.801
Ratio: Average to Maximum	0.27	0.31	0.32	0.35	0.40	0.43	0.40	0.52	0.33
Observations	50	108	91	94	110	102	42	29	626
Primarily Surface Systems									
Average Daily Treated Production	0.021	0.087	0.116	0.366	1.016	4.519	12.424	62.684	5.027
Maximum Daily Treatment Design Capacity	0.078	0.319	0.355	1.869	2.564	9.883	28.658	126.651	10.899
Ratio: Average to Maximum	0.31	0.38	0.38	0.38	0.45	0.50	0.49	0.51	0.43
Observations	24	37	38	55	58	78	52	53	395

Data: Q. 18, Q. 5B

Notes: The maximum daily treatment design capacity shown above may differ slightly from that reported in Table I-7. Although the same variable is tabulated in both tables, the tables report mean values based on different sets of observations. Each table uses the maximum number of observations containing responses for both variables needed to calculate each ratio reported in the respective table.
Similarly, the reported ratio of average to maximum may not be replicable by dividing the reported average by the reported maximum, since more observations may have been available to calculate the average and maximum separately than were available to calculate the ratio. The latter could be calculated only for systems that reported both their average and their maximum. (See General Notes 2 & 3)

Definitions: Primarily: system obtains all or highest percentage of water from stated source
All: excludes primarily purchased water systems

Table 1 - 7
Comparison of Peak Daily Production to Maximum Daily Treatment Design Capacity by Primary Water Source (MGD)

Primary Water Source/ Production Data	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Peak Daily Production	0.024	0.068	0.204	0.615	1.615	6.379	17.861	87.769	2.134
Maximum Daily Treatment Design Capacity	0.059	0.166	0.444	1.236	2.595	9.799	25.648	120.123	3.186
Ratio: Peak to Maximum Production	0.50	0.55	0.58	0.60	0.67	0.70	0.72	0.75	0.58
Primarily Ground Systems									
Peak Daily Production	0.023	0.057	0.202	0.553	1.647	6.286	18.425	93.741	1.079
Maximum Daily Treatment Design Capacity	0.058	0.152	0.450	1.041	2.672	10.052	25.564	125.287	1.691
Ratio: Peak to Maximum Production	0.50	0.54	0.57	0.57	0.66	0.69	0.73	0.77	0.56
Primarily Surface Systems									
Peak Daily Production	0.043	0.248	0.224	0.759	1.644	6.695	19.120	93.130	7.972
Maximum Daily Treatment Design Capacity	0.078	0.422	0.398	1.898	2.537	9.700	27.750	128.331	11.437
Ratio: Peak to Maximum Production	0.57	0.60	0.61	0.66	0.69	0.72	0.74	0.77	0.67
Primarily Purchased Systems									
Peak Daily Production		0.060	0.235	1.628	1.184	4.592	9.253	24.672	3.149
Maximum Daily Treatment Design Capacity		0.095	0.368	1.822	2.064	7.101	15.513	35.069	4.805
Ratio: Peak to Maximum Production		0.85	0.80	0.72	0.71	0.62	0.58	0.58	0.71

Data: Q. 5A, Q. 5B

Notes: The maximum daily treatment design capacity shown above may differ slightly from that reported in Table 1-6. Although the same variable is tabulated in both tables, the tables report mean values based on different sets of observations. Each table uses the maximum number of observations containing responses for both variables needed to calculate each ratio reported in the respective table.
Similarly, the reported ratio of peak to maximum may not be replicable by dividing the reported peak by the reported maximum, since more observations may have been available to calculate the peak and maximum separately than were available to calculate the ratio. The latter could be calculated only for systems that reported both their peak and their maximum. (See General Notes 2 & 3)

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 8
Finished Water Storage
by Tank Covering and Tank Material

Tank Covering/ Tank Material/ Tank Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Total Systems								
Without Finished Water Storage	7,838	5,485	1,223	1,136	380	79	7	26
With Finished Water Storage	5,459	9,661	5,287	5,800	3,721	2,486	477	353
Covered Tanks								
Natural Material								
Number of Systems	409	968	378	396	302	119	14	11
Average Number of Tanks	1.3	1.4	1.6	2.2	2.6	2.9	2.6	4.1
Average Total Capacity (MG)	0.048	0.066	0.189	0.631	3.187	2.377	6.343	38.145
% of Systems Disinfecting after Storage	25.8%	43.6%	15.9%	23.4%	20.6%	29.0%	15.2%	13.0%
Synthetic Material								
Number of Systems	3,910	7,806	4,561	5,295	3,371	2,416	461	325
Average Number of Tanks	1.5	1.5	1.6	2.5	3.4	5.6	7.7	15.4
Average Total Capacity (MG)	0.246	3.304	3.878	1.562	2.844	120.033	15.270	149.065
% of Systems Disinfecting after Storage	25.8%	18.0%	15.2%	13.4%	14.3%	19.2%	23.4%	24.0%
Uncovered Tanks								
Natural Material								
Number of Systems	297	196	142	89	56	6		8
Average Number of Tanks	1.6	1.1	1.8	2.0	3.2	8.5		1.3
Average Total Capacity (MG)	0.012	0.067	0.154	0.364	0.787	1.450		1,758.819
% of Systems Disinfecting after Storage	0.0%	49.1%	27.8%	14.4%	0.0%	50.0%		100.0%
Synthetic Material								
Number of Systems	369	301	318	215	91	49	14	36
Average Number of Tanks	1.0	2.3	2.0	2.0	3.4	2.2	1.2	4.1
Average Total Capacity (MG)	0.005	0.024	0.245	0.393	1.005	7.917	18.817	254.958
% of Systems Disinfecting after Storage	0.0%	26.0%	48.0%	63.1%	36.1%	29.6%	54.8%	80.1%

Data: Q7, Q. 8

Notes: Total systems accounted for across all tank types may not equal total systems with finished water storage:
- Total systems with finished water storage is based on data in Q. 7. Tank data are based on Q. 8.
- To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each tank type may represent a slightly different set of systems overall (See General Note 3)
- A given system may have more than one type of storage tank

Definitions: Natural Materials: wood, earth, etc.
Synthetic materials: steel, concrete, etc.

Table 1 - 9
Distribution System Summary - Overview
by Ownership Type

Ownership Type/ Distribution System Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Total Miles in Place	1.12	7.01	14.57	37.12	100.74	169.93	391.28	1,117.80
Service Connections per Mile	70.4	78.2	78.6	54.1	57.8	79.1	74.9	154.1
Rate of Expansion (Miles/Year)	0.01	0.10	0.32	0.96	1.31	2.33	5.26	11.65
Number of Main Repairs in Last Year	0.3	1.4	3.6	7.2	13.1	30.2	49.8	278.8
Public Systems								
Total Miles in Place	2.51	6.59	11.50	26.25	76.48	167.84	381.77	1,128.34
Service Connections per Mile	41.9	44.7	101.2	57.1	66.2	79.4	76.1	163.3
Rate of Expansion (Miles/Year)	0.03	0.11	0.30	0.66	0.83	2.02	4.96	11.64
Number of Main Repairs in Last Year	0.7	1.5	3.1	6.2	10.2	25.7	48.3	282.1
Private Systems								
Total Miles in Place	0.98	11.43	21.52	69.97	178.45	182.84	450.88	1,026.75
Service Connections per Mile	59.8	72.2	35.8	37.7	31.1	77.1	67.0	80.0
Rate of Expansion (Miles/Year)	0.03	0.15	0.38	1.88	3.06	4.54	7.46	11.74
Number of Main Repairs in Last Year	0.3	1.9	4.8	10.4	23.3	60.5	59.5	247.6
Ancillary Systems								
Total Miles in Place	0.98	1.36	1.98	1.50				
Service Connections per Mile	84.4	135.0	124.1	300.0				
Rate of Expansion (Miles/Year)	0.00	0.01	0.14	0.00				
Number of Main Repairs in Last Year	0.4	0.5	0.3	2.0				

Data: Q. 9, Q. 11B, Q. 10

Definitions: Connections: active connections with piped drinking water
Rate of Expansion: number of miles of new pipe per year over last five years

Table 1 -10
Distribution System Summary -- Pipe in Place
by Ownership Type and Pipe Material
(Miles per System)

Ownership Type/ Pipe Material	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Iron	1.03	2.99	4.65	9.87	27.75	129.96	264.64	780.69
Observations	13	54	81	108	99	103	87	85
Asbestos Cement	0.61	3.73	2.53	5.52	12.77	28.83	51.12	188.13
Observations	7	27	34	65	59	66	58	64
PVC	2.71	5.15	9.92	19.13	59.58	42.26	103.97	99.36
Observations	31	90	90	110	92	69	57	61
Other Plastic & Other Materials	1.08	1.40	1.94	3.79	7.15	18.79	59.05	332.92
Observations	10	15	21	21	27	30	38	55
Total System Length	2.51	6.59	11.50	26.25	76.48	167.84	381.77	1,128.34
Private Systems								
Iron	0.37	2.37	2.88	5.06	18.52	90.80	166.88	810.58
Observations	16	32	25	38	62	50	26	15
Asbestos Cement	0.81	3.40	3.50	10.89	11.82	45.25	135.98	133.34
Observations	1	18	26	36	56	49	22	14
PVC	0.98	11.96	22.23	71.81	176.27	94.50	130.90	87.90
Observations	58	103	83	89	101	48	19	11
Other Plastic & Other Materials	0.50	1.11	3.45	3.29	7.27	85.36	142.72	156.58
Observations	15	17	14	15	19	29	17	15
Total System Length	0.98	11.43	21.52	69.97	178.45	182.84	450.88	1,026.75
Ancillary Systems								
Iron	0.36	1.18	1.14	1.50				
Observations	14	16	1	1				
Asbestos Cement	0.05	0.65						
Observations	3	3						
PVC	0.99	1.26	1.80					
Observations	44	51	3					
Other Plastic & Other Materials	0.85	0.79	1.43					
Observations	15	15	2					
Total System Length	0.98	1.36	1.98	1.50				

Data: Q. 9

Notes: The sum of the average lengths for each pipe type will not equal the total system length since the average for each pipe type was calculated only for systems having that type . Thus, different systems are represented in each type of pipe, and some systems may appear in more than one pipe type. Total system length is the average across all systems.

Table 1 - 11
Distribution System Summary -- Pipe Replacement in Last Year
by Ownership Type and Pipe Material
(Miles per System)

Ownership Type/ Pipe Material	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Iron	0.00	0.08	0.03	0.09	0.20	0.41	1.04	4.26
Observations	15	59	94	120	114	112	89	84
Asbestos Cement	0.00	0.00	0.00	0.03	0.08	0.16	0.21	0.41
Observations	7	28	38	71	71	75	63	66
PVC	0.00	0.06	0.02	0.25	0.30	0.21	0.44	0.89
Observations	32	105	106	112	98	72	61	58
Other Plastic & Other Materials	0.00	0.05	0.03	0.03	0.21	0.15	0.14	0.41
Observations	12	19	26	23	33	39	47	59
Total Length Replaced	0.00	0.08	0.04	0.25	0.43	0.55	1.23	4.26
Private Systems								
Iron	0.00	0.01	0.02	0.13	0.14	0.11	0.80	0.91
Observations	18	33	28	40	65	52	27	15
Asbestos Cement	0.00	0.00	0.06	0.00	0.01	0.03	0.12	0.40
Observations	1	20	30	38	58	51	24	15
PVC	0.00	0.04	0.53	0.08	0.18	0.76	0.07	1.98
Observations	65	113	94	91	91	48	19	7
Other Plastic & Other Materials	0.00	0.04	0.03	0.01	0.00	1.89	0.01	0.28
Observations	16	18	18	18	24	28	16	16
Total Length Replaced	0.00	0.04	0.44	0.10	0.20	1.05	0.86	2.02
Ancillary Systems								
Iron	0.00	0.01	0.00	0.00				
Observations	17	17	1	1				
Asbestos Cement	0.00	0.00						
Observations	5	3						
PVC	0.00	0.00	0.01					
Observations	51	54	2					
Other Plastic & Other Materials	0.01	0.00	0.00					
Observations	20	21	2					
Total Length Replaced	0.00	0.00	0.00	0.00				

Data: Q. 9

Notes: The sum of the average lengths replaced for each pipe type will not equal the total length replaced since the average for each pipe type was calculated only for systems having that type . Thus, different systems are represented in each type of pipe, and some systems may appear in more than one pipe type.

Table 1 - 12
Distribution Summary - Maintenance
by Ownership Type and Pipe Material

Ownership Type/ Pipe Material/ Pipe Lining	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Iron								
With Cement Lining								
# Main Repairs/Mile (Last Year)	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.3
# Months between Flushes	14.4	5.4	6.4	6.5	6.5	9.0	10.1	12.0
Observations	3	19	28	58	93	102	90	78
Without Cement Lining								
# Main Repairs/Mile (Last Year)	0.4	0.6	0.6	0.8	0.8	0.5	1.0	1.0
# Months between Flushes	9.2	6.1	4.7	6.3	6.6	9.3	10.8	10.2
Observations	8	51	53	85	84	96	58	63
Asbestos Cement								
With Vinyl								
# Main Repairs/Mile (Last Year)		1.8	0.4	0.1	0.2	0.1	0.4	0.0
# Months between Flushes		3.7	1.7	7.0	8.4	7.1	11.4	24.0
Observations	0	5	4	13	14	13	10	4
Without Vinyl								
# Main Repairs/Mile (Last Year)	0.0	0.2	0.4	0.4	0.4	0.4	0.5	0.6
# Months between Flushes	9.7	8.0	5.0	6.9	8.0	9.1	9.8	11.2
Observations	3	24	41	71	85	86	59	61
PVC								
# Main Repairs/Mile (Last Year)	0.2	0.5	0.3	0.2	0.2	1.1	0.1	0.3
# Months between Flushes	7.2	5.0	5.0	5.5	7.1	7.7	10.1	10.7
Observations	53	165	139	178	160	100	61	51
Other Plastic								
# Main Repairs/Mile (Last Year)	0.3	0.7	0.4	4.6	0.5	5.8	0.1	0.1
# Months between Flushes	7.0	4.0	4.1	7.5	4.3	7.1	10.2	10.5
Observations	9	8	6	8	8	6	6	7
Other Materials								
# Main Repairs/Mile (Last Year)	0.0	0.0	1.7	1.9	1.0	2.3	0.5	0.2
# Months between Flushes	8.1	5.2	5.7	8.0	6.1	9.2	11.7	13.4
Observations	5	8	14	17	29	40	40	57

Table 1 - 12
Distribution Summary - Maintenance
by Ownership Type and Pipe Material

Ownership Type/ Pipe Material/ Pipe Lining	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Iron								
With Cement Lining								
# Main Repairs/Mile (Last Year)	0.0	0.1	0.3	0.2	0.3	0.2	0.1	0.4
# Months between Flushes	16.0	5.8	5.8	6.5	6.6	9.1	10.0	12.5
Observations	2	14	25	47	66	76	72	68
Without Cement Lining								
# Main Repairs/Mile (Last Year)	1.6	0.9	0.6	0.6	0.5	0.4	1.0	0.5
# Months between Flushes	5.1	6.4	4.4	6.2	6.5	9.2	10.8	10.4
Observations	3	25	40	66	54	65	45	52
Asbestos Cement								
With Vinyl								
# Main Repairs/Mile (Last Year)		0.2	0.0	0.1	0.1	0.1	0.7	0.0
# Months between Flushes		5.7		7.5	8.0	7.0	11.2	24.0
Observations	0	3	1	10	12	8	4	3
Without Vinyl								
# Main Repairs/Mile (Last Year)	0.0	0.3	0.3	0.4	0.4	0.4	0.5	0.7
# Months between Flushes	14.3	5.3	4.8	6.8	8.4	9.0	9.6	11.3
Observations	2	14	22	44	41	49	43	51
PVC								
# Main Repairs/Mile (Last Year)	0.3	0.2	0.3	0.2	0.2	0.2	0.1	0.3
# Months between Flushes	6.8	5.5	4.2	6.0	7.6	7.7	10.1	10.9
Observations	16	61	65	96	77	60	45	44
Other Plastic								
# Main Repairs/Mile (Last Year)	0.0		0.4	6.1	0.5	6.1	0.1	0.0
# Months between Flushes	24.0	5.0	8.8	8.1	3.7	6.7	10.1	12.0
Observations	2	0	3	4	4	5	5	4
Other Materials								
# Main Repairs/Mile (Last Year)	0.0	0.0	0.0	2.1	1.1	2.3	0.6	0.2
# Months between Flushes	8.5	6.9	4.1	8.5	5.8	8.6	12.1	14.9
Observations	2	6	6	10	20	19	26	46

Table 1 - 12
Distribution Summary - Maintenance
by Ownership Type and Pipe Material

Ownership Type/ Pipe Material/ Pipe Lining	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Iron								
With Cement Lining								
# Main Repairs/Mile (Last Year)	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.2
# Months between Flushes	7.5	2.7	8.8	6.7	6.3	8.6	10.6	9.4
Observations	1	3	2	11	27	26	18	10
Without Cement Lining								
# Main Repairs/Mile (Last Year)	0.4	0.5	0.4	2.0	2.7	0.9	0.7	5.3
# Months between Flushes	10.5	6.1	5.9	5.5	7.3	9.8	11.0	9.7
Observations	3	18	13	18	30	31	13	11
Asbestos Cement								
With Vinyl								
# Main Repairs/Mile (Last Year)		2.4	0.6	0.0	1.0	0.0	0.1	0.0
# Months between Flushes		3.3	1.7	3.0	10.8	8.1	11.6	
Observations	0	2	3	3	2	5	6	1
Without Vinyl								
# Main Repairs/Mile (Last Year)		0.1	0.5	0.1	0.4	0.2	0.1	0.1
# Months between Flushes	6.0	10.0	5.5	7.3	6.5	9.2	10.5	10.8
Observations	0	9	19	27	44	37	16	10
PVC								
# Main Repairs/Mile (Last Year)	0.1	0.6	0.3	0.3	0.3	6.6	0.1	0.1
# Months between Flushes	5.4	4.6	5.7	3.9	5.7	7.9	10.3	10.2
Observations	26	84	73	82	83	40	16	7
Other Plastic								
# Main Repairs/Mile (Last Year)	0.0	1.0	0.0	0.7	0.4	0.6	0.0	0.4
# Months between Flushes	6.4	3.0	7.1	4.4	8.0	8.9	10.7	9.7
Observations	3	6	2	4	4	1	1	3
Other Materials								
# Main Repairs/Mile (Last Year)	0.0		2.8	0.8	0.4	2.1	0.2	0.6
# Months between Flushes	10.2	3.8	7.1	5.2	7.4	11.4	10.5	10.2
Observations	2	0	8	7	9	21	14	11

Table 1 - 12
Distribution Summary - Maintenance
by Ownership Type and Pipe Material

Ownership Type/ Pipe Material/ Pipe Lining	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Ancillary Systems								
Iron								
With Cement Lining								
# Main Repairs/Mile (Last Year)		0.0	0.0					
# Months between Flushes		6.9	6.0					
Observations	0	2	1	0				
Without Cement Lining								
# Main Repairs/Mile (Last Year)	0.0	0.1		1.3				
# Months between Flushes	9.0	4.8		12.0				
Observations	2	8	0	1				
Asbestos Cement								
With Vinyl								
# Main Repairs/Mile (Last Year)								
# Months between Flushes		2.0						
Observations	0	0	0	0				
Without Vinyl								
# Main Repairs/Mile (Last Year)	0.0	0.5						
# Months between Flushes	12.0	6.0						
Observations	1	1	0	0				
PVC								
# Main Repairs/Mile (Last Year)	0.3	0.9	0.0					
# Months between Flushes	8.8	4.7	8.8					
Observations	11	20	1	0				
Other Plastic								
# Main Repairs/Mile (Last Year)	0.3	0.1	0.7					
# Months between Flushes	7.5		1.4					
Observations	4	2	1	0				
Other Materials								
# Main Repairs/Mile (Last Year)	0.7	0.0						
# Months between Flushes	3.7	4.6						
Observations	1	2	0	0				

Data: Q. 9

Notes: Systems with pipe length less than 1 mile for any type of pipe are excluded from the calculation of number of repairs per mile for that pipe type, since the resulting large numbers are not meaningful and skew the summary results.

Table 1 - 13
Service Connection Profile
by Ownership Type and Customer Category
(Number of Connections)

Ownership Type/ Connection Data/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Total Connections								
Mean	28.4	114.2	309.5	732.0	2,145.2	7,501.6	20,972.0	90,882.0
Median	25.0	93.0	280.0	666.0	1,938.0	6,504.0	21,200.0	58,600.5
Observations	131	243	196	208	197	159	102	87
Mean by Customer Category								
Residential	27.6	109.9	288.8	638.6	1,859.8	6,522.1	18,216.3	81,342.6
Commercial/Industrial	0.3	4.4	14.3	45.5	156.9	587.6	1,541.5	5,705.7
Wholesale	0.0	0.1	0.2	0.5	1.2	2.8	2.8	16.5
Governmental	0.0	0.6	2.1	1.9	6.2	34.4	57.8	201.5
Agricultural	0.1	0.4	0.7	2.6	0.7	8.7	27.4	25.8
Other (includes combined)	0.5	1.0	4.7	54.9	158.0	442.6	1,151.1	3,947.2
Public Systems								
Total Connections								
Mean	43.5	132.9	334.6	754.6	2,231.0	7,388.5	20,760.7	91,176.9
Median	29.0	114.0	310.0	700.0	2,025.0	6,300.0	21,439.0	59,087.0
Observations	38	110	107	124	101	96	84	74
Mean by Customer Category								
Residential	41.5	123.9	314.1	649.6	1,901.1	6,403.0	18,549.2	81,877.5
Commercial/Industrial	0.5	7.4	19.3	53.5	183.2	590.6	1,612.0	5,643.4
Wholesale	0.0	0.1	0.3	0.5	1.3	3.1	3.1	18.2
Governmental	0.1	1.0	0.9	2.3	7.7	32.5	51.5	203.7
Agricultural	0.5	0.5	0.9	1.7	0.6	7.0	29.8	28.6
Other (includes combined)	1.1	2.0	1.1	56.2	184.6	465.8	375.9	3,754.3
Private Systems								
Total Connections								
Mean	25.9	104.6	268.0	658.8	1,867.2	8,181.3	22,417.4	88,177.2
Median	22.0	75.0	247.0	590.0	1,614.0	6,655.0	19,988.0	56,638.0
Observations	61	98	87	84	96	63	18	13
Mean by Customer Category								
Residential	25.0	103.7	245.7	602.0	1,729.0	7,232.8	15,837.4	76,436.7
Commercial/Industrial	0.1	3.0	6.9	19.7	71.1	570.1	1,075.9	6,273.1
Wholesale	0.0	0.0	0.0	0.5	0.9	1.2	1.0	1.7
Governmental	0.0	0.2	4.1	0.8	1.6	45.9	96.4	182.2
Agricultural	0.0	0.3	0.4	5.3	1.2	17.8	13.6	0.0
Other (includes combined)	0.8	0.4	10.9	51.1	74.6	315.2	5,982.4	5,827.5
Ancillary Systems								
Total Connections								
Mean	27.5	88.9	310.0					
Median	26.0	62.0	336.0					
Observations	32	35	2					
Mean by Customer Category								
Residential	27.1	88.6	310.0					
Commercial/Industrial	0.5	0.0	0.0					
Wholesale								
Governmental								
Agricultural								
Other (includes combined)	0.0	0.0	0.0					

Data: Q. 11B, Q. 31

Notes: Question 11B was the source of data for Total Connections, while Question 31 was the source for Mean by Customer category. To ensure reasonable comparability, the table includes only systems whose total connections, as reported for explicit categories (Q. 31), account for an amount within +/- 10% of total connections as reported in Q. 11B.

The sum of the individual customer category values may not equal the reported total connections:
- The 10% tolerance was allowed between report by category and total report
- To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within ownership type may represent a slightly different set of systems overall (See General Note 3)

Definitions: Connections: Includes metered and unmetered connections
Other: Includes connections for miscellaneous customer categories and connections for which systems that could not distinguish between two or more customer categories

Table 1 - 14
Annual Deliveries per Customer Service Connection
by Ownership Type and Customer Category
(Thousands of Gallons)

Ownership Type / Delivery Data/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Annual Deliveries/Connection								
Mean	139	114	113	128	138	205	193	222
Median	64	78	76	98	112	147	170	191
Observations	101	214	185	201	193	153	100	81
Mean by Customer Category								
Residential	123	99	104	87	97	109	119	125
Commercial/Industrial	50	313	432	1,018	965	582	1,873	1,011
Wholesale		9,953	9,752	19,082	41,201	91,002	146,390	589,736
Governmental	90	110	344	3,067	1,409	14,218	30,347	20,872
Agricultural	195	97	505	1,029	587	754	3,663	3,030
Other (includes combined)	87	205	4,041	1,615	7,592	6,037	42,344	55,924
Public Systems								
Annual Deliveries/Connection								
Mean	82	105	108	128	136	207	195	229
Median	67	71	78	100	113	155	180	195
Observations	28	93	102	121	100	93	83	68
Mean by Customer Category								
Residential	81	93	97	82	87	108	122	127
Commercial/Industrial	48	229	383	1,061	855	602	962	1,052
Wholesale		7,703	9,919	22,438	45,575	95,185	126,889	632,135
Governmental	90	112	391	2,675	1,493	16,442	34,482	24,566
Agricultural	195	101	298	1,096	797	531	3,117	3,030
Other (includes combined)	87	53	5,257	1,594	8,302	4,012	53,702	59,237
Private Systems								
Annual Deliveries/Connection								
Mean	136	136	98	128	144	192	175	169
Median	80	81	77	90	96	130	175	170
Observations	46	89	81	80	93	60	17	13
Mean by Customer Category								
Residential	92	110	88	102	124	110	96	114
Commercial/Industrial		534	583	836	1,488	493	8,114	729
Wholesale		25,413	8,021	9,264	31,140	50,674	343,625	194,286
Governmental		95	180	7,015	832	1,479	2,026	1,763
Agricultural		83	879	474	262	1,113	8,500	
Other (includes combined)		475	1,656	1,685	4,654	12,930	516	346
Ancillary Systems								
Annual Deliveries/Connection								
Mean	159	85	475					
Median	56	70	504					
Observations	27	32	2					
Mean by Customer Category								
Residential	169	85	475					
Commercial/Industrial	57							
Wholesale								
Governmental								
Agricultural								
Other (includes combined)								

Data: Q. 29, Q. 11B, Q. 31

Notes: Question 11B is the source of connection data for total Annual Deliveries/Connection, while Question 31 is the source for Mean by Customer Category. To ensure reasonable comparability, the table includes only systems whose total connections, as reported for explicit categories (Q. 31), account for an amount within +/- 10% of total connections as reported in Q. 11B.

The sum of the individual customer category values may not equal the reported total annual deliveries per connection, for the following reason: Averages are calculated in each customer category only for systems reporting non-zero deliveries in the category, that is, individual customer category line items represent the average only across systems having that customer category; however, the line item Annual Deliveries/Connection represents the average across all customer categories and all systems.

Definitions: Connections: Includes metered and unmetered connections
Other: Includes connections for miscellaneous customer categories and connections for which systems that could not distinguish between two or more customer categories

Table 1 - 15
Treatment Plant Operators
by Primary Water Source, Operator Category, and Employment Status
(Average Number per System)

Primary Water Source/ Operator Category/ Employment Status	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Total - All Operator Categories	0.6	1.2	1.6	2.2	3.2	6.0	8.7	16.6
State Certified Operators								
Full Time	0.2	0.4	0.9	1.1	2.2	4.0	6.6	12.8
Part Time	0.3	0.5	0.4	0.5	0.2	0.3	0.4	0.4
State or Nationally Trained/Not Certified								
Full Time	0.0	0.0	0.1	0.2	0.3	0.6	0.5	0.9
Part Time	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0
Other Training Level								
Full Time	0.0	0.1	0.1	0.1	0.3	0.8	1.0	2.5
Part Time	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Observations	245	402	276	282	282	230	139	124
Primarily Ground Systems								
Total - All Operator Categories	0.6	1.2	1.6	2.3	3.2	5.9	8.9	16.8
State Certified Operators								
Full Time	0.2	0.4	0.9	1.2	2.2	3.5	7.3	12.2
Part Time	0.3	0.5	0.3	0.5	0.3	0.4	0.7	0.4
State or Nationally Trained/Not Certified								
Full Time	0.0	0.0	0.1	0.2	0.3	0.7	0.3	0.8
Part Time	0.1	0.1	0.0	0.1	0.0	0.2	0.0	0.0
Other Training Level								
Full Time	0.0	0.1	0.1	0.1	0.3	1.0	0.4	3.4
Part Time	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.1
Observations	159	214	141	142	153	118	53	40
Primarily Surface Systems								
Total - All Operator Categories	0.8	1.5	2.3	3.0	4.6	6.9	9.8	20.2
State Certified Operators								
Full Time	0.2	0.6	1.5	1.8	3.3	5.4	8.1	15.6
Part Time	0.5	0.6	0.5	0.4	0.1	0.2	0.2	0.5
State or Nationally Trained/Not Certified								
Full Time	0.0	0.1	0.0	0.2	0.4	0.5	0.2	1.3
Part Time	0.0	0.1	0.1	0.2	0.1	0.1	0.0	0.0
Other Training Level								
Full Time	0.0	0.1	0.0	0.3	0.5	0.5	1.2	2.8
Part Time	0.1	0.1	0.2	0.2	0.0	0.1	0.1	0.1
Observations	52	79	48	67	64	82	60	58
Primarily Purchased Systems								
Total - All Operator Categories	1.1	0.7	1.4	1.1	1.8	3.6	6.5	7.0
State Certified Operators								
Full Time	0.4	0.3	0.5	0.4	1.3	2.0	2.9	6.3
Part Time	0.3	0.3	0.3	0.3	0.1	0.2	0.4	0.1
State or Nationally Trained/Not Certified								
Full Time	0.1	0.0	0.1	0.1	0.2	0.3	1.3	0.1
Part Time	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Other Training Level								
Full Time	0.2	0.0	0.3	0.1	0.2	0.9	1.7	0.4
Part Time	0.0	0.1	0.2	0.1	0.0	0.1	0.2	0.2
Observations	34	109	87	73	65	30	26	26

Data: Q. 14

Notes: Averages in each category represent all systems, including those reporting zero operators in the category.

Definitions: State Certified: Formally certified through state-approved drinking water operator training program
State/Nationally Trained: trained through a state or national drinking water training program, but not formally state-certified
Other Training Level: e.g., on-the-job training
Full Time: Operators who work at least 35 hours per week
Part Time: Operators who operate more than one plant (e.g., circuit riders) or who work less than 35 hours per week
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 16
Treatment Plant Operators
by Ownership Type, Operator Category, and Employment Status
(Average Number per System)

Ownership Type/ Operator Category/ Employment Status	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Total - All Operator Categories	2.1	1.2	1.7	2.4	3.4	6.1	9.0	16.4
State Certified Operators								
Full Time	1.4	0.4	1.0	1.2	2.3	4.0	6.9	13.0
Part Time	0.3	0.4	0.3	0.5	0.2	0.3	0.4	0.3
State or Nationally Trained/Not Certified								
Full Time	0.0	0.1	0.1	0.2	0.4	0.6	0.5	0.8
Part Time	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.0
Other Training Level								
Full Time	0.2	0.2	0.2	0.1	0.4	0.8	1.1	2.3
Part Time	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.0
Observations	60	161	151	164	150	143	109	105
Private Systems								
Total - All Operator Categories	0.6	1.4	1.5	1.7	2.4	5.0	6.7	18.7
State Certified Operators								
Full Time	0.3	0.6	0.7	0.9	1.8	3.5	4.5	10.9
Part Time	0.3	0.6	0.5	0.3	0.2	0.5	0.5	1.0
State or Nationally Trained/Not Certified								
Full Time	0.0	0.0	0.1	0.2	0.1	0.2	0.3	1.9
Part Time	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
Other Training Level								
Full Time	0.0	0.0	0.1	0.1	0.2	0.6	0.7	3.6
Part Time	0.0	0.0	0.2	0.2	0.1	0.2	0.5	1.2
Observations	97	143	120	117	132	87	30	19
Ancillary Systems								
Total - All Operator Categories	0.4	0.8	1.1	0.0				
State Certified Operators								
Full Time	0.0	0.1	0.8	0.0				
Part Time	0.2	0.5	0.0	0.0				
State or Nationally Trained/Not Certified								
Full Time	0.0	0.0	0.0	0.0				
Part Time	0.1	0.1	0.0	0.0				
Other Training Level								
Full Time	0.0	0.0	0.0	0.0				
Part Time	0.1	0.0	0.3	0.0				
Observations	88	98	5	1				

Data: Q. 14

Notes: Averages in each category represent all systems, including those reporting zero operators in the category.

Definitions: State Certified: Formally certified through state-approved drinking water operator training program
State/Nationally Trained: trained through a state or national drinking water training program, but not formally state-certified
Other Training Level: e.g., on-the-job training
Full Time: Operators who work at least 35 hours per week
Part Time: Operators who operate more than one plant (e.g., circuit riders) or who work less than 35 hours per week

Table 1 - 17

Systems Utilizing Various Solutions, Given Permanently Contaminated Primary Water Source

(Percent)

Solution	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Draw on other sources in own system	12%	20%	38%	33%	43%	55%	66%	68%	27%
Drill new well(s)	15%	15%	18%	19%	31%	46%	59%	46%	19%
Draw on another system currently connected to own system	32%	36%	30%	39%	42%	49%	49%	38%	36%
Draw upon alternative sources	39%	55%	69%	68%	83%	90%	83%	92%	59%
Implement water management plan (e.g., rationing)	58%	67%	67%	60%	56%	53%	47%	39%	62%
Curtail service	30%	29%	33%	36%	45%	52%	47%	56%	33%
Other	13%	13%	10%	5%	8%	14%	13%	18%	11%
Observations	245	402	276	282	282	230	139	124	1,980

Data: Q. 16

Notes: Percentages may not add to 100% because a system may adopt more than one solution.

Table 1 - 18
Water Systems Not Providing Any Treatment
by Primary Water Source

Primary Water Source/ Non-treatment Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Percent of Systems	30.5%	15.7%	10.7%	11.8%	4.7%	0.9%	0.0%	0.9%
# of Wells or Intakes	1.4	1.7	2.2	2.8	6.1	12.2		23.0
Primarily Ground Systems								
Percent of Systems	31.2%	16.5%	11.6%	14.6%	6.3%	1.5%	0.0%	2.8%
# of Wells or Intakes	1.4	1.7	2.2	2.8	6.1	12.2		23.0
Primarily Surface Systems								
Percent of Systems	6.1%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Wells or Intakes	1.4	2.0						

Data: Q. 18

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 19
Treatment Facilities per System
by Primary Water Source

Primary Water Source/ Facility Characteristics/ Water Source Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
# Treatment Facilities/System	1.1	1.3	1.5	1.5	1.9	3.0	3.4	5.8
# Wells/Facility	1.3	1.5	1.6	1.8	2.1	2.8	3.7	8.5
% Facilities Treating Surface Water	99.4%	99.0%	96.1%	94.0%	87.3%	90.3%	84.5%	83.2%
Primarily Ground Systems								
# Treatment Facilities/System	1.1	1.3	1.5	1.6	2.1	4.1	5.0	8.4
# Wells/Facility	1.4	1.7	1.8	2.3	3.0	4.7	5.6	24.6
% Facilities Treating Surface Water	98.4%	97.4%	95.4%	65.1%	65.6%	57.6%	44.5%	39.8%
Primarily Surface Systems								
# Treatment Facilities/System	1.0	1.1	1.1	1.1	1.3	1.3	2.4	5.0
# Wells/Facility	0.0	0.1	0.0	0.0	0.2	0.3	1.2	2.1
% Facilities Treating Surface Water	100.0%	99.4%	96.0%	97.7%	92.2%	94.4%	86.8%	86.3%
Primarily Purchased Systems								
# Treatment Facilities/System	1.0	1.1	1.0	1.1	2.1	2.6	1.6	4.6
# Wells/Facility	0.0	0.3	1.0	0.6	0.8	0.6	7.9	6.9
% Facilities Treating Surface Water	100.0%	100.0%	100.0%	100.0%	86.8%	81.4%	93.8%	78.0%

Data: Q. 18

Notes: Table includes systems reporting zero wells or surface intakes

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 20
Wells and Intakes Not Receiving Treatment by Primary Water Source

Primary Water Source/ Overall System Data/ Data by Type of Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
# Sources Untreated/System	1.4	1.8	2.1	2.5	5.1	6.1	12.4	15.4
# Wells Untreated/System	1.4	1.8	2.1	2.4	5.2	6.1	12.4	15.4
# Surface Intakes Untreated/System	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Primarily Ground Systems								
# Sources Untreated/System	1.4	1.8	2.1	2.5	5.5	7.3	15.7	16.0
# Wells Untreated/System	1.4	1.8	2.1	2.5	5.8	7.3	15.7	16.0
# Surface Intakes Untreated/System	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Primarily Surface Systems								
# Sources Untreated/System	1.3	1.8	4.0	3.0	1.1	1.0	5.0	21.0
# Wells Untreated/System	0.2	0.8	4.0	3.0	0.3	1.0	5.0	21.0
# Surface Intakes Untreated/System	1.1	1.0	0.0	0.0	0.9	0.0	0.0	0.0
Primarily Purchased Systems								
# Sources Untreated/System		1.0		1.0		1.0	3.9	8.7
# Wells Untreated/System		1.0		0.0		1.0	3.9	8.7
# Surface Intakes Untreated/System		0.0		1.0		0.0	0.0	0.0

Data: Q. 20

Notes: Table includes systems that treat none or only part of their sources

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 21
Treatment Facility Flow Characteristics
by Primary Water Source and Type of Water Source
(Gallons/Day)

Primary Water Source/ Type of Water Source/ Water Source Flow Characteristics	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Ground Water Sources								
Combined Average Daily Flow	10,325	27,193	72,894	226,074	547,119	1,836,187	4,027,283	15,660,059
Combined Potential Flow	76,457	138,178	551,808	1,142,112	1,658,138	4,294,325	9,692,928	39,469,975
Surface Intakes								
Combined Average Daily Flow	10,012	22,455		48,300	335,690	197,934	1,203,035	2,995,719
Combined Potential Flow	10,112	128,452		829,280	1,085,515	3,922,070	4,510,389	7,084,335
Primarily Surface Systems								
Ground Water Sources								
Combined Average Daily Flow			8,659	33,160	51,794	652,834	709,411	4,076,396
Combined Potential Flow	130,000		97,775	113,622	441,363	1,479,591	3,508,381	9,927,426
Surface Intakes								
Combined Average Daily Flow	20,362	68,534	107,893	353,166	921,269	3,743,489	7,581,103	34,557,346
Combined Potential Flow	66,022	180,150	310,570	1,051,809	2,513,054	9,770,367	21,171,210	82,418,156
Primarily Purchased Systems								
Ground Water Sources								
Combined Average Daily Flow		4,863	89,508	24,925	285,933	302,237	2,630,319	17,960,414
Combined Potential Flow		698,745	183,793	496,291	1,149,646	965,492	7,979,357	23,003,840
Surface Intakes								
Combined Average Daily Flow		25,734	38,341	109,624	425,128	2,787,779	8,044,975	8,110,146
Combined Potential Flow		426,095	302,266	1,017,498	949,128	5,482,871	15,671,652	28,151,766

Data: Q. 18

Definitions: Combined Average Daily Flow: total of average flows for each individual treated source in the system, totaled separately for ground and water sources
Combined Potential Flow: total of potential flows for each individual treated source in the system, totaled separately for ground and water sources
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 22
Treatment Practice for Primarily Surface Water Systems

(Percent of Plants Performing Each Treatment)

Treatment Type/ Specific Treatment	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Raw Water Storage	16.3%	20.0%	17.7%	9.5%	19.1%	13.7%	20.2%	14.1%	15.3%
Presedimentation	27.9%	11.6%	10.9%	7.8%	20.1%	6.9%	8.2%	18.8%	12.3%
Aeration	2.5%	0.0%	1.1%	7.0%	4.5%	2.3%	13.7%	8.0%	4.7%
Pre-Disinfection/Oxidation/Softening									
Chlorine	59.0%	73.9%	67.3%	66.3%	68.8%	58.6%	47.6%	57.1%	63.8%
Chlorine Dioxide	0.0%	0.0%	0.0%	5.0%	4.7%	13.2%	14.2%	7.8%	6.3%
Chloramines	4.6%	0.0%	1.1%	2.1%	0.0%	2.2%	15.5%	10.8%	3.1%
Ozone	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	5.4%	5.8%	0.9%
KMnO4	0.0%	4.9%	9.6%	9.9%	15.2%	28.3%	25.9%	26.5%	16.0%
Pre-disinfection/oxidation combinations	0.0%	0.0%	2.0%	2.9%	0.6%	9.2%	5.1%	4.3%	3.5%
Lime/Soda Ash softening	6.8%	9.8%	20.9%	16.2%	14.3%	11.7%	3.5%	5.9%	12.5%
Recarbonation with CO2	0.0%	0.0%	0.0%	0.0%	2.1%	4.7%	0.6%	6.3%	1.9%
Iron and Manganese Removal									
Green Sand Filtration	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	0.9%
Chemical Oxidation Filtration	0.0%	1.6%	6.9%	1.5%	6.8%	8.2%	3.5%	3.5%	4.5%
Aeration Filtration	0.0%	0.0%	0.0%	0.0%	1.7%	3.5%	0.0%	0.0%	1.0%
Flocculation/Coagulation									
Aluminum Salt	22.4%	37.1%	45.5%	50.5%	62.8%	64.4%	72.4%	71.6%	55.8%
Iron Salts	0.0%	0.0%	0.0%	2.1%	6.1%	4.8%	9.7%	17.9%	4.7%
pH Adjustment	15.4%	19.1%	30.7%	53.7%	55.5%	47.3%	49.7%	25.1%	43.1%
Activated Silica	0.0%	0.0%	0.0%	0.7%	2.1%	1.9%	0.0%	0.0%	0.9%
Clays	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	5.4%	0.0%	0.7%
Polymers	21.0%	27.6%	41.4%	28.4%	43.6%	29.8%	44.4%	45.1%	34.5%
Other flocculation/coagulation	6.8%	1.4%	2.4%	7.9%	4.8%	9.6%	2.7%	3.8%	5.8%
Flocculation/coagulation combinations	7.0%	7.6%	18.5%	9.7%	22.9%	31.1%	32.8%	18.0%	19.1%
Filtration									
Slow Sand	28.5%	12.0%	9.5%	10.5%	3.6%	4.2%	0.0%	0.0%	7.2%
Rapid Sand	13.5%	18.7%	29.0%	35.3%	26.7%	29.3%	29.8%	27.8%	28.3%
Dual/Multi-media	21.0%	26.7%	32.8%	23.5%	49.2%	56.5%	67.3%	64.1%	42.2%
Diatomaceous Earth	0.0%	0.0%	5.6%	0.0%	1.7%	0.0%	0.0%	0.0%	0.7%
Reverse Osmosis	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pressure Filtration	20.5%	15.3%	2.5%	4.2%	3.3%	0.3%	2.7%	0.0%	4.6%
Other Filtration	17.7%	4.4%	0.0%	4.6%	0.0%	3.6%	0.0%	1.6%	3.2%
Filtration Combinations	8.1%	0.0%	0.0%	2.9%	8.1%	3.1%	0.6%	1.6%	3.3%
Organics Removal									
GAC Adsorption Post Contactors	4.3%	2.3%	0.0%	0.0%	0.3%	3.7%	0.6%	0.4%	1.3%
GAC Adsorption Filter Adsorbers	0.0%	0.0%	1.1%	2.1%	4.0%	4.1%	7.1%	6.0%	3.1%
PAC Addition	0.0%	1.6%	2.8%	4.2%	17.1%	24.6%	33.7%	35.9%	14.7%
Ion Exchange	0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	0.4%
Air Stripping	0.0%	0.0%	0.0%	0.0%	2.1%	0.0%	1.0%	1.6%	0.6%
Organics Removal Combinations	0.0%	2.3%	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%	0.3%
Post-Disinfection									
Chlorine/Hypochlorination	49.7%	51.6%	80.6%	62.8%	77.9%	71.1%	73.8%	61.6%	67.5%
Chlorine Dioxide	0.0%	0.0%	0.0%	0.0%	0.3%	4.9%	5.9%	1.6%	1.6%
Chloramines	0.0%	0.0%	0.0%	2.9%	2.1%	15.6%	29.4%	24.2%	8.1%
Post-disinfection Combinations	0.0%	0.0%	0.0%	2.1%	4.0%	3.9%	1.9%	11.2%	3.0%
Fluoridation	0.0%	4.9%	13.9%	32.4%	42.6%	48.8%	49.9%	63.6%	35.5%
Corrosion Control									
pH Adjustment	15.4%	14.6%	29.9%	36.8%	49.2%	40.5%	43.1%	40.7%	36.8%
Alkalinity Adjustment	6.8%	4.9%	20.9%	13.0%	12.5%	8.0%	9.6%	1.1%	10.2%
Corrosion Inhibitors	0.0%	6.4%	0.0%	13.0%	25.5%	37.4%	24.8%	30.2%	20.2%
Corrosion Control Combinations	0.0%	1.2%	0.0%	2.1%	3.7%	12.2%	6.2%	2.7%	4.4%
Other Treatments (Not elsewhere classified)	5.9%	2.3%	9.4%	2.1%	4.0%	3.1%	3.1%	3.9%	3.6%

Data: Q. 18

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

Table 1 - 23
Treatment Practice for Primarily Ground Water Systems

(Percent of Plants Performing Each Treatment)

Treatment Type/ Specific Treatment	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Raw Water Storage	14.2%	8.4%	7.5%	5.3%	3.6%	3.2%	1.7%	7.8%	7.5%
Presedimentation	0.1%	1.6%	1.5%	2.1%	1.5%	0.7%	0.6%	7.4%	1.4%
Aeration	2.5%	3.0%	13.5%	15.8%	11.5%	9.2%	17.8%	16.2%	8.5%
Pre-Disinfection/Oxidation/Softening									
Chlorine	64.2%	69.9%	56.7%	73.2%	60.6%	57.4%	36.2%	38.1%	63.9%
Chlorine Dioxide	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.0%	0.3%
Chloramines	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	1.4%	0.7%	0.1%
Ozone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%
KMnO4	0.0%	0.9%	2.2%	0.6%	5.8%	3.2%	7.0%	0.0%	1.8%
Pre-disinfection/oxidation combinations	0.3%	0.5%	0.0%	0.7%	1.0%	2.6%	0.0%	0.0%	0.7%
Lime/Soda Ash softening	2.9%	2.9%	2.2%	3.6%	3.5%	3.8%	5.0%	9.1%	3.2%
Recarbonation with CO2	0.0%	0.5%	0.0%	0.6%	1.4%	1.5%	2.8%	1.1%	0.6%
Iron and Manganese Removal									
Green Sand Filtration	2.9%	6.4%	4.3%	2.0%	4.8%	3.2%	4.0%	0.7%	4.1%
Chemical Oxidation Filtration	4.4%	1.4%	2.0%	1.0%	2.1%	1.4%	2.7%	0.5%	2.0%
Aeration Filtration	0.0%	3.5%	5.4%	2.8%	5.9%	2.2%	0.7%	1.1%	3.1%
Flocculation/Coagulation									
Aluminum Salt	0.0%	1.5%	0.9%	0.9%	1.5%	0.1%	0.0%	0.2%	0.8%
Iron Salts	0.7%	0.5%	0.0%	0.0%	0.0%	0.8%	0.8%	1.1%	0.4%
pH Adjustment	10.4%	2.4%	3.3%	8.4%	6.3%	5.7%	14.3%	4.1%	5.8%
Activated Silica	3.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	1.1%	0.6%
Clays	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
Polymers	0.0%	1.2%	0.9%	1.4%	2.9%	3.3%	2.3%	2.1%	1.4%
Other flocculation/coagulation	1.3%	0.5%	0.9%	0.0%	0.7%	0.6%	0.6%	0.7%	0.7%
Flocculation/coagulation combinations	0.0%	0.0%	0.3%	0.6%	1.3%	0.3%	2.1%	0.7%	0.4%
Filtration									
Slow Sand	2.4%	1.4%	2.3%	1.7%	1.0%	0.5%	0.0%	0.2%	1.5%
Rapid Sand	1.7%	0.4%	3.6%	3.7%	2.0%	2.0%	6.2%	6.0%	2.2%
Dual/Multi-media	2.1%	1.6%	3.2%	3.3%	2.4%	4.0%	5.9%	4.5%	2.7%
Diatomaceous Earth	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
Reverse Osmosis	0.0%	0.7%	0.0%	0.6%	0.6%	0.2%	0.3%	0.0%	0.4%
Pressure Filtration	6.0%	3.4%	6.6%	2.6%	8.5%	4.0%	2.3%	3.9%	4.7%
Other Filtration	1.5%	1.4%	0.3%	0.6%	3.2%	0.3%	0.3%	0.0%	1.1%
Filtration Combinations	0.0%	0.7%	0.6%	0.7%	0.6%	0.3%	0.8%	0.0%	0.5%
Organics Removal									
GAC Adsorption Post Contactors	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.7%	0.0%	0.1%
GAC Adsorption Filter Adsorbers	0.0%	0.5%	0.0%	0.3%	0.0%	1.6%	2.3%	3.1%	0.5%
PAC Addition	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.2%	0.0%
Ion Exchange	1.1%	1.4%	4.6%	2.0%	2.4%	0.8%	0.3%	0.0%	1.9%
Air Stripping	0.0%	0.0%	0.0%	0.3%	0.7%	4.2%	1.9%	3.6%	0.7%
Organics Removal Combinations	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Post-Disinfection									
Chlorine/Hypochlorination	23.0%	23.4%	32.5%	28.3%	42.5%	41.9%	54.5%	65.8%	31.0%
Chlorine Dioxide	0.0%	1.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.4%
Chloramines	0.0%	0.0%	0.0%	0.0%	0.1%	1.1%	3.9%	4.3%	0.3%
Post-disinfection Combinations	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%
Fluoridation	2.4%	6.3%	13.2%	12.4%	45.3%	31.2%	34.3%	52.5%	16.0%
Corrosion Control									
pH Adjustment	3.4%	3.9%	5.3%	4.3%	6.8%	8.6%	18.6%	4.8%	5.2%
Alkalinity Adjustment	0.0%	0.8%	0.0%	1.6%	1.0%	0.5%	0.3%	0.2%	0.6%
Corrosion Inhibitors	4.6%	1.9%	6.8%	12.6%	14.5%	14.0%	11.7%	19.0%	7.9%
Corrosion Control Combinations	0.0%	1.8%	3.4%	0.3%	4.2%	0.0%	14.0%	5.5%	1.8%
Other Treatments (Not elsewhere classified)	2.5%	2.3%	8.4%	5.5%	6.5%	5.4%	4.2%	3.4%	4.6%

Data: Q. 18

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

Table 1 - 24
Source Water Protection Methods
by Primary Water Source
(Percent of Systems)

Primary Water Source/ Source Water Protection Program/ Specific Protection Measure	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
% Systems with source water protection	27.5%	31.2%	38.5%	35.0%	40.1%	49.2%	51.1%	57.0%	33.8%
Education on land use impacts	59.5%	58.6%	68.3%	69.7%	70.2%	65.6%	58.9%	70.0%	63.8%
Watershed ownership	37.9%	28.1%	36.5%	49.0%	34.9%	48.2%	42.8%	42.4%	37.4%
Zoning or land use controls	58.9%	54.9%	71.9%	69.7%	77.6%	68.0%	67.7%	66.8%	64.2%
Best management practices	62.6%	53.5%	66.3%	64.5%	59.9%	56.3%	56.9%	70.1%	60.1%
Other	11.2%	16.6%	0.2%	2.0%	8.9%	15.3%	18.4%	33.8%	10.2%
Primarily Ground Systems									
% Systems with source water protection	28.0%	33.3%	44.4%	40.3%	48.0%	59.4%	78.8%	75.1%	35.9%
Education on land use impacts	59.9%	58.9%	70.3%	75.0%	73.5%	71.6%	55.5%	77.4%	65.3%
Watershed ownership	37.7%	28.8%	35.6%	49.0%	30.0%	47.1%	36.4%	39.0%	36.3%
Zoning or land use controls	58.9%	55.1%	71.2%	74.0%	78.1%	68.6%	64.4%	88.0%	64.3%
Best management practices	62.8%	53.0%	69.1%	68.0%	60.7%	59.8%	36.7%	68.8%	61.0%
Other	11.1%	16.5%	0.0%	1.0%	8.5%	17.5%	19.9%	27.5%	9.9%
Primarily Surface Systems									
% Systems with source water protection	21.0%	27.8%	24.5%	33.8%	40.4%	41.4%	40.4%	57.6%	35.0%
Education on land use impacts	0.0%	63.2%	68.6%	38.7%	64.0%	56.1%	58.3%	71.3%	55.0%
Watershed ownership	61.3%	22.9%	77.6%	54.9%	57.4%	53.2%	48.4%	40.3%	50.6%
Zoning or land use controls	61.3%	41.4%	66.5%	62.1%	77.2%	66.7%	66.2%	60.1%	64.0%
Best management practices	22.7%	54.4%	50.8%	48.8%	58.8%	51.6%	71.6%	74.8%	54.9%
Other	38.7%	28.0%	4.5%	7.3%	14.9%	9.0%	16.4%	37.3%	14.6%
Primarily Purchased Systems									
% Systems with source water protection	6.8%	10.9%	14.0%	12.7%	17.5%	25.4%	26.4%	31.9%	14.5%
Education on land use impacts	46.0%	41.2%	7.1%	89.4%	55.7%	45.3%	74.9%	43.2%	51.3%
Watershed ownership	46.0%	14.8%	7.1%	23.8%	32.7%	37.5%	54.9%	62.5%	27.5%
Zoning or land use controls	46.0%	67.7%	95.1%	14.8%	74.2%	67.0%	86.2%	41.7%	63.4%
Best management practices	100.0%	68.5%	7.1%	58.3%	56.0%	40.9%	100.0%	50.1%	53.8%
Other	0.0%	4.5%	0.0%	0.0%	0.0%	22.1%	17.4%	33.3%	5.9%

Data: Q. 21, Q. 22

Notes: Table includes only systems participating in a source-water or wellhead protection program
Percentages may not add to 100% because a system may use no measures or more than one measure.

Definitions: Primarily: system obtains all or highest percentage of water from stated source
Best Management Practices: e.g., run-off controls, fertilizer scheduling, less toxic road maintenance materials

Table 1 - 25
Source Water Protection Methods
by Ownership Type
(Percent of Systems)

Primary Water Source/ Source Water Protection Program/ Specific Protection Measure	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
% Systems with source water protection	27.5%	31.2%	38.5%	35.0%	40.1%	49.2%	51.1%	57.0%	33.8%
Education on land use impacts	59.5%	58.6%	68.3%	69.7%	70.2%	65.6%	58.9%	70.0%	63.8%
Watershed ownership	37.9%	28.1%	36.5%	49.0%	34.9%	48.2%	42.8%	42.4%	37.4%
Zoning or land use controls	58.9%	54.9%	71.9%	69.7%	77.6%	68.0%	67.7%	66.8%	64.2%
Best management practices	62.6%	53.5%	66.3%	64.5%	59.9%	56.3%	56.9%	70.1%	60.1%
Other	11.2%	16.6%	0.2%	2.0%	8.9%	15.3%	18.4%	33.8%	10.2%
Public Systems									
% Systems with source water protection	30.9%	29.3%	38.0%	35.0%	43.0%	48.7%	52.5%	57.1%	37.3%
Education on land use impacts	52.2%	72.2%	61.5%	69.2%	73.3%	65.0%	54.4%	70.7%	67.4%
Watershed ownership	37.4%	18.2%	37.6%	48.2%	36.4%	48.0%	42.4%	42.9%	38.1%
Zoning or land use controls	42.2%	73.7%	77.2%	78.2%	81.2%	68.4%	68.8%	70.0%	74.4%
Best management practices	49.2%	69.0%	67.8%	65.7%	61.6%	58.0%	54.7%	70.1%	63.9%
Other	0.0%	3.2%	0.0%	0.0%	8.7%	15.9%	17.5%	33.1%	5.6%
Private Systems									
% Systems with source water protection	27.0%	41.2%	35.6%	35.8%	30.3%	52.6%	41.6%	55.7%	34.7%
Education on land use impacts	49.5%	43.4%	74.0%	70.9%	53.8%	69.0%	91.9%	63.7%	54.0%
Watershed ownership	29.5%	31.6%	41.1%	51.3%	26.7%	49.3%	45.4%	37.5%	35.0%
Zoning or land use controls	50.2%	45.1%	53.3%	45.2%	57.2%	65.4%	60.0%	36.9%	48.8%
Best management practices	57.0%	49.8%	53.9%	61.0%	50.8%	45.7%	72.9%	69.6%	53.8%
Other	7.8%	32.7%	0.7%	7.8%	9.7%	11.5%	24.2%	41.2%	17.0%
Ancillary Systems									
% Systems with source water protection	27.2%	21.2%	72.4%	0.0%					25.7%
Education on land use impacts	69.7%	71.0%	100.0%						72.1%
Watershed ownership	45.4%	35.7%	0.0%						39.9%
Zoning or land use controls	70.1%	48.5%	100.0%						64.6%
Best management practices	70.4%	38.4%	100.0%						61.3%
Other	16.5%	0.6%	0.0%						10.1%

Data: Q. 21, Q. 22

Notes: Table includes only systems participating in a source-water or wellhead protection program
Percentages may not add to 100% because a system may use no measures or more than one measure.

Definitions: Best Management Practices: e.g., run-off controls, fertilizer scheduling, less toxic road maintenance materials

Table 1 - 26
Source Water Protection -- Program Management
by Primary Water Source
(Percent of Systems in Programs Managed by Each Authority)

Primary Water Source/ Lead Agency	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Local Government	12.0%	35.3%	40.7%	50.6%	48.4%	49.7%	67.4%	56.0%	36.1%
Regional Authority	6.3%	6.0%	8.0%	1.3%	5.2%	9.9%	2.4%	7.0%	5.9%
State Agency	48.9%	34.5%	39.6%	40.3%	33.9%	24.0%	19.3%	14.2%	38.0%
Other	32.8%	24.2%	11.7%	7.7%	12.6%	16.4%	10.9%	22.8%	20.0%
Primarily Ground Systems									
Local Government	11.2%	34.8%	41.1%	52.3%	50.7%	52.4%	73.4%	71.1%	35.3%
Regional Authority	6.4%	5.4%	8.3%	1.1%	5.3%	8.6%	0.0%	10.6%	5.7%
State Agency	49.5%	35.8%	39.5%	44.0%	32.0%	25.7%	13.7%	11.5%	39.7%
Other	32.9%	24.0%	11.1%	2.7%	12.0%	13.4%	12.8%	6.8%	19.3%
Primarily Surface Systems									
Local Government	46.1%	45.1%	32.1%	41.6%	38.1%	44.2%	57.0%	47.6%	43.0%
Regional Authority	0.0%	17.8%	0.0%	2.6%	4.6%	12.7%	6.4%	5.0%	7.5%
State Agency	23.5%	9.5%	42.6%	20.3%	42.2%	20.4%	29.0%	15.8%	24.0%
Other	30.4%	27.6%	25.4%	35.5%	15.0%	22.8%	7.5%	31.6%	25.4%

Data: Q. 23

Notes: Table includes only systems participating in a source-water or wellhead protection program

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 27
Source Water Protection -- Management Area Delineation by Primary Water Source
(Percent of Systems with Each Type of Area Delineation)

Primary Water Source/ Type of Area Delineation/ Linear Distance	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Watershed Boundaries (%)	19.2%	20.5%	18.5%	29.6%	28.8%	42.6%	49.8%	58.4%	24.8%
Aquifer Boundaries (%)	11.4%	25.4%	27.5%	23.0%	18.0%	28.4%	26.3%	25.0%	21.9%
Fixed Radius Around Well (%)	69.1%	64.5%	71.8%	67.6%	44.7%	38.2%	21.9%	27.6%	62.0%
Mean Radius (Feet)	683	495	745	877	1,349	825	898	344	719
Fixed Distance from Surface Water (%)	0.7%	9.4%	5.8%	11.1%	6.4%	8.2%	5.7%	10.7%	6.8%
Mean Distance (Feet)	294	628	595	591	3,412	1,641	514	3,778	1,069
Primarily Ground Systems									
Watershed Boundaries (%)	18.9%	18.2%	16.9%	24.8%	20.2%	29.6%	25.8%	29.8%	20.1%
Aquifer Boundaries (%)	11.6%	26.7%	28.3%	27.0%	20.9%	35.5%	37.8%	30.2%	23.7%
Fixed Radius Around Well (%)	70.5%	66.4%	73.5%	76.1%	54.4%	52.4%	26.5%	56.0%	67.6%
Mean Radius (Feet)	683	497	755	888	1,291	863	954	416	719
Fixed Distance from Surface Water (%)	0.0%	9.3%	4.5%	6.6%	0.8%	3.6%	2.3%	4.8%	4.8%
Mean Distance (Feet)		638	457	113	125	150	200	340	462
Primarily Surface Systems									
Watershed Boundaries (%)	37.2%	67.4%	60.1%	57.6%	60.4%	72.7%	84.2%	74.7%	65.0%
Aquifer Boundaries (%)	0.0%	0.0%	4.8%	0.0%	7.2%	12.2%	10.0%	22.0%	6.8%
Fixed Radius Around Well (%)	0.0%	25.8%	28.8%	18.4%	8.9%	5.7%	15.4%	11.5%	13.7%
Mean Radius (Feet)		200	196	615	2,350	94	400	175	707
Fixed Distance from Surface Water (%)	34.1%	11.1%	39.9%	37.4%	26.9%	18.7%	10.7%	14.0%	24.3%
Mean Distance (Feet)	294	200	904	1,264	3,781	1,745	660	4,512	2,030

Data: Q. 24

Notes: Table includes only systems participating in a source water or wellhead protection program
Percentages may not add to 100% because a system may use more than one method of delineation

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 28
Potential Sources of Contamination Within 2 Miles of Water Supply Intakes
by Primary Water Source
(Percent of Systems Having Each Potential Source of Contamination)

Primary Water Source/ Potential Source of Contamination	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Industrial/Manufacturing Facilities	11.0%	14.1%	20.0%	29.8%	44.2%	61.7%	65.1%	52.1%	22.1%
Agricultural Runoff	42.1%	51.8%	66.9%	63.4%	67.8%	71.4%	67.1%	76.1%	55.3%
Animal Feed Lots	9.1%	18.8%	28.8%	28.4%	23.8%	18.8%	18.7%	24.9%	19.1%
Urban Runoff	19.1%	21.3%	31.0%	38.5%	57.9%	68.9%	73.8%	83.2%	30.9%
Sewage Discharge	22.5%	20.6%	37.7%	32.6%	34.1%	35.9%	33.4%	30.8%	27.0%
Hazardous Waste Site	5.3%	3.8%	2.1%	6.1%	7.7%	10.6%	20.2%	21.7%	5.4%
Solid Waste Disposal	6.7%	3.2%	4.6%	7.0%	15.2%	14.2%	26.5%	27.6%	6.9%
Nitrates	11.8%	20.6%	22.7%	26.2%	26.5%	33.7%	38.8%	44.2%	20.8%
Pesticides, Rodenticides, Fungicides	7.2%	11.4%	23.1%	21.7%	23.5%	24.7%	26.4%	29.9%	15.1%
Mining, Oil, or Gas Activities	5.1%	9.7%	15.9%	18.3%	16.8%	21.9%	26.4%	25.0%	11.9%
Petroleum Products	29.7%	27.8%	43.3%	52.0%	53.3%	61.5%	63.6%	56.0%	38.3%
Solvents	4.8%	6.4%	10.3%	12.9%	35.0%	42.0%	49.7%	45.3%	12.4%
Septic Systems/Other sewage Discharges	88.9%	76.1%	75.5%	78.0%	66.4%	68.0%	77.1%	60.1%	78.6%
Other	6.5%	3.4%	6.6%	3.6%	6.4%	4.5%	1.8%	10.2%	5.0%
Observations	147	206	141	177	184	183	107	86	1,231
Primarily Ground Systems									
Industrial/Manufacturing Facilities	11.2%	14.2%	20.5%	33.2%	51.7%	66.9%	77.2%	79.8%	21.6%
Agricultural Runoff	42.0%	51.2%	67.9%	62.5%	66.4%	66.1%	57.3%	63.5%	53.6%
Animal Feed Lots	9.1%	19.2%	29.3%	29.6%	27.7%	17.9%	19.2%	32.7%	19.3%
Urban Runoff	19.2%	22.0%	32.4%	41.1%	61.5%	70.5%	82.2%	85.3%	29.9%
Sewage Discharge	22.5%	20.9%	39.2%	35.3%	38.7%	32.7%	26.7%	35.4%	27.3%
Hazardous Waste Site	5.4%	3.9%	2.2%	7.4%	9.8%	12.6%	30.9%	41.9%	5.6%
Solid Waste Disposal	6.8%	3.2%	4.9%	7.9%	20.1%	16.8%	33.4%	34.4%	7.0%
Nitrates	11.8%	20.9%	22.2%	25.9%	22.6%	35.7%	52.9%	59.4%	19.9%
Pesticides, Rodenticides, Fungicides	7.1%	11.5%	23.7%	22.9%	26.9%	28.4%	35.9%	33.3%	15.0%
Mining, Oil, or Gas Activities	5.0%	9.7%	15.9%	19.7%	15.7%	21.7%	34.9%	26.2%	11.4%
Petroleum Products	30.0%	29.0%	45.6%	56.9%	65.7%	72.8%	74.3%	81.1%	39.6%
Solvents	4.9%	6.6%	10.9%	15.2%	43.0%	52.5%	64.4%	67.9%	12.4%
Septic Systems/Other sewage Discharges	89.5%	76.8%	75.9%	80.4%	69.0%	67.7%	78.4%	85.9%	80.3%
Other	6.4%	2.9%	6.0%	3.5%	6.6%	2.8%	2.8%	8.3%	4.7%
Observations	122	164	107	125	130	105	49	35	837
Primarily Surface Systems									
Industrial/Manufacturing Facilities	0.0%	12.1%	12.7%	13.2%	21.5%	53.8%	55.2%	39.7%	26.7%
Agricultural Runoff	45.5%	66.9%	53.1%	67.7%	71.9%	79.3%	75.1%	81.6%	69.9%
Animal Feed Lots	7.4%	8.2%	20.7%	22.2%	12.0%	20.1%	18.3%	21.5%	17.1%
Urban Runoff	12.7%	4.4%	11.3%	25.8%	46.9%	66.5%	67.1%	82.3%	39.7%
Sewage Discharge	21.4%	14.5%	16.4%	19.3%	20.5%	40.7%	38.7%	28.7%	25.2%
Hazardous Waste Site	0.0%	1.9%	0.0%	0.0%	1.6%	7.5%	11.5%	12.7%	3.5%
Solid Waste Disposal	0.0%	1.9%	0.0%	2.6%	0.4%	10.4%	20.9%	24.6%	5.6%
Nitrates	9.6%	13.1%	30.2%	27.6%	38.3%	30.8%	27.3%	37.4%	28.4%
Pesticides, Rodenticides, Fungicides	13.5%	10.0%	13.5%	16.1%	13.1%	19.2%	18.7%	28.3%	15.9%
Mining, Oil, or Gas Activities	13.8%	8.7%	16.8%	11.7%	20.1%	22.1%	19.6%	24.5%	16.8%
Petroleum Products	12.9%	1.9%	9.7%	27.9%	15.6%	44.7%	55.0%	44.8%	26.5%
Solvents	0.0%	0.0%	1.4%	1.2%	10.7%	26.5%	37.9%	35.2%	12.1%
Septic Systems/Other sewage Discharges	58.6%	60.3%	70.6%	66.5%	58.5%	68.4%	76.0%	48.7%	64.2%
Other	13.8%	15.7%	15.0%	3.9%	5.8%	7.1%	1.0%	11.0%	7.9%
Observations	25	42	34	52	54	78	58	51	394

Data: Q. 25

Note: Percentages may not add to 100% because a system may have more than one potential source of contamination

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 29
Laboratory Analysis Provider Profile
by Ownership Type and Contaminant Type
(Percent of Systems Using Each Type of Laboratory Provider)

Ownership Type/ Contaminant Type/ Lab Provider	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Metals/ Inorganics									
State	48.5%	45.8%	49.5%	57.4%	47.5%	35.8%	41.9%	25.1%	48.1%
Private Firm	45.9%	51.5%	45.7%	43.9%	53.7%	70.9%	57.2%	48.2%	49.4%
In-house	1.5%	1.5%	3.6%	2.8%	7.6%	16.7%	35.5%	60.5%	4.0%
Other	0.9%	0.4%	1.0%	1.9%	2.7%	4.9%	6.5%	13.3%	1.4%
Microbials									
State	44.1%	42.6%	50.1%	54.9%	45.7%	27.2%	28.6%	15.2%	44.8%
Private Firm	39.0%	47.6%	37.4%	39.2%	40.9%	48.5%	32.8%	25.2%	41.9%
In-house	1.6%	1.3%	2.6%	3.3%	7.4%	32.3%	52.7%	79.4%	5.0%
Other	2.1%	2.2%	3.5%	3.5%	6.6%	6.9%	4.0%	13.2%	3.2%
VOC's									
State	41.6%	39.3%	47.0%	51.8%	45.6%	34.7%	41.0%	26.7%	42.9%
Private Firm	40.8%	45.1%	39.7%	40.9%	48.5%	67.3%	54.3%	51.8%	44.2%
In-house	0.4%	0.8%	0.2%	0.1%	0.6%	3.2%	12.6%	36.4%	1.0%
Other	0.2%	0.2%	0.3%	1.2%	0.9%	4.2%	5.9%	14.1%	0.8%
Other Organics									
State	42.1%	42.4%	47.2%	52.7%	44.3%	31.8%	37.2%	23.4%	43.8%
Private Firm	40.1%	46.8%	40.9%	41.4%	49.5%	67.8%	66.4%	54.7%	45.0%
In-house	0.4%	0.6%	1.0%	0.6%	3.1%	6.1%	13.0%	32.1%	1.5%
Other	0.4%	0.4%	0.3%	1.3%	1.4%	5.2%	7.1%	12.4%	1.0%
Total	90.9%	95.4%	94.9%	96.7%	97.2%	97.4%	96.5%	93.9%	94.5%
Public Systems									
Metals/ Inorganics									
State	53.1%	52.1%	47.5%	57.0%	46.7%	38.8%	43.7%	26.7%	49.8%
Private Firm	54.7%	36.5%	46.5%	44.8%	56.1%	70.8%	58.7%	48.1%	48.2%
In-house	10.3%	1.9%	5.3%	2.6%	7.7%	15.6%	33.2%	61.6%	6.9%
Other	2.3%	0.8%	1.6%	2.0%	3.1%	3.4%	4.1%	11.9%	2.2%
Microbials									
State	40.9%	50.4%	51.9%	56.7%	45.2%	28.7%	29.2%	16.3%	47.8%
Private Firm	34.7%	33.1%	34.9%	38.3%	40.2%	47.8%	34.0%	25.2%	37.2%
In-house	19.0%	3.8%	4.0%	3.3%	7.2%	31.7%	49.9%	78.6%	9.9%
Other	4.0%	4.2%	2.6%	4.1%	7.8%	7.6%	4.6%	12.8%	4.9%
VOC's									
State	50.9%	46.3%	46.2%	54.4%	44.9%	37.4%	42.6%	28.5%	47.0%
Private Firm	40.9%	33.7%	37.3%	41.4%	49.4%	66.9%	56.1%	52.7%	43.0%
In-house	4.7%	2.3%	0.1%	0.0%	0.0%	2.7%	11.8%	37.0%	1.9%
Other	2.3%	0.5%	0.5%	1.1%	0.9%	2.7%	3.4%	12.8%	1.3%
Other Organics									
State	43.2%	49.3%	47.4%	54.5%	43.7%	34.1%	37.8%	24.8%	46.9%
Private Firm	38.8%	36.4%	39.2%	42.8%	50.6%	66.8%	67.5%	55.3%	44.7%
In-house	4.7%	1.9%	1.5%	0.4%	3.3%	5.1%	11.3%	32.2%	2.8%
Other	2.3%	0.8%	0.5%	1.1%	1.6%	3.9%	4.7%	10.9%	1.6%
Total	98.0%	91.9%	94.6%	96.6%	97.3%	97.2%	95.9%	93.7%	95.3%

Table 1 - 29
Laboratory Analysis Provider Profile
by Ownership Type and Contaminant Type
(Percent of Systems Using Each Type of Laboratory Provider)

Ownership Type/ Contaminant Type/ Lab Provider	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Private Systems									
Metals/ Inorganics									
State	45.1%	53.9%	57.6%	60.2%	50.3%	16.0%	29.4%	10.0%	50.9%
Private Firm	40.6%	49.8%	38.9%	39.7%	45.3%	71.7%	46.4%	49.0%	44.3%
In-house	0.4%	1.5%	1.0%	3.2%	7.4%	24.0%	51.5%	50.5%	2.3%
Other	1.8%	0.0%	0.0%	1.8%	1.2%	15.0%	23.5%	26.2%	1.3%
Microbials									
State	40.4%	44.9%	47.2%	50.9%	47.4%	17.0%	24.2%	4.3%	43.7%
Private Firm	40.6%	48.5%	37.9%	40.3%	43.4%	52.9%	25.2%	24.8%	43.2%
In-house	0.1%	0.0%	0.2%	3.3%	8.0%	35.9%	72.2%	86.5%	2.1%
Other	2.2%	1.8%	5.5%	1.8%	2.6%	2.6%	0.0%	17.0%	2.5%
VOC's									
State	41.8%	45.0%	50.9%	45.3%	47.9%	17.1%	30.2%	10.0%	44.2%
Private Firm	38.6%	45.9%	40.3%	40.6%	45.3%	69.8%	42.0%	43.3%	42.5%
In-house	0.1%	0.0%	0.0%	0.2%	2.5%	6.5%	18.0%	31.3%	0.5%
Other	0.1%	0.0%	0.0%	1.3%	0.8%	13.8%	23.5%	26.2%	0.6%
Other Organics									
State	43.5%	51.5%	46.9%	49.0%	46.4%	16.9%	32.8%	10.0%	46.7%
Private Firm	36.9%	44.1%	40.3%	38.5%	45.6%	74.0%	59.2%	49.0%	41.3%
In-house	0.1%	0.0%	0.0%	1.3%	2.5%	13.4%	24.7%	31.3%	0.8%
Other	0.3%	0.1%	0.0%	1.8%	0.8%	13.8%	23.5%	26.2%	0.8%
Total	88.1%	96.5%	94.7%	96.7%	97.0%	98.8%	100.0%	95.2%	93.5%
Ancillary Systems									
Metals/ Inorganics									
State	50.5%	28.7%	0.0%	0.0%					41.0%
Private Firm	48.7%	71.0%	100.0%	100.0%					58.4%
In-house	1.1%	1.2%	0.0%	0.0%					1.1%
Other	0.0%	0.3%	0.0%	0.0%					0.1%
Microbials									
State	47.5%	30.7%	47.1%	0.0%					40.9%
Private Firm	38.4%	63.4%	78.1%	100.0%					48.9%
In-house	0.1%	0.0%	2.4%	0.0%					0.1%
Other	1.8%	0.3%	0.0%	0.0%					1.2%
VOC's									
State	40.1%	24.3%	21.9%	0.0%					33.6%
Private Firm	42.5%	57.4%	78.1%	0.0%					48.7%
In-house	0.0%	0.0%	2.4%	0.0%					0.0%
Other	0.0%	0.1%	0.0%	0.0%					0.0%
Other Organics									
State	40.9%	23.3%	47.1%	0.0%					34.2%
Private Firm	42.8%	62.3%	78.1%	0.0%					50.7%
In-house	0.0%	0.0%	2.4%	0.0%					0.0%
Other	0.1%	0.3%	0.0%	0.0%					0.2%
Total	92.1%	97.9%	100.0%	100.0%					94.5%

Data: Q. 26

Definitions: VOC's: Volatile organic compounds

Table 1 - 30
Laboratory Payment Methods
by Ownership Type
(Percent of Systems Using Each Payment Method)

Ownership Type/ Payment Method	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Direct payment	84.8%	86.0%	88.7%	89.3%	85.5%	93.7%	90.0%	82.6%	86.8%
Included in State Permit	8.5%	8.0%	7.4%	12.0%	5.8%	3.8%	7.5%	8.4%	8.2%
Don't Pay	7.8%	3.6%	4.6%	5.1%	4.3%	2.3%	5.6%	4.9%	5.1%
Other	4.1%	2.3%	5.3%	4.5%	3.5%	4.3%	15.6%	14.8%	3.9%
Public Systems									
Direct payment	83.3%	84.4%	88.5%	89.5%	84.8%	93.9%	93.1%	86.2%	87.6%
Included in State Permit	14.4%	8.8%	9.3%	14.1%	6.6%	3.9%	6.8%	8.7%	9.6%
Don't Pay	14.3%	5.1%	1.2%	3.7%	3.8%	2.3%	3.2%	3.6%	4.0%
Other	1.7%	3.1%	3.0%	5.7%	3.8%	2.8%	13.2%	12.4%	4.0%
Private Systems									
Direct payment	83.5%	87.3%	88.0%	88.5%	87.9%	92.3%	68.6%	49.0%	86.2%
Included in State Permit	1.8%	8.3%	4.7%	6.2%	3.1%	3.4%	12.7%	5.7%	5.0%
Don't Pay	9.9%	3.9%	11.1%	9.3%	6.0%	2.2%	21.8%	17.8%	7.7%
Other	9.7%	0.3%	9.8%	1.1%	2.3%	14.1%	32.3%	37.6%	5.5%
Ancillary Systems									
Direct payment	86.0%	86.1%	100.0%	100.0%					86.4%
Included in State Permit	12.8%	6.6%	0.0%	0.0%					10.2%
Don't Pay	5.1%	1.3%	0.0%	0.0%					3.6%
Other	0.1%	3.9%	0.0%	0.0%					1.5%

Data: Q. 27

Notes: Percentages may not add to 100% because a system may use more than one payment method

Table 1 - 31
Total Revenues
by Ownership Type
(Thousands of Dollars)

Ownership Type/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	2.4	20.1	78.4	196.5	605.1	2,445.3	7,363.4	29,864.5
Median	0.0	8.8	65.0	156.4	543.3	1,898.4	6,492.7	17,520.9
% Not Charging Directly for Water	11.4%	6.6%	0.8%	0.9%	0.1%	0.0%	0.0%	0.0%
Observations	245	402	276	282	282	230	139	124
Public Systems								
Mean	6.9	29.4	84.3	204.8	613.6	2,360.6	7,392.3	29,815.3
Median	3.9	18.2	71.4	164.7	566.8	1,886.2	6,492.7	17,018.2
% Not Charging Directly for Water	3.9%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observations	60	161	151	164	150	143	109	105
Private Systems								
Mean	3.9	25.4	73.2	177.1	575.3	3,007.9	7,163.2	30,330.0
Median	2.7	18.8	63.0	128.0	457.5	2,304.5	6,399.7	18,993.1
% Not Charging Directly for Water	25.5%	6.2%	2.2%	3.5%	0.2%	0.0%	0.0%	0.0%
Observations	97	143	120	117	132	87	30	19
Ancillary Systems								
Mean	0.6	3.0	26.3	0.0				
Median	0.0	0.0	0.0	0.0				
% Not Charging Directly for Water	1.5%	5.5%	0.0%	0.0%				
Observations	88	98	5	1				

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 1 - 32
Total Revenues -- Private Systems
by Private Ownership Category
(Thousands of Dollars)

Private Ownership Category/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Investor-Owned - Dependent on Parent Co.								
Mean	0.0	46.6	178.3	140.6	434.8	3,677.5	10,757.9	20,763.3
Median	0.0	52.9	236.7	82.3	71.3	3,810.1	11,548.2	19,528.2
% Not Charging Directly for Water	52.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observations	2	5	3	8	7	16	13	6
Investor-Owned - Not Dependent on Parent Co.								
Mean	4.6	34.6	101.8	226.7	628.0	3,338.3	7,736.5	46,703.9
Median	4.3	25.8	81.1	183.0	521.5	2,172.7	5,629.4	28,439.5
% Not Charging Directly for Water	14.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observations	25	45	31	44	55	41	7	9
Mutual Association (Homeowners Assoc., etc.)								
Mean	3.9	23.7	77.4	136.7	435.6	2,373.6	6,186.2	
Median	2.2	15.7	54.4	115.9	304.1	1,401.6	6,186.2	
% Not Charging Directly for Water	38.3%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	
Observations	32	40	33	20	22	8	2	
Other								
Mean	5.9	19.3	88.4	276.5	862.8	4,244.8		
Median	6.3	7.9	80.8	186.9	678.6	2,610.1		
% Not Charging Directly for Water	19.8%	1.8%	0.0%	0.0%	0.0%	0.0%		
Observations	6	11	15	16	24	5		

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 1 - 33
Total Revenues
by Primary Water Source
(Thousands of Dollars)

Primary Water Source/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Mean	2.3	16.6	68.3	167.2	543.5	2,082.1	6,602.1	25,640.6
Median	0.0	7.9	61.4	136.3	498.9	1,635.3	4,832.8	17,488.3
% Not Charging Directly for Water	11.5%	7.0%	0.8%	1.2%	0.1%	0.0%	0.0%	0.0%
Observations	159	214	141	142	153	118	53	40
Primarily Surface Systems								
Mean	4.1	46.0	96.4	296.4	709.5	2,617.0	7,578.9	36,260.2
Median	0.0	16.2	85.9	233.6	642.5	2,282.8	7,454.6	22,592.7
% Not Charging Directly for Water	17.4%	4.4%	1.8%	0.3%	0.0%	0.0%	0.0%	0.0%
Observations	52	79	48	67	64	82	60	58
Primarily Purchased Systems								
Mean	6.7	37.9	116.8	220.6	670.5	3,530.9	8,138.4	18,110.3
Median	4.8	24.0	91.9	184.3	572.2	2,551.9	6,492.7	13,953.7
% Not Charging Directly for Water	0.0%	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observations	34	109	87	73	65	30	26	26

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities
Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 34
Percentage of Systems Having Each Type of Revenue Source by Ownership Type

Ownership Type/ Revenue Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Sales	31.5%	54.6%	80.9%	88.0%	90.1%	92.7%	92.2%	92.3%
Water-Related Operations	14.3%	38.8%	71.1%	85.3%	88.8%	89.5%	82.5%	90.2%
General Fund	0.8%	2.0%	7.2%	5.9%	9.7%	14.3%	9.9%	10.8%
Other Revenue Sources	3.5%	11.6%	25.4%	35.4%	41.8%	54.8%	52.8%	66.6%
Public Systems								
Water Sales	72.6%	72.9%	88.8%	90.5%	92.0%	93.3%	94.1%	92.9%
Water-Related Operations	36.5%	59.7%	78.0%	89.0%	90.3%	90.9%	86.8%	91.6%
General Fund	10.8%	5.7%	11.8%	8.0%	12.5%	16.4%	11.3%	12.0%
Other Revenue Sources	5.2%	21.4%	29.5%	36.4%	44.3%	54.5%	54.7%	66.0%
Private Systems								
Water Sales	51.9%	71.3%	72.6%	82.9%	83.3%	89.1%	79.2%	86.5%
Water-Related Operations	23.9%	47.2%	66.0%	76.3%	83.8%	80.6%	52.9%	76.6%
Other Revenue Sources	7.3%	9.5%	20.5%	33.4%	33.1%	56.5%	40.0%	71.7%
Ancillary Systems								
Water Sales	9.2%	13.1%	25.3%	0.0%				
Water-Related Operations	3.5%	4.2%	0.0%	0.0%				
Other Revenue Sources	0.1%	2.7%	0.0%	0.0%				

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Water Sales Revenues: revenues from the actual sale of water
Water-Related Revenues: revenues from activities related to water operations other than the actual sale of water, e.g., connection fees
Other Revenues: revenues from activities not related to water service, e.g., sewer fees, trailer pad rental, etc.

Table 1 - 35
Total Revenue Breakdown: Percentage of Revenues from Each Type of Revenue Source by Ownership Type

Ownership Type/ Type of Revenue	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Sales	89.8%	90.8%	90.3%	88.3%	88.4%	87.3%	86.4%	88.0%
Water-Related Operations	9.3%	8.8%	8.5%	8.7%	11.0%	9.2%	10.0%	10.7%
General Fund	0.4%	0.5%	1.5%	1.5%	1.0%	1.3%	0.9%	0.3%
Other Revenue Sources	3.9%	4.9%	2.8%	3.8%	3.5%	4.1%	3.3%	3.5%
Public Systems								
Water Sales	93.3%	87.0%	89.7%	87.2%	87.9%	86.7%	85.1%	87.1%
Water-Related Operations	5.8%	9.6%	7.6%	9.2%	9.8%	9.8%	11.1%	11.6%
General Fund	6.8%	1.8%	2.5%	2.0%	1.3%	1.5%	1.1%	0.3%
Other Revenue Sources	1.7%	7.7%	3.3%	4.5%	3.5%	4.1%	3.5%	3.7%
Private Systems								
Water Sales	87.4%	93.7%	91.2%	92.1%	90.5%	91.3%	96.9%	97.7%
Water-Related Operations	8.2%	9.1%	10.5%	6.9%	15.2%	4.9%	1.4%	0.8%
Other Revenue Sources	5.3%	2.4%	1.7%	1.5%	3.3%	3.9%	1.7%	1.4%
Ancillary Systems								
Water Sales	98.0%	96.9%	100.0%					
Water-Related Operations	17.7%	1.1%	0.0%					
Other Revenue Sources	0.1%	2.0%	0.0%					

Data: Q. 29, Q. 30

Notes: Table includes only systems reporting non-zero revenues

General Fund revenues apply only to Public Systems; to calculate the percentage revenue breakdown across All systems, Private and Ancillary systems are regarded as receiving zero revenues from this source

To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each revenue source within each ownership type may represent a slightly different set of systems overall; the sum of revenue source type percentages may not equal 100% (See General Note 3)

Definitions: Water Sales Revenues: revenues from the actual sale of water
Water-Related Revenues: revenues from activities related to water operations other than the actual sale of water, e.g., connection fees
Other Revenues: revenues from activities not related to water service, e.g., sewer fees, trailer pad rental, etc.

Table 1 - 36
Water Sales Revenue Profile
by Ownership Type
(Percentage of Revenues from Each Customer Category)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential	94.5%	81.9%	73.5%	62.6%	58.3%	52.4%	56.5%	49.5%
Observations	97	224	212	241	248	202	119	114
Non-Residential:								
Commercial/Industrial	1.0%	6.2%	8.6%	12.4%	14.0%	19.2%	19.9%	20.9%
Observations	98	224	212	242	250	203	121	113
Wholesale	0.0%	1.5%	0.3%	1.8%	2.7%	2.9%	2.5%	9.0%
Observations	98	225	212	242	249	203	120	114
Governmental	0.2%	0.7%	0.8%	1.2%	1.2%	1.6%	3.2%	2.2%
Observations	98	225	212	242	249	204	121	114
Agricultural	0.3%	0.7%	0.5%	0.6%	0.5%	0.1%	0.1%	0.8%
Observations	98	225	212	242	250	205	121	114
Other	6.0%	9.7%	16.7%	22.1%	25.1%	27.1%	18.7%	18.0%
Observations	98	220	207	238	241	194	118	113
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	98	225	212	242	250	205	121	114
Public Systems								
Residential	84.2%	72.4%	69.6%	59.0%	55.9%	50.6%	57.2%	48.5%
Observations	41	105	126	145	135	126	97	98
Non-Residential:								
Commercial/Industrial	1.6%	8.4%	10.5%	14.4%	15.7%	19.7%	19.2%	20.0%
Observations	41	105	126	146	136	127	98	97
Wholesale	0.0%	2.5%	0.4%	1.6%	2.7%	3.1%	2.7%	9.8%
Observations	41	106	126	146	135	127	97	98
Governmental	1.0%	1.0%	1.1%	1.3%	1.4%	1.4%	3.1%	2.1%
Observations	41	106	126	146	135	128	98	98
Agricultural	1.9%	0.4%	0.6%	0.5%	0.1%	0.0%	0.1%	0.8%
Observations	41	106	126	146	136	129	98	98
Other	11.2%	16.9%	18.5%	24.2%	26.3%	28.8%	18.4%	19.2%
Observations	41	103	122	142	128	120	95	97
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	41	106	126	146	136	129	98	98

Table 1 - 36
Water Sales Revenue Profile
by Ownership Type
(Percentage of Revenues from Each Customer Category)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Residential	96.1%	88.8%	80.5%	73.9%	67.4%	64.0%	50.7%	60.2%
Observations	46	104	85	96	113	76	22	16
Non-Residential:								
Commercial/Industrial	1.1%	4.4%	5.2%	6.2%	7.4%	15.7%	25.0%	29.6%
Observations	47	104	85	96	114	76	23	16
Wholesale	0.0%	0.8%	0.2%	2.4%	2.8%	1.4%	1.3%	1.6%
Observations	47	104	85	96	114	76	23	16
Governmental	0.0%	0.5%	0.3%	1.1%	0.5%	2.9%	3.7%	3.1%
Observations	47	104	85	96	114	76	23	16
Agricultural	0.0%	1.0%	0.3%	1.0%	2.0%	0.3%	0.1%	0.0%
Observations	47	104	85	96	114	76	23	16
Other	5.9%	4.6%	13.6%	15.3%	20.7%	15.9%	20.8%	5.5%
Observations	47	102	84	96	113	74	23	16
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	47	104	85	96	114	76	23	16
Ancillary Systems								
Residential	100.0%	94.2%	100.0%					
Observations	10	15	1					
Non-Residential:								
Commercial/Industrial	0.0%	5.2%	0.0%					
Observations	10	15	1					
Wholesale	0.0%	0.0%	0.0%					
Observations	10	15	1					
Governmental	0.0%	0.0%	0.0%					
Observations	10	15	1					
Agricultural	0.0%	0.6%	0.0%					
Observations	10	15	1					
Other	0.0%	0.0%	0.0%					
Observations	10	15	1					
Total	100.0%	100.0%	100.0%					
Observations	10	15	1					

Data: Q. 29

Notes: Table includes only systems that charge directly for water
To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within each ownership type may represent a slightly different set of systems overall; the sum of customer category revenue percentages may not equal 100% (See General Note 3)

Definitions: Water Sales Revenues: revenues from the actual sale of water
Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 1 - 37
Total Revenues
by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	345	342	356	295	293	240	220	189
Median	288	285	308	255	245	209	196	173
Observations	83	207	208	235	244	201	126	108
Public Systems								
Mean	434	362	339	282	278	232	218	181
Median	320	269	290	241	229	203	196	166
Observations	32	97	125	145	134	129	103	92
Private Systems								
Mean	333	326	395	342	354	303	242	263
Median	262	295	359	300	322	278	224	245
Observations	41	96	82	90	110	72	23	16
Ancillary Systems								
Mean	286	324	318					
Median	266	276	318					
Observations	10	14	1					

Data: Q. 29, Q. 30

Notes: Table includes only systems reporting non-zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 1 - 38
Water Sales Revenues
by Ownership Type and Service Population Size
(Cents per 1,000 Gallons Sold)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	321	306	312	255	252	205	188	164
Median	271	256	284	213	219	181	174	150
Observations	83	207	208	235	244	201	126	108
Public Systems								
Mean	335	315	291	239	240	196	182	154
Median	280	252	256	198	210	179	170	140
Observations	32	97	125	145	134	129	103	92
Private Systems								
Mean	327	298	357	308	302	271	236	258
Median	244	256	346	285	281	267	217	240
Observations	41	96	82	90	110	72	23	16
Ancillary Systems								
Mean	276	298	318					
Median	266	276	318					
Observations	10	14	1					

Data: Q. 29

Notes: Table includes only systems reporting non-zero revenues

Definitions: Water Sales Revenues: revenues from the actual sale of water

Table 1 - 39
Water Sales Revenues -- Customer Breakdown by Ownership Type (Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential								
Mean	334	293	321	283	291	235	212	195
Median	271	252	293	250	254	210	186	172
Observations	69	165	165	180	182	148	102	88
Commercial/Industrial								
Mean	343	287	288	243	227	201	186	154
Median	360	217	229	171	178	176	158	145
Observations	4	62	79	113	124	119	95	73
Wholesale								
Mean		160	117	163	221	150	157	106
Median		179	77	166	178	132	143	99
Observations	0	10	5	20	46	49	46	50
Governmental								
Mean	691	404	429	289	204	189	168	149
Median	674	411	314	196	171	166	146	144
Observations	2	19	23	37	46	78	59	51
Agricultural								
Mean	517	405	255	259	294	189	175	163
Median	521	316	203	279	250	219	183	124
Observations	3	12	18	16	12	6	10	13
Other								
Mean	185	263	276	247	244	238	183	275
Median	219	177	254	182	210	167	172	152
Observations	3	26	44	59	73	81	53	62
Total								
Mean	329	306	312	255	252	205	188	164
Median	271	253	281	213	219	181	174	150
Observations	73	193	207	235	244	201	126	108

Table 1 - 39
Water Sales Revenues -- Customer Breakdown by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Residential								
Mean	353	279	301	263	274	223	199	180
Median	351	237	257	244	228	195	182	163
Observations	30	76	94	104	94	88	82	72
Commercial/Industrial								
Mean	304	308	300	224	212	193	186	146
Median	240	230	243	163	177	173	158	139
Observations	3	40	57	75	73	66	75	58
Wholesale								
Mean		174	99	143	222	140	155	101
Median		179	77	140	178	130	135	93
Observations	0	6	3	12	19	28	36	40
Governmental								
Mean	674	392	429	311	183	171	152	139
Median	674	411	304	175	153	156	143	130
Observations	1	14	18	25	25	40	45	39
Agricultural								
Mean	517	423	280	243	166	167	184	163
Median	521	316	246	279	200	63	183	124
Observations	3	7	10	11	4	2	8	13
Other								
Mean	147	296	265	253	228	225	176	273
Median	173	207	256	182	196	155	172	152
Observations	2	19	31	43	41	50	43	56
Total								
Mean	335	315	291	239	240	196	182	154
Median	280	252	256	198	210	179	170	140
Observations	32	97	125	145	134	129	103	92

Table 1 - 39
Water Sales Revenues -- Customer Breakdown by Ownership Type (Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Residential								
Mean	328	304	361	338	350	301	316	299
Median	244	270	346	296	318	270	297	293
Observations	39	89	71	76	88	60	20	16
Commercial/Industrial								
Mean	360	253	241	334	307	241	190	210
Median	360	207	229	296	279	227	185	202
Observations	1	22	22	38	51	53	20	15
Wholesale								
Mean		118	273	205	219	209	173	139
Median		76	207	211	208	192	188	146
Observations	0	4	2	8	27	21	10	10
Governmental								
Mean	758	454	423	212	332	272	278	195
Median	758	554	486	216	236	250	231	187
Observations	1	5	5	12	21	38	14	12
Agricultural								
Mean		373	172	341	487	243	115	
Median		238	124	363	404	219	114	
Observations	0	5	8	5	8	4	2	0
Other								
Mean	219	172	306	213	313	319	233	305
Median	219	168	237	187	273	279	195	208
Observations	1	7	13	16	32	31	10	6
Total								
Mean	327	298	357	308	302	271	236	258
Median	244	256	346	285	281	267	217	240
Observations	41	96	82	90	110	72	23	16

Data: Q. 29

Notes: Table includes only systems reporting non-zero revenues

Definitions: All Systems: excludes ancillary systems
Water Sales Revenues: revenues from the actual sale of water
Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 1 - 40
Total Revenues Per Capita
by Ownership Type
(Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	111	109	121	110	110	117	113	96
Median	79	83	93	97	99	100	93	90
Observations	94	231	214	233	250	208	126	115
Public Systems								
Mean	134	108	121	107	109	115	112	94
Median	81	78	91	97	99	98	92	89
Observations	36	118	131	147	137	133	104	99
Private Systems								
Mean	98	111	121	119	114	133	126	111
Median	76	93	106	92	97	115	106	112
Observations	47	98	82	86	113	75	22	16
Ancillary Systems								
Mean	133	98	181					
Median	107	84	181					
Observations	11	15	1					

Data: Q. 29, Q. 30, Q. 11A

Notes: Table includes only systems reporting non-zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 1 - 41
Metered Customer Connections
by Ownership Type and Customer Category
(Percent of Connections That Are Metered)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential	57.8%	76.4%	82.0%	82.1%	81.0%	84.6%	83.5%	80.0%
Commercial/Industrial	0.3%	3.1%	4.1%	7.1%	8.3%	9.0%	9.5%	7.0%
Wholesale	0.0%	0.2%	0.0%	0.9%	1.9%	0.5%	0.0%	5.1%
Governmental	0.0%	0.4%	1.1%	0.7%	0.3%	1.0%	0.6%	0.3%
Agricultural	0.2%	1.7%	0.4%	0.3%	1.2%	0.1%	0.1%	0.1%
Other	0.0%	0.9%	2.7%	6.4%	7.1%	4.1%	5.3%	7.6%
Total	36.6%	71.8%	87.4%	93.7%	92.0%	97.2%	97.2%	96.6%
Public Systems								
Residential	79.1%	81.7%	84.4%	81.9%	79.1%	84.3%	85.1%	79.7%
Commercial/Industrial	0.8%	5.1%	5.2%	8.4%	9.3%	9.3%	10.0%	6.7%
Wholesale	0.0%	0.1%	0.0%	0.6%	2.5%	0.6%	0.0%	5.7%
Governmental	0.3%	0.5%	1.4%	0.8%	0.4%	1.1%	0.6%	0.3%
Agricultural	1.5%	0.3%	0.3%	0.2%	0.8%	0.1%	0.1%	0.1%
Other	0.0%	1.4%	2.0%	5.9%	7.9%	4.2%	2.3%	7.5%
Total	71.7%	82.4%	90.2%	94.4%	93.4%	97.5%	97.0%	96.3%
Private Systems								
Residential	59.1%	81.8%	79.5%	82.5%	87.6%	85.9%	68.8%	82.6%
Commercial/Industrial	0.2%	2.3%	2.5%	3.0%	4.9%	6.8%	5.3%	9.3%
Wholesale	0.0%	0.3%	0.0%	1.7%	0.1%	0.1%	0.0%	0.0%
Governmental	0.0%	0.2%	0.6%	0.1%	0.1%	0.4%	0.4%	0.3%
Agricultural	0.0%	3.1%	0.5%	0.7%	2.6%	0.1%	0.0%	0.0%
Other	0.0%	0.7%	4.3%	8.0%	4.7%	3.8%	33.1%	8.8%
Total	43.1%	77.7%	84.4%	91.4%	87.4%	95.6%	99.8%	99.2%
Ancillary Systems								
Residential	44.2%	42.8%	53.6%					
Commercial/Industrial	0.2%	0.0%	0.0%					
Wholesale								
Governmental								
Agricultural								
Other	0.0%	0.0%	0.0%					
Total	19.5%	30.3%	53.6%					

Data: Q. 31

Notes: Tabulations are based on the percentage that a system's metered connections in a given category represent out of all connections in the system, both metered and unmetered (e.g., the Residential percentage means the percentage of all connections that are metered residential connections; Total percentage means the percentage of all connections that are metered connections)

To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within each ownership type may represent a slightly different set of systems overall; the sum of customer category metered percentages may not equal the total percentage (See General Note 3)

Definitions: Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 1 - 42
Rate Structure and Billing Profile
by Ownership Type and Population Size Category
(Percent of Systems with Each Structure)

Ownership Type/ Rate Structure	Service Population Category								ROW TOTAL
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Metered Charges									
Uniform Rate	37.7%	50.0%	61.4%	64.0%	56.2%	54.9%	60.8%	64.2%	52.5%
Declining Block Rate	1.2%	11.8%	22.4%	26.4%	34.2%	32.8%	31.4%	38.3%	17.6%
Increasing Block Rate	5.3%	11.7%	14.7%	11.2%	11.9%	20.1%	24.4%	27.6%	11.5%
Seasonal Rate	0.1%	0.9%	1.8%	1.3%	1.6%	0.9%	1.5%	9.1%	1.1%
Unmetered Charges									
Separate Flat Fee for Water	21.9%	16.9%	20.3%	14.7%	15.9%	14.8%	18.8%	14.6%	17.8%
Combined Flat Fee for Water & Other Services	26.4%	11.3%	2.7%	3.4%	4.1%	4.0%	4.2%	0.0%	10.6%
Other billing methods	15.1%	13.4%	3.6%	5.8%	12.6%	10.0%	10.1%	16.3%	10.8%
Public Systems									
Metered Charges									
Uniform Rate	48.1%	56.4%	61.8%	62.8%	55.8%	53.6%	62.5%	65.9%	58.5%
Declining Block Rate	9.3%	20.2%	21.3%	30.2%	33.9%	32.8%	27.3%	36.3%	26.2%
Increasing Block Rate	26.9%	14.4%	13.5%	11.8%	12.3%	20.1%	25.3%	29.2%	14.9%
Seasonal Rate	0.8%	2.1%	2.7%	1.4%	2.0%	1.1%	1.7%	9.5%	2.0%
Unmetered Charges									
Separate Flat Fee for Water	19.2%	17.9%	22.1%	13.1%	17.5%	13.9%	19.3%	14.1%	17.0%
Combined Flat Fee for Water & Other Services	9.2%	8.1%	2.7%	3.0%	5.1%	3.8%	4.2%	0.0%	4.8%
Other billing methods	2.3%	10.8%	3.5%	6.8%	13.8%	10.4%	10.9%	14.9%	8.6%
Private Systems									
Metered Charges									
Uniform Rate	48.1%	51.9%	62.7%	67.8%	57.7%	63.8%	46.8%	46.1%	54.6%
Declining Block Rate	0.5%	7.0%	25.6%	14.7%	35.3%	32.8%	64.5%	59.1%	11.0%
Increasing Block Rate	5.2%	11.5%	14.3%	9.3%	10.2%	20.2%	17.6%	10.1%	9.9%
Seasonal Rate	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	0.0%	5.7%	0.2%
Unmetered Charges									
Separate Flat Fee for Water	27.3%	18.6%	17.1%	19.6%	10.1%	20.8%	14.5%	19.0%	20.6%
Combined Flat Fee for Water & Other Services	15.4%	6.0%	3.0%	4.7%	0.5%	5.7%	4.3%	0.0%	7.9%
Other billing methods	6.1%	9.8%	3.9%	2.5%	8.3%	7.1%	3.6%	30.3%	7.0%
Ancillary Systems									
Metered Charges									
Uniform Rate	23.0%	24.5%	0.0%						23.2%
Declining Block Rate	0.0%	1.1%	0.0%						0.3%
Increasing Block Rate	0.0%	3.8%	100.0%						2.4%
Seasonal Rate	0.0%	0.0%	0.0%						0.0%
Unmetered Charges									
Separate Flat Fee for Water	16.3%	8.2%	0.0%						13.6%
Combined Flat Fee for Water & Other Services	43.3%	37.9%	0.0%						41.1%
Other billing methods	28.7%	32.6%	0.0%						29.6%

Data: Q. 31

Note: Percentages may not add to 100% because a system may have more than one rate structure

Definitions: Other billing methods: Includes miscellaneous rate structures, both metered and unmetered

Table 1 - 43
Rate Structure and Billing Profile by Customer Category
(Percent of Systems with Each Structure)

Customer Category/ Rate Structure	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Residential									
Metered Charges									
Uniform Rate	38.9%	48.2%	57.0%	60.6%	50.8%	46.0%	43.3%	35.8%	49.4%
Declining Block Rate	1.3%	11.1%	19.7%	24.5%	31.3%	29.3%	27.0%	31.1%	15.9%
Increasing Block Rate	5.5%	11.7%	14.3%	9.6%	9.5%	19.2%	21.2%	30.0%	10.9%
Seasonal Rate	0.1%	0.9%	1.6%	0.8%	1.7%	1.0%	1.1%	4.4%	0.9%
Unmetered Charges									
Separate Flat Fee for Water	22.5%	16.7%	16.1%	10.0%	10.6%	6.0%	10.7%	6.3%	15.3%
Combined Flat Fee for Water & Other Services	25.3%	11.4%	2.4%	2.8%	3.2%	1.6%	3.1%	0.0%	10.0%
Other billing method	14.1%	11.8%	2.9%	2.9%	3.8%	5.0%	4.9%	5.0%	8.2%
Commercial/Industrial									
Metered Charges									
Uniform Rate	10.6%	50.9%	61.7%	59.2%	49.0%	45.4%	46.7%	46.8%	52.7%
Declining Block Rate	8.2%	19.5%	24.8%	29.0%	33.7%	32.5%	30.2%	36.4%	26.6%
Increasing Block Rate	15.0%	13.4%	7.2%	10.8%	10.7%	18.6%	19.5%	13.1%	12.0%
Seasonal Rate	1.3%	1.3%	2.4%	0.4%	1.9%	1.0%	1.6%	4.8%	1.4%
Unmetered Charges									
Separate Flat Fee for Water	62.3%	19.5%	13.6%	5.6%	7.1%	6.0%	9.8%	4.3%	12.3%
Combined Flat Fee for Water & Other Services	4.1%	3.7%	2.4%	1.7%	3.6%	1.7%	2.4%	0.0%	2.7%
Other billing method	3.8%	10.9%	3.6%	3.8%	5.5%	5.2%	6.4%	7.0%	6.1%
All Other Customer Categories									
Metered Charges									
Uniform Rate	22.4%	57.7%	56.4%	62.1%	47.7%	51.2%	59.7%	63.8%	54.7%
Declining Block Rate	3.9%	15.1%	24.9%	21.7%	31.0%	33.0%	28.2%	28.2%	23.8%
Increasing Block Rate	20.5%	12.1%	5.2%	8.2%	9.9%	12.6%	22.6%	16.2%	10.6%
Seasonal Rate	1.3%	0.4%	2.8%	0.6%	2.5%	1.2%	1.1%	7.7%	1.6%
Unmetered Charges									
Separate Flat Fee for Water	2.3%	15.6%	27.2%	13.9%	14.2%	14.9%	18.4%	12.8%	16.1%
Combined Flat Fee for Water & Other Services	32.3%	2.4%	4.2%	2.2%	3.7%	5.4%	3.9%	0.0%	4.4%
Other billing method	23.5%	17.0%	4.2%	9.1%	17.5%	11.4%	11.4%	18.8%	12.7%

Data: Q. 31

Notes: Tabulations represent the percentage of systems employing each particular rate structure for a particular customer category (e.g., percentage of systems with residential customers that employ a uniform rate for residential customers)
Percentages may not add to 100% because a system may have more than one rate structure for a given customer category

Definitions: Other billing method: Includes miscellaneous rate structures, both metered and unmetered
Other Customer Categories: Includes wholesale, governmental, agricultural, and miscellaneous, as well as combined categories for which systems could not distinguish between two or more customer categories

Table 1 - 44
Rate Structure Increase and Billing Profile
by Ownership Type

Ownership Type/ Customer Category/ Rate Increase Data	Service Population Category								ROW TOTAL
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Residential									
Years Since Last Increase	2.5	3.8	2.9	3.8	3.3	2.9	1.8	1.2	3.3
Percentage of Last Increase	37.2%	22.2%	24.7%	28.4%	16.3%	15.8%	12.8%	8.7%	23.8%
Years Between Last Two Increases	3.4	4.4	4.4	4.1	3.7	2.9	2.2	2.4	3.9
Average Percentage of Last Two Increases	25.6%	17.7%	20.7%	24.5%	16.5%	12.3%	14.2%	9.7%	19.2%
Non-Residential									
Years Since Last Increase	2.2	3.4	3.0	4.2	3.5	2.7	1.9	1.2	3.3
Percentage of Last Increase	42.1%	23.1%	25.6%	29.1%	17.6%	14.6%	12.9%	7.9%	22.7%
Years Between Last Two Increases	2.0	4.3	3.7	4.0	3.7	2.7	2.1	2.3	3.6
Average Percentage of Last Two Increases	41.4%	19.8%	21.8%	27.6%	18.5%	12.7%	14.1%	8.5%	20.3%
Public Systems									
Residential									
Years Since Last Increase	2.0	3.5	2.8	3.8	3.1	2.9	1.8	1.2	3.2
Percentage of Last Increase	45.5%	25.2%	27.5%	29.5%	15.6%	15.7%	13.2%	9.0%	24.2%
Years Between Last Two Increases	3.6	3.9	4.0	4.1	3.7	2.7	2.2	2.4	3.6
Average Percentage of Last Two Increases	58.1%	24.6%	23.7%	25.2%	16.1%	11.7%	14.5%	9.9%	21.3%
Non-Residential									
Years Since Last Increase	1.2	2.9	2.7	4.3	3.5	2.7	1.9	1.2	3.2
Percentage of Last Increase	60.1%	22.3%	27.2%	30.4%	16.7%	14.3%	13.0%	7.9%	23.0%
Years Between Last Two Increases	2.7	3.5	3.6	4.0	3.7	2.6	2.1	2.3	3.4
Average Percentage of Last Two Increases	63.7%	22.7%	23.3%	28.2%	17.5%	12.3%	14.3%	8.5%	21.0%
Private Systems									
Residential									
Years Since Last Increase	2.6	4.1	3.2	3.9	4.0	2.9	1.5	1.3	3.5
Percentage of Last Increase	35.3%	19.6%	18.9%	24.1%	18.9%	15.9%	9.0%	5.7%	23.2%
Years Between Last Two Increases	3.4	4.7	5.0	4.1	3.7	3.8	1.8	1.9	4.3
Average Percentage of Last Two Increases	18.1%	12.5%	14.7%	21.3%	17.8%	15.4%	12.3%	7.1%	15.5%
Non-Residential									
Years Since Last Increase	4.0	4.4	3.7	3.7	3.2	2.9	2.0	1.2	3.7
Percentage of Last Increase	10.8%	24.5%	21.1%	21.9%	21.4%	16.9%	11.7%	7.4%	21.4%
Years Between Last Two Increases	1.1	5.6	4.2	4.2	3.6	3.5	2.2	1.6	4.2
Average Percentage of Last Two Increases	10.2%	14.2%	17.1%	23.5%	24.4%	15.1%	13.2%	8.8%	17.4%

Data: Q. 31

Definitions: All Systems: excludes ancillary systems
Non-Residential: includes Commercial, Industrial, Wholesale, Local Municipal Government, Other Government, Agricultural, and Other (miscellaneous) customer categories

Table 1 - 45
Uncompensated Usage as a Percentage of Total Water Produced by Ownership Type and Uncompensated Usage Category

Ownership Category/ Uncompensated Usage Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Free Service to Municipal Facilities		3.8%	1.1%	3.4%	2.5%	1.0%	0.9%	3.0%
Observations	0	7	8	15	12	13	6	2
Fire Protection & Street Cleaning,	14.4%	5.1%	3.8%	5.7%	2.7%	2.1%	4.5%	2.9%
Observations	3	22	31	31	34	31	11	11
Leaks, Breaks, Failed Meters	25.3%	12.2%	9.4%	10.1%	8.8%	7.4%	6.2%	6.4%
Observations	4	30	35	39	37	35	12	14
Uncollected Bills	1.9%	1.1%	0.8%	0.7%	1.8%	0.6%	0.2%	0.5%
Observations	1	8	19	13	14	14	8	5
Other	1.1%	9.1%	13.2%	15.7%	21.0%	13.4%	10.4%	15.1%
Observations	1	9	12	8	21	12	12	9
Total Uncompensated Usage	26.3%	16.3%	14.8%	15.2%	16.4%	11.9%	12.1%	10.9%
Observations	5	37	45	50	56	44	21	23
Public Systems								
Free Service to Municipal Facilities		3.8%	1.1%	3.5%	2.7%	1.1%	0.9%	3.0%
Observations	0	7	7	13	9	11	6	2
Fire Protection & Street Cleaning,	18.3%	5.7%	4.3%	5.6%	2.5%	2.0%	4.5%	2.9%
Observations	2	15	20	22	17	22	11	11
Leaks, Breaks, Failed Meters	23.5%	12.7%	9.4%	10.1%	9.0%	7.1%	5.6%	6.2%
Observations	3	14	22	24	18	25	11	13
Uncollected Bills	1.9%	1.4%	0.8%	0.7%	2.9%	0.6%	0.2%	0.5%
Observations	1	3	11	10	5	11	8	5
Other	1.1%	7.3%	10.3%	15.5%	22.8%	13.4%	10.4%	18.1%
Observations	1	5	6	7	13	10	12	6
Total Uncompensated Usage	25.0%	19.7%	14.4%	15.8%	17.7%	11.8%	11.9%	11.1%
Observations	4	19	27	33	30	32	20	20
Private Systems								
Free Service to Municipal Facilities			0.6%	1.1%	0.7%	0.1%		
Observations	0	0	1	2	3	2	0	0
Fire Protection & Street Cleaning,	0.0%	3.0%	3.2%	6.0%	3.3%	2.7%		
Observations	1	7	11	9	17	9	0	0
Leaks, Breaks, Failed Meters	43.8%	11.8%	9.4%	10.0%	8.3%	9.4%	17.8%	12.8%
Observations	1	16	13	15	19	10	1	1
Uncollected Bills		0.7%	0.7%	0.2%	0.2%	0.3%		
Observations	0	5	8	3	9	3	0	0
Other		11.8%	15.2%	22.8%	13.1%	14.1%		5.3%
Observations	0	4	6	1	8	2	0	3
Total Uncompensated Usage	43.8%	13.1%	15.3%	11.8%	12.3%	12.5%	17.7%	9.4%
Observations	1	18	18	17	26	12	1	3

Data: Q. 32, Q. 4, Q. 29

Notes: The sum of the individual uncompensated usage percentages may not equal the reported total uncompensated usage percentage, for the following reason: Percentages are calculated in each category only for systems reporting non-zero uncompensated usage the category, that is, individual category line items represent the average only for systems having uncompensated usage in that customer category; however, the line item Total Uncompensated Usage represents the average across all uncompensated usage categories and all systems.

Table includes only systems whose uncompensated usage, as reported for explicit categories (Q. 32), accounts for an amount within +/- 10% of total uncompensated usage, as defined below.

Definitions: All Systems: excludes ancillary systems
Other: includes miscellaneous uncompensated usage categories
Total uncompensated usage: total production (Q. 4) minus total customer deliveries (Q. 29)

Table 1 - 46
Total Expenses
by Ownership Type
(Thousands of Dollars)

Ownership Type/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	7	30	86	206	570	2,106	7,096	28,098
Median	4	17	61	165	499	1,719	5,154	15,480
Observations	160	306	228	252	255	209	124	116
Public Systems								
Mean	13	36	87	209	571	2,023	7,056	27,862
Median	7	20	66	171	504	1,689	5,071	13,672
Observations	39	136	134	150	138	134	102	100
Private Systems								
Mean	6	32	87	201	568	2,699	7,438	30,555
Median	4	21	55	151	465	1,955	5,803	17,190
Observations	68	108	92	101	117	75	22	16
Ancillary Systems								
Mean	6	16	51	23				
Median	3	8	84	23				
Observations	53	62	2	1				

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 47
Total Expenses -- Private Systems
by Private Ownership Category
(Thousands of Dollars)

Private Ownership Category/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Investor-Owned - Dependent on Parent Co.								
Mean	40.1	57.3	165.0	145.9	523.2	2,801.6	8,198.2	16,738.4
Median	39.5	50.0	271.6	91.2	335.3	3,140.1	8,857.8	15,523.0
Observations	2	5	3	8	7	16	13	6
Investor-Owned - Not Dependent on Parent Co.								
Mean	6.2	33.8	84.4	233.1	558.4	2,811.2	6,892.6	41,581.8
Median	5.8	22.3	51.4	165.7	471.6	1,749.0	5,320.8	24,639.2
Observations	25	45	31	44	55	41	7	9
Mutual Association (Homeowners Assoc., etc.)								
Mean	7.0	28.6	87.9	140.5	428.9	1,801.4	5,168.0	
Median	4.4	21.6	55.4	112.4	274.3	1,167.0	5,168.0	
Observations	32	40	33	20	22	8	2	
Other Private Ownership								
Mean	4.1	29.1	85.2	271.5	700.5	3,411.1		
Median	2.5	19.9	71.2	206.7	586.5	2,177.2		
Observations	6	11	14	16	24	5		

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 48
Total Expenses
by Primary Water Source
(Thousands of Dollars)

Primary Water Source/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Mean	6.3	22.4	77.1	167.2	517.1	1,925.9	7,674.6	23,060.5
Median	3.6	14.7	54.9	147.5	468.7	1,274.5	4,025.5	13,187.0
Observations	106	156	109	125	134	110	45	36
Primarily Surface Systems								
Mean	13.9	80.6	121.4	265.4	670.7	2,128.0	6,368.0	34,426.5
Median	8.8	34.2	103.1	206.7	551.6	1,980.6	5,153.7	17,107.9
Observations	28	55	39	59	58	71	56	56
Primarily Purchased Systems								
Mean	9.3	59.0	108.5	313.8	615.7	2,854.6	7,496.5	16,495.9
Median	9.4	38.4	83.2	192.3	558.0	1,996.2	5,083.8	12,479.8
Observations	26	95	80	68	63	28	23	24

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Primarily: system obtains all or highest percentage of water from stated source
Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 49
Total Expenses Breakdown - Major Categories as Percentage of Total by Ownership Type

Ownership Type/ Major Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Routine Operating Expenses	98.3%	94.7%	90.4%	89.6%	89.2%	89.1%	84.7%	87.4%
Debt Service Expenses	1.2%	5.2%	9.5%	9.9%	10.5%	10.7%	14.9%	11.7%
Other Expenses	0.5%	0.1%	0.1%	0.5%	0.3%	0.2%	0.4%	0.9%
Public Systems								
Routine Operating Expenses	93.9%	93.8%	90.0%	89.5%	89.9%	88.8%	83.9%	87.2%
Debt Service Expenses	6.1%	6.0%	9.9%	10.0%	9.8%	11.0%	15.6%	11.8%
Other Expenses	0.0%	0.1%	0.1%	0.6%	0.3%	0.2%	0.5%	1.0%
Private Systems								
Routine Operating Expenses	98.2%	93.9%	90.6%	90.1%	86.9%	91.0%	90.9%	89.1%
Debt Service Expenses	1.5%	6.1%	9.3%	9.7%	13.0%	8.8%	9.1%	10.7%
Other Expenses	0.3%	0.0%	0.1%	0.3%	0.1%	0.1%	0.0%	0.2%
Ancillary Systems								
Routine Operating Expenses	99.1%	97.0%	100.0%					
Debt Service Expenses	0.1%	2.8%	0.0%					
Other Expenses	0.8%	0.2%	0.0%					

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 50
Total Expenses per Capita
by Ownership Type
(Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	205	100	112	107	99	101	101	83
Median	60	72	81	88	89	77	75	76
Observations	143	286	211	231	245	205	122	113
Public Systems								
Mean	197	109	112	106	97	101	101	82
Median	123	79	85	88	88	77	74	75
Observations	33	127	127	140	133	131	101	97
Private Systems								
Mean	99	110	112	112	104	103	102	95
Median	68	83	76	88	96	90	87	100
Observations	61	99	82	90	112	74	21	16
Ancillary Systems								
Mean	289	74	86	19				
Median	45	42	147	19				
Observations	49	60	2	1				

Data: Q. 33, Q. 11A

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions
Total Expenses per Capita: Total expenses per person served with piped drinking water

Table 1 - 51
Total Expenses
by Ownership Type
(Cents per Thousand Gallons Produced)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	330	336	281	253	225	196	166	142
Median	224	211	234	204	198	153	148	131
Observations	129	277	212	238	248	201	123	111
Public Systems								
Mean	752	390	272	242	210	194	164	137
Median	335	200	220	185	180	150	145	124
Observations	30	125	125	144	135	130	101	95
Private Systems								
Mean	262	276	303	295	283	213	181	192
Median	200	205	286	251	247	219	178	185
Observations	56	100	86	93	113	71	22	16
Ancillary Systems								
Mean	312	336	253	54				
Median	244	273	253	54				
Observations	43	52	1	1				

Data: Q. 33, Q. 4

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 52
Total Expenses
by Primary Water Source
(Cents per Thousand Gallons Produced)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Mean	316	292	255	217	196	202	151	127
Median	213	194	219	172	158	140	128	113
Observations	84	140	99	121	129	105	44	34
Primarily Surface Systems								
Mean	685	471	315	254	212	160	153	140
Median	350	291	268	232	195	132	130	129
Observations	19	42	33	49	56	68	56	53
Primarily Purchased Systems								
Mean	535	581	364	409	304	266	211	167
Median	415	390	337	360	277	223	180	164
Observations	26	95	80	68	63	28	23	24

Data: Q. 33, Q. 4

Notes: Table includes only systems reporting non-zero expenses

Definitions: Primarily: system obtains all or highest percentage of water from stated source
Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 1 - 53
Detailed Operating Expenses as a Percentage of Total Operating Expense by Ownership Type

Ownership Type/ Operating Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Direct Compensation & Benefits	15.8%	29.6%	29.7%	33.1%	35.0%	34.6%	29.7%	32.6%
Energy, Chemicals, & Supplies	32.2%	26.9%	25.4%	22.3%	20.4%	20.4%	18.5%	18.3%
Outside Labs & Contractors	24.9%	18.0%	8.3%	6.8%	3.7%	3.0%	3.3%	4.3%
Depreciation Expenses	4.4%	6.5%	7.7%	12.3%	11.6%	12.7%	10.3%	12.7%
Water Purchase Expense	3.3%	7.5%	11.1%	9.1%	10.9%	8.5%	16.0%	13.5%
Taxes/Payments in lieu of Taxes	7.8%	2.2%	2.5%	2.3%	2.5%	3.3%	5.5%	5.4%
Other Operating Expenses	11.2%	12.6%	14.6%	13.6%	14.8%	16.3%	18.1%	12.2%
Observations	106	243	227	249	255	207	123	116
Public Systems								
Direct Compensation & Benefits	21.4%	31.9%	32.8%	34.9%	35.6%	34.8%	30.1%	32.9%
Energy, Chemicals, & Supplies	29.1%	26.8%	24.5%	23.0%	20.2%	21.0%	19.1%	18.9%
Outside Labs & Contractors	17.9%	11.9%	7.3%	7.1%	3.6%	3.0%	3.2%	4.5%
Depreciation Expenses	4.9%	6.4%	5.7%	11.2%	10.2%	12.6%	10.2%	12.8%
Water Purchase Expense	9.9%	8.4%	11.7%	8.5%	11.4%	8.9%	16.0%	14.3%
Payments in lieu of Taxes	0.5%	1.2%	2.0%	2.1%	2.3%	2.3%	4.5%	4.2%
Other Operating Expenses	11.6%	13.1%	14.8%	12.8%	15.4%	16.3%	18.5%	12.0%
Observations	39	135	134	148	138	133	101	100
Private Systems								
Direct Compensation & Benefits	14.6%	27.0%	23.1%	27.6%	32.6%	33.4%	27.2%	30.2%
Energy, Chemicals, & Supplies	32.8%	26.9%	27.3%	20.1%	21.5%	16.0%	13.7%	12.0%
Outside Labs & Contractors	26.3%	24.8%	10.6%	6.0%	4.4%	3.1%	3.4%	2.0%
Depreciation Expenses	4.3%	6.6%	11.8%	15.9%	16.4%	13.8%	11.6%	11.5%
Water Purchase Expense	2.0%	6.5%	9.6%	11.0%	8.9%	5.4%	15.8%	5.4%
Taxes	9.2%	3.3%	3.6%	3.0%	3.1%	10.5%	13.7%	18.1%
Other Operating Expenses	11.1%	12.1%	14.1%	16.1%	12.9%	16.3%	14.6%	14.3%
Observations	67	108	93	101	117	74	22	16

Data: Q. 33

Notes: Table includes only systems reporting non-zero total operating expenses

To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each category of operating expense within each ownership type may represent a slightly different set of systems overall; the sum of operating expense types by percent may not equal 100% (See General Note 3)

Definitions: All Systems: excludes ancillary systems

Table 1 - 54
Detailed Non-Operating Expenses as a Percentage of Total Non-Operating Expenses by Ownership Type

Ownership Type/ Non-Operating Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Interest Payments	54.3%	91.5%	89.5%	88.9%	90.9%	90.0%	90.6%	92.8%
Other Debt Service Expenditures	10.1%	7.0%	8.9%	4.2%	5.2%	8.2%	5.0%	2.9%
Other Expenses	35.6%	1.5%	1.6%	6.8%	3.9%	1.7%	4.4%	4.2%
Observations	26	98	129	176	191	145	96	96
Public Systems								
Interest Payments	100.0%	89.3%	88.3%	88.2%	89.9%	89.7%	91.3%	92.4%
Other Debt Service Expenditures	0.0%	7.9%	9.8%	4.0%	5.4%	8.8%	4.4%	3.1%
Other Expenses	0.0%	2.9%	1.9%	7.7%	4.7%	1.5%	4.3%	4.5%
Observations	14	59	72	104	99	94	79	83
Private Systems								
Interest Payments		94.0%	91.9%	91.0%	94.3%	92.8%	85.4%	97.4%
Other Debt Service Expenditures		6.0%	7.2%	4.9%	4.5%	4.2%	9.6%	0.9%
Other Expenses		0.0%	0.9%	4.1%	1.2%	3.1%	5.0%	1.8%
Observations	0	39	57	72	92	51	17	13

Data: Q. 33

Notes: Table includes only systems reporting non-zero total debt service

To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each category of non-operating expense within each ownership type may represent a slightly different set of systems overall; the sum of non-operating expense types by percent may not equal 100% (See General Note 3)

Definitions: All Systems: excludes ancillary systems

Table 1 - 55
Ratio of Total Assets to Total Revenues
by Ownership Type

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	3.40	8.41	5.63	6.06	6.12	6.14	6.31	6.51
Median	2.17	3.33	4.19	4.37	5.14	5.22	5.64	5.83
Observations	55	154	166	192	211	164	106	93
Public Systems								
Mean	6.53	10.42	6.60	6.73	6.04	6.39	6.52	6.78
Median	3.41	3.95	4.85	5.14	5.34	5.46	5.78	5.87
Observations	20	72	89	111	106	108	88	80
Private Systems								
Mean	2.70	6.46	4.07	4.20	6.40	4.20	4.57	3.94
Median	2.50	2.76	3.64	3.21	4.71	3.94	4.51	4.38
Observations	26	74	76	81	105	56	18	13
Ancillary Systems								
Mean	3.32	7.86	1.44					
Median	2.17	4.18	1.44					
Observations	9	8	1					

Data: Q. 29, Q. 30, Q. 34

Notes: Table includes only systems reporting non-zero revenues and non-zero assets

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 1 - 56
Total Assets
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	31.9	333.6	522.8	1,268.7	3,866.6	15,707.6	63,119.5	187,617.8
Median	15.2	100.5	254.5	860.7	3,069.4	10,701.0	39,868.9	112,565.5
Observations	79	190	181	200	218	168	107	97
Primarily Ground Systems								
Mean	30.6	306.3	480.0	1,124.2	3,540.9	15,020.0	85,438.0	163,767.8
Median	15.0	75.0	243.0	789.8	3,064.3	9,913.0	32,540.9	96,222.1
Observations	49	85	87	100	118	89	38	28
Primarily Surface Systems								
Mean	73.3	402.0	645.1	1,735.7	5,709.2	17,322.8	55,039.3	221,484.1
Median	31.1	167.6	329.5	1,196.7	4,458.5	13,450.0	46,298.0	137,488.7
Observations	16	39	29	43	49	54	47	49
Primarily Purchased Systems								
Mean	27.5	446.7	639.6	1,435.4	3,073.7	14,649.5	46,939.1	122,037.7
Median	21.6	149.3	376.5	783.1	2,554.7	9,558.0	35,404.4	69,791.9
Observations	14	66	65	57	51	25	22	20

Data: Q. 34

Notes: Table includes only systems reporting non-zero total assets

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 57
Total Assets
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	30.7	343.5	527.7	1,268.7	3,866.6	15,707.6	63,119.5	187,617.8
Median	11.4	102.0	274.1	860.7	3,069.4	10,701.0	39,868.9	112,565.5
Observations	61	176	180	200	218	168	107	97
Public Systems								
Mean	93.7	463.2	565.1	1,417.8	3,979.1	15,784.3	66,143.2	190,795.6
Median	42.2	156.0	329.5	952.5	3,132.2	10,701.0	39,868.9	112,565.5
Observations	23	93	94	115	109	110	89	84
Private Systems								
Mean	18.5	211.8	464.1	870.4	3,514.4	15,113.3	37,527.4	155,321.2
Median	10.1	59.1	240.2	541.7	2,921.2	12,188.2	40,236.4	83,522.5
Observations	38	83	86	85	109	58	18	13

Data: Q. 34

Notes: Table includes only systems reporting non-zero total assets

Definitions: All: excludes ancillary systems

Table 1 - 58
Total Liabilities
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	29.3	207.8	286.7	731.8	1,857.8	6,395.4	42,015.6	84,772.3
Median	8.5	50.0	140.0	412.0	1,230.3	3,528.7	15,056.3	41,180.3
Observations	40	136	160	187	207	160	101	94
Primarily Ground Systems								
Mean	29.6	195.4	257.0	702.1	1,658.4	6,182.2	64,684.8	67,204.8
Median	8.0	39.7	131.9	394.7	997.4	3,791.9	9,075.2	43,109.6
Observations	23	60	80	89	114	85	36	28
Primarily Surface Systems								
Mean	33.9	159.9	681.5	860.1	3,074.2	7,782.1	34,066.2	109,735.9
Median	29.1	42.0	288.8	469.0	2,443.9	4,240.6	21,426.2	54,436.3
Observations	6	24	25	43	43	51	43	46
Primarily Purchased Systems								
Mean	22.0	281.8	277.6	721.7	1,338.4	3,970.4	25,409.3	40,455.4
Median	12.9	72.8	179.1	365.5	1,230.3	2,456.9	17,480.0	22,262.6
Observations	11	52	55	55	50	24	22	20

Data: Q. 34

Notes: Table includes only systems reporting non-zero total liabilities

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 59
Total Liabilities
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	34.1	204.2	286.7	731.8	1,857.8	6,395.4	42,015.6	84,772.3
Median	8.5	55.0	140.0	412.0	1,230.3	3,528.7	15,056.3	41,180.3
Observations	36	125	160	187	207	160	101	94
Public Systems								
Mean	60.3	223.4	289.9	814.0	1,899.0	6,334.2	44,639.7	87,470.2
Median	29.1	62.5	116.9	469.0	1,267.2	3,528.7	14,783.3	40,117.0
Observations	18	73	89	110	105	107	85	83
Private Systems								
Mean	24.5	178.1	280.9	495.8	1,725.7	6,890.3	17,985.1	52,997.9
Median	8.0	45.9	170.6	359.8	1,128.5	3,262.8	16,601.7	44,840.4
Observations	18	52	71	77	102	53	16	11

Data: Q. 34

Notes: Table includes only systems reporting non-zero total liabilities

Definitions: All: excludes ancillary systems

Table 1 - 60
Total Debt Outstanding
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	3.7	101.0	169.7	456.7	1,285.6	3,507.4	27,787.5	67,185.9
Median	0.0	0.8	42.6	195.0	763.1	2,110.8	10,625.4	31,572.5
Observations	79	190	181	200	218	168	107	97
Primarily Ground Systems								
Mean	3.6	95.7	146.3	385.9	1,114.1	3,084.0	45,909.1	65,146.1
Median	0.0	0.0	42.1	157.0	670.0	2,175.0	3,778.8	39,053.6
Observations	49	85	87	100	118	89	38	28
Primarily Surface Systems								
Mean	3.1	26.5	448.0	624.1	2,124.9	4,466.2	22,939.8	84,824.9
Median	0.0	0.0	120.0	263.0	1,160.1	1,570.5	11,700.0	42,490.1
Observations	16	39	29	43	49	54	47	49
Primarily Purchased Systems								
Mean	8.3	167.7	170.1	595.4	988.7	2,942.4	12,150.8	21,332.9
Median	0.0	39.9	28.4	210.0	962.0	1,655.1	12,474.8	8,085.2
Observations	14	66	65	57	51	25	22	20

Data: Q. 34

Notes: Table includes systems reporting zero as well as non-zero total debt, except those reporting zero total assets

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 61
Total Debt Outstanding
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	5.1	110.6	172.0	456.7	1,285.6	3,507.4	27,787.5	67,185.9
Median	0.0	1.0	43.1	195.0	763.1	2,110.8	10,625.4	31,572.5
Observations	61	176	180	200	218	168	107	97
Public Systems								
Mean	20.3	123.4	177.1	502.1	1,297.7	3,400.2	30,078.8	70,396.6
Median	0.0	3.6	23.5	198.0	740.0	2,084.3	10,625.4	32,890.0
Observations	23	93	94	115	109	110	89	84
Private Systems								
Mean	2.1	96.6	163.2	335.2	1,247.8	4,338.3	8,394.3	34,554.5
Median	0.0	1.0	70.2	158.9	871.4	2,665.0	9,198.3	17,000.0
Observations	38	83	86	85	109	58	18	13

Data: Q. 34

Notes: Table includes systems reporting zero as well as non-zero total debt, except those reporting zero total assets

Definitions: All: excludes ancillary systems

Table 1 - 62
Percentage of Systems Making Major Capital Improvements Since January 1,1987
by Ownership Type and Primary Water Source

Ownership Type/ Water Source	Service Population Category								ROW TOTAL
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Primarily Ground	33.9%	38.5%	52.0%	47.7%	69.4%	73.4%	86.1%	96.5%	43.1%
Primarily Surface	45.8%	32.9%	48.4%	50.2%	72.2%	77.1%	80.2%	90.0%	58.3%
Primarily Purchased	13.9%	30.9%	45.7%	54.0%	51.5%	60.9%	90.1%	92.7%	45.5%
Public Systems									
Primarily Ground	38.7%	43.9%	46.6%	46.0%	70.7%	72.5%	87.5%	100.0%	51.0%
Primarily Surface	28.3%	37.7%	43.7%	49.9%	74.9%	78.8%	85.3%	90.3%	62.4%
Primarily Purchased	7.6%	27.2%	49.3%	50.3%	51.2%	58.8%	92.4%	94.3%	45.9%
Private Systems									
Primarily Ground	40.8%	46.8%	57.9%	50.4%	66.0%	77.7%	74.5%	77.9%	47.7%
Primarily Surface	55.6%	29.0%	62.9%	52.0%	58.1%	59.0%	54.5%	86.8%	49.9%
Primarily Purchased	29.4%	40.0%	36.8%	61.3%	52.9%	81.6%	64.5%	72.5%	46.8%
Ancillary Systems									
Primarily Ground	28.0%	24.6%	74.1%	100.0%					27.9%
Primarily Surface	33.7%	24.9%	100.0%						29.9%
Primarily Purchased	11.0%	10.5%							10.7%

Data: Q. 35

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 63
Total Capital Investment Since Jan. 1, 1987
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	24.4	160.7	384.9	515.6	1,644.4	4,547.8	13,605.1	53,915.3
Median	5.3	22.0	179.8	265.0	1,090.0	2,229.6	8,908.9	28,681.9
Observations	60	110	100	111	156	126	91	85
Primarily Ground Systems								
Mean	23.1	143.1	389.0	325.1	1,151.2	4,712.8	9,620.0	48,202.3
Median	5.3	20.0	179.8	200.0	900.0	2,275.0	6,520.9	24,649.0
Observations	40	58	56	51	87	64	33	23
Primarily Surface Systems								
Mean	58.4	358.3	546.5	1,009.3	3,392.4	4,882.1	19,236.1	68,381.2
Median	30.0	85.0	200.0	689.0	2,505.5	3,284.6	11,715.0	35,770.6
Observations	16	21	17	28	35	45	39	44
Primarily Purchased Systems								
Mean	22.9	214.6	314.9	730.7	1,232.2	2,894.7	9,438.8	18,856.3
Median	6.4	45.0	110.0	325.0	772.5	2,026.0	9,538.0	12,563.2
Observations	4	31	27	32	34	17	19	18

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 1 - 64
Total Capital Investment Since Jan. 1, 1987
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Mean	75.6	304.7	354.9	637.1	1,742.5	4,693.3	13,933.9	55,571.0
Median	5.3	50.0	200.0	325.0	1,136.2	2,312.0	8,441.7	28,681.9
Observations	18	49	53	62	84	87	79	76
Private Systems								
Mean	22.1	65.3	466.8	186.3	1,285.6	3,447.5	9,638.5	30,622.7
Median	12.0	20.0	179.8	86.9	620.8	975.7	10,585.1	31,236.0
Observations	26	45	44	48	72	39	12	9
Ancillary Systems								
Mean	13.0	27.0	140.0	300.0				
Median	4.5	10.0	154.4	300.0				
Observations	16	16	3	1				

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

Table 1 - 65

Capital Investment Profile: Percentage of Systems Investing Capital Funds in Each Major Capital Expense Category Since Jan. 1, 1987 by Ownership Type

Ownership Type / Major Capital Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Quality Improvement	33.8%	25.0%	29.8%	27.5%	26.1%	35.9%	35.7%	60.7%
Replacement or Major Repairs	82.2%	74.4%	52.3%	53.9%	54.7%	65.9%	65.0%	79.9%
System Expansion	12.8%	33.5%	42.8%	60.1%	67.7%	66.1%	74.1%	86.3%
Observations	60	110	100	111	156	126	91	85
Public Systems								
Water Quality Improvement	16.8%	21.5%	28.1%	31.5%	28.8%	34.5%	33.8%	60.1%
Replacement or Major Repairs	81.9%	70.8%	48.4%	56.2%	53.2%	66.3%	64.9%	79.9%
System Expansion	12.5%	31.4%	37.0%	61.7%	68.4%	67.8%	74.0%	87.5%
Observations	18	49	53	62	84	87	79	76
Private Systems								
Water Quality Improvement	32.7%	25.9%	36.5%	17.9%	16.1%	46.2%	59.2%	68.7%
Replacement or Major Repairs	85.6%	69.8%	59.3%	44.4%	60.0%	63.3%	66.2%	79.7%
System Expansion	12.8%	41.0%	51.4%	59.7%	64.9%	53.4%	74.8%	68.7%
Observations	26	45	44	48	72	39	12	9
Ancillary Systems								
Water Quality Improvement	40.0%	31.1%	0.0%	0.0%				
Replacement or Major Repairs	78.1%	91.8%	49.0%	100.0%				
System Expansion	13.0%	23.2%	51.0%	0.0%				
Observations	16	16	3	1				

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

Table 1 - 66
Capital Investment Profile: Percentage of Capital Funds Invested in Each Major Capital Expense Category Since Jan. 1, 1987 by Ownership Type

Ownership Type/ Major Capital Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Quality Improvement	16.6%	12.8%	21.4%	20.0%	14.7%	17.5%	15.6%	16.9%
Replacement or Major Repairs	73.1%	63.1%	41.3%	36.8%	33.9%	36.3%	37.1%	38.2%
System Expansion	10.3%	24.1%	37.4%	43.1%	51.4%	46.2%	47.3%	44.9%
Observations	60	110	100	111	156	126	91	85
Public Systems								
Water Quality Improvement	13.0%	11.1%	21.5%	23.3%	16.1%	16.9%	14.7%	16.3%
Replacement or Major Repairs	78.8%	64.7%	45.6%	35.5%	31.8%	35.5%	37.7%	38.5%
System Expansion	8.2%	24.2%	32.9%	41.2%	52.1%	47.6%	47.6%	45.2%
Observations	18	49	53	62	84	87	79	76
Private Systems								
Water Quality Improvement	15.9%	15.1%	23.8%	12.1%	9.5%	21.8%	26.2%	24.6%
Replacement or Major Repairs	74.9%	54.7%	33.0%	36.3%	41.7%	42.7%	30.1%	34.1%
System Expansion	9.2%	30.2%	43.2%	51.6%	48.8%	35.5%	43.6%	41.3%
Observations	26	45	44	48	72	39	12	9
Ancillary Systems								
Water Quality Improvement	18.5%	11.9%	0.0%	0.0%				
Replacement or Major Repairs	69.2%	76.4%	49.0%	100.0%				
System Expansion	12.3%	11.7%	51.0%	0.0%				
Observations	16	16	3	1				

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

Table 1 - 67

Capital Investment Source Profile: Percentage of Systems Acquiring Capital Funds from Each Major Capital Funds Source Since Jan. 1, 1987 by Ownership Type

Ownership Type/ Major Capital Funds Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Debt Financing	7.3%	22.8%	43.3%	30.0%	54.4%	60.5%	76.1%	76.0%
Government Loan	3.8%	19.5%	16.4%	27.2%	34.4%	17.6%	12.9%	13.2%
Government Grant	1.1%	7.4%	9.1%	8.5%	7.0%	1.3%	2.5%	0.0%
All Other Sources	92.3%	72.2%	65.1%	70.5%	66.2%	58.3%	65.8%	80.3%
Public Systems								
Debt Financing	0.0%	21.3%	51.9%	31.0%	58.3%	62.6%	76.8%	75.8%
Government Loan	5.6%	37.4%	14.9%	28.9%	33.5%	17.0%	13.2%	12.7%
Government Grant	6.9%	11.9%	7.6%	10.2%	6.6%	1.1%	1.9%	0.0%
All Other Sources	88.8%	71.5%	54.7%	69.2%	64.0%	56.0%	64.3%	81.1%
Private Systems								
Debt Financing	6.0%	23.9%	27.6%	29.2%	40.1%	44.8%	68.2%	79.7%
Government Loan	6.4%	8.6%	21.1%	24.3%	38.1%	21.8%	8.9%	20.3%
Government Grant	0.7%	6.1%	13.0%	4.2%	8.3%	2.3%	8.9%	0.0%
All Other Sources	87.6%	67.0%	78.4%	72.1%	74.3%	76.2%	83.8%	68.7%
Ancillary Systems								
Debt Financing	11.0%	24.3%	51.0%	0.0%				
Government Loan	0.0%	1.1%	0.0%	0.0%				
Government Grant	0.0%	0.0%	0.0%	0.0%				
All Other Sources	99.2%	84.3%	100.0%	100.0%				

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

Table 1 - 68
Capital Investment Source Profile: Percentage of Capital Funds Acquired from Each Major Capital Funds Source Since Jan.1, 1987 by Ownership Type

Ownership Type/ Major Capital Funds Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Debt Financing	6.0%	16.5%	29.0%	22.9%	42.7%	51.4%	56.1%	49.5%
Government Loan	3.7%	12.4%	12.8%	19.2%	17.9%	9.0%	4.0%	3.7%
Government Grant	0.8%	5.8%	6.2%	3.7%	2.6%	0.3%	0.7%	0.0%
All Other Sources	89.6%	65.3%	52.0%	54.3%	36.9%	39.3%	39.2%	46.8%
Public Systems								
Debt Financing	0.0%	10.2%	36.9%	24.5%	47.7%	53.6%	57.3%	49.0%
Government Loan	5.6%	21.8%	12.8%	19.7%	17.7%	9.1%	4.2%	3.3%
Government Grant	5.9%	8.4%	6.5%	4.1%	2.3%	0.3%	0.8%	0.0%
All Other Sources	88.5%	59.6%	43.9%	51.7%	32.4%	37.1%	37.7%	47.7%
Private Systems								
Debt Financing	6.0%	21.8%	16.4%	19.6%	24.3%	35.3%	41.5%	56.3%
Government Loan	6.1%	7.8%	14.5%	19.1%	18.6%	8.0%	1.1%	9.3%
Government Grant	0.3%	5.8%	6.4%	2.7%	3.6%	0.5%	0.2%	0.0%
All Other Sources	87.6%	64.6%	62.7%	58.6%	53.5%	56.1%	57.3%	34.4%
Ancillary Systems								
Debt Financing	7.6%	20.2%	23.1%	0.0%				
Government Loan	0.0%	0.4%	0.0%	0.0%				
Government Grant	0.0%	0.0%	0.0%	0.0%				
All Other Sources	92.4%	79.4%	76.9%	100.0%				

Data: Q. 36

Notes: To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each category of funds source within each ownership type may represent a slightly different set of systems overall; the sum of funds source types by percent may not equal 100% (See General Note 3)

Table 1 - 69
Bond Issues and Ratings: Percentage of Systems with Bonds in Each Rating Category (for Systems Issuing Bonds) by Ownership Type

Ownership Type / Bond Rating Categories	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Bonds Not Rated	92.4%	98.6%	95.5%	88.5%	64.5%	28.3%	14.0%	10.3%
Bonds Rated "A" or Better	7.6%	1.2%	4.0%	8.2%	20.5%	53.2%	76.7%	84.1%
Bonds Rated from "B" to "BBB"	0.0%	0.1%	0.5%	2.6%	12.1%	17.3%	6.9%	5.1%
Bonds Rated Below "B"	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
Observations	35	93	108	115	133	127	100	109
Public Systems								
Bonds Not Rated	67.8%	97.9%	95.2%	88.0%	62.9%	25.2%	10.6%	6.1%
Bonds Rated "A" or Better	32.2%	1.9%	4.1%	8.1%	21.9%	55.8%	80.6%	88.5%
Bonds Rated from "B" to "BBB"	0.0%	0.2%	0.7%	3.0%	13.5%	17.9%	7.4%	5.0%
Bonds Rated Below "B"	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
Observations	21	63	75	85	96	95	87	95
Private Systems								
Bonds Not Rated	100.0%	100.0%	96.4%	91.5%	77.1%	67.5%	54.6%	59.1%
Bonds Rated "A" or Better	0.0%	0.0%	3.6%	8.5%	9.6%	19.6%	30.2%	34.4%
Bonds Rated from "B" to "BBB"	0.0%	0.0%	0.0%	0.0%	0.0%	9.3%	0.0%	6.4%
Bonds Rated Below "B"	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Observations	14	30	33	30	37	32	13	14

Data: Q. 39A

Notes: Percentages may not sum to 100% because rating percentages tabulated only for bonds rated by Moody's and Standard & Poor's

Definitions: All Systems: excludes ancillary systems

PART 2

DETAILED SURVEY RESULT TABLES WITH CONFIDENCE INTERVALS

Table 2 - 1
Residential Population Served
by Ownership Type and Primary Water Source

Ownership Type/ Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public								
Primarily Ground	66	276	772	1,928	5,989	22,461	64,973	316,159
Confidence Interval	*± 8*	*± 24*	*± 39*	*± 331*	*± 386*	*± 3,381*	*± 3,020*	*± 7,814*
Primarily Surface	57	287	750	2,160	6,221	24,708	73,930	417,896
Confidence Interval	*± 9*	*± 52*	*± 62*	*± 162*	*± 418*	*± 2,669*	*± 5,169*	*± 54,541*
Primarily Purchased	66	293	755	1,989	6,092	22,291	68,241	186,945
Confidence Interval	*± 21*	*± 25*	*± 60*	*± 208*	*± 421*	*± 3,876*	*± 8,459*	*± 22,674*
Private								
Primarily Ground	62	250	714	1,770	5,311	24,543	70,078	238,900
Confidence Interval	*± 4*	*± 21*	*± 38*	*± 167*	*± 538*	*± 3,568*	*± 5,332*	*± 0*
Primarily Surface	61	255	861	1,820	6,371	24,446	70,524	456,903
Confidence Interval	*± 9*	*± 44*	*± 77*	*± 351*	*± 1,083*	*± 2,640*	*± 2,983*	*± 84,646*
Primarily Purchased	69	321	714	2,116	5,378	28,020	64,769	145,341
Confidence Interval	*± 10*	*± 50*	*± 64*	*± 285*	*± 788*	*± 7,833*	*± 8,112*	*± 3,978*
Ancillary								
Primarily Ground	61	228	660	1,200				
Confidence Interval	*± 5*	*± 40*	*± 127*	**				
Primarily Surface	66	240	750					
Confidence Interval	*± 16*	*± 41*	**					
Primarily Purchased	57	195						
Confidence Interval	*± 14*	*± 47*						

**** :** Insufficient observations to calculate confidence interval

Data: Q. 11A

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 2
Average Daily Production and Percentage Produced
by Source of Water
(MGD)

Source of Water/ Production Data	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Ground									
Average Daily Production	0.006	0.026	0.072	0.209	0.512	1.929	4.275	14.919	0.364
Confidence Interval	*± 0.002*	*± 0.006*	*± 0.016*	*± 0.039*	*± 0.076*	*± 0.310*	*± 1.060*	*± 2.374*	*± 0.029*
Percent of Total	95.2%	84.1%	76.1%	68.5%	55.9%	52.7%	37.7%	28.3%	77.5%
Confidence Interval	*± 1.2%*	*± 4.5%*	*± 4.1%*	*± 5.9%*	*± 5.5%*	*± 4.3%*	*± 8.2%*	*± 4.3%*	*± 1.8%*
Surface									
Average Daily Production	0.000	0.004	0.007	0.056	0.210	1.452	4.765	32.544	0.418
Confidence Interval	*± 0.000*	*± 0.004*	*± 0.004*	*± 0.020*	*± 0.024*	*± 0.304*	*± 1.417*	*± 2.475*	*± 0.031*
Percent of Total	2.3%	4.0%	5.9%	14.9%	21.0%	34.0%	38.6%	48.4%	9.7%
Confidence Interval	*± 1.0%*	*± 2.0%*	*± 2.2%*	*± 3.7%*	*± 3.9%*	*± 5.7%*	*± 8.8%*	*± 5.5%*	*± 1.0%*
Purchased									
Average Daily Production	0.000	0.009	0.016	0.040	0.156	0.545	2.268	7.717	0.140
Confidence Interval	*± 0.000*	*± 0.012*	*± 0.004*	*± 0.012*	*± 0.059*	*± 0.261*	*± 0.815*	*± 1.537*	*± 0.020*
Percent of Total	2.5%	11.9%	17.9%	16.6%	23.2%	13.4%	23.7%	23.3%	12.7%
Confidence Interval	*± .8%*	*± 3.7%*	*± 4.1%*	*± 3.5%*	*± 5.7%*	*± 3.3%*	*± 9.4%*	*± 6.9%*	*± 1.6%*
All									
Average Daily Production	0.008	0.042	0.097	0.305	0.886	3.948	11.755	55.180	0.996
Confidence Interval	*± 0.004*	*± 0.014*	*± 0.016*	*± 0.047*	*± 0.084*	*± 0.292*	*± 1.192*	*± 2.707*	*± 0.055*
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	206	367	260	269	277	222	139	119	1,859

Data: Q. 4

Notes: Tabulations represent the average daily production across systems from each type of source

Table 2 - 3
Water Source Profile: Number and Percentage of Systems by Primary Water Source

Primary Water Source		Service Population Category: 100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	Row Total
Primarily Ground										
100%	Number	9,042	10,367	4,443	4,422	2,035	1,094	120	56	31,579
	Confidence Interval	*± 615*	*± 625*	*± 611*	*± 587*	*± 282*	*± 156*	*± 49*	*± 7*	*± 1,204*
	Percent	65.5%	67.2%	68.3%	63.2%	49.4%	42.4%	24.8%	14.7%	62.8%
	Confidence Interval	*± 4.3%*	*± 4.1%*	*± 3.9%*	*± 6.6%*	*± 5.1%*	*± 4.9%*	*± 9.8%*	*± 1.7%*	*± 2.6%*
Mostly	Number	4,163	2,773	537	347	340	276	50	38	8,526
	Confidence Interval	*± 661*	*± 876*	*± 201*	*± 193*	*± 157*	*± 133*	*± 24*	*± 7*	*± 1,569*
	Percent	30.2%	18.0%	8.3%	5.0%	8.2%	10.7%	10.3%	10.1%	17.0%
	Confidence Interval	*± 4.0%*	*± 5.2%*	*± 3.3%*	*± 2.7%*	*± 3.7%*	*± 5.3%*	*± 5.2%*	*± 1.6%*	*± 3.0%*
Primarily Surface										
100%	Number	218	432	330	845	679	626	103	104	3,337
	Confidence Interval	*± 97*	*± 197*	*± 145*	*± 212*	*± 143*	*± 241*	*± 51*	*± 17*	*± 386*
	Percent	1.6%	2.8%	5.1%	12.1%	16.5%	24.3%	21.3%	27.4%	6.6%
	Confidence Interval	*± 0.6%*	*± 1.3%*	*± 2.1%*	*± 2.7%*	*± 3.4%*	*± 9.4%*	*± 8.6%*	*± 4.5%*	*± 0.8%*
Mostly	Number	142	388	99	290	137	265	101	103	1,524
	Confidence Interval	*± 60*	*± 168*	*± 53*	*± 161*	*± 60*	*± 123*	*± 36*	*± 33*	*± 292*
	Percent	1.0%	2.5%	1.5%	4.1%	3.3%	10.3%	20.7%	27.1%	3.0%
	Confidence Interval	*± 0.4%*	*± 1.1%*	*± 0.8%*	*± 2.3%*	*± 1.4%*	*± 4.6%*	*± 8.2%*	*± 8.0%*	*± 0.6%*
Primarily Purchased										
100%	Number	230	1,435	983	1,049	804	251	75	45	4,874
	Confidence Interval	*± 71*	*± 455*	*± 249*	*± 212*	*± 188*	*± 95*	*± 51*	*± 22*	*± 666*
	Percent	1.7%	9.3%	15.1%	15.0%	19.5%	9.7%	15.5%	11.9%	9.7%
	Confidence Interval	*± 0.5%*	*± 3.0%*	*± 4.0%*	*± 3.1%*	*± 4.7%*	*± 3.5%*	*± 10.9%*	*± 6.1%*	*± 1.3%*
Mostly	Number	0	28	117	41	129	67	36	33	450
	Confidence Interval	*± 0*	*± 46*	*± 127*	*± 43*	*± 62*	*± 53*	*± 26*	*± 15*	*± 152*
	Percent	0.0%	0.2%	1.8%	0.6%	3.1%	2.6%	7.3%	8.8%	0.9%
	Confidence Interval	*± 0.0%*	*± 0.3%*	*± 1.9%*	*± 0.6%*	*± 1.5%*	*± 2.1%*	*± 5.2%*	*± 3.3%*	*± 0.3%*
Column Total	Number	13,795	15,422	6,510	6,995	4,123	2,579	486	379	50,289
	Confidence Interval	± 767	± 698	± 709	± 535	± 322	± 172	± 54	± 35	± 799
	Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Data: Q. 4

Definitions: 100%: system obtains all water from indicated type of source
Mostly: system obtains highest percentage of water from indicated type of source

Table 2 - 4
Average Daily Production (MGD)
by Primary Water Source

Primary Water Source/ Production Data		Service Population Category: 100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	Row Total
Primarily Ground Systems										
100%	Avg. Daily Production	0.008	0.033	0.095	0.304	0.909	3.431	11.456	43.516	0.367
	Confidence Interval	*± 0.004*	*± 0.008*	*± 0.020*	*± 0.065*	*± 0.073*	*± 0.484*	*± 4.155*	*± 1.049*	*± 0.035*
Mostly	Avg. Daily Production	0.028	0.040	0.105	0.337	1.154	4.823	12.606	61.442	2.725
	Confidence Interval	*± 0.065*	*± 0.045*	*± 0.045*	*± 0.159*	*± 0.465*	*± 1.541*	*± 3.606*	*± 5.157*	*± 0.796*
	% Ground Water	94.4%	84.0%	86.0%	77.1%	72.2%	78.4%	81.0%	78.7%	81.3%
	Confidence Interval	*± 6.5%*	*± 15.3%*	*± 5.9%*	*± 10.2%*	*± 5.5%*	*± 8.4%*	*± 8.4%*	*± 0.6%*	*± 7.1%*
	% Surface Water	1.2%	3.4%	3.5%	11.8%	16.6%	13.0%	7.0%	8.8%	8.3%
	Confidence Interval	*± 3.5%*	*± 2.9%*	*± 7.1%*	*± 12.7%*	*± 12.0%*	*± 10.4%*	*± 4.9%*	*± 1.4%*	*± 3.7%*
	% Purchased Water	7.2%	12.6%	10.5%	11.2%	11.2%	8.7%	12.0%	12.5%	10.9%
	Confidence Interval	*± 13.9%*	*± 18.0%*	*± 2.9%*	*± 12.0%*	*± 10.6%*	*± 3.9%*	*± 4.9%*	*± 1.6%*	*± 6.3%*
Observations		159	214	141	142	153	118	53	40	1,020
Primarily Surface Systems										
100%	Avg. Daily Production	0.017	0.108	0.123	0.364	0.992	4.270	12.974	75.904	3.886
	Confidence Interval	*± 0.008*	*± 0.094*	*± 0.043*	*± 0.035*	*± 0.118*	*± 0.202*	*± 2.358*	*± 5.251*	*± 0.425*
Mostly	Avg. Daily Production		0.066	0.116	0.456	0.963	4.683	12.979	56.808	9.980
	Confidence Interval		*± 0.076*	*± 0.008*	*± 0.380*	*± 0.451*	*± 1.666*	*± 2.076*	*± 12.458*	*± 3.195*
	% Ground Water		6.8%	24.7%	6.2%	8.2%	11.7%	9.9%	16.3%	10.4%
	Confidence Interval		*± 5.1%*	*± 7.8%*	*± 6.9%*	*± 5.3%*	*± 6.5%*	*± 3.9%*	*± 6.3%*	*± 2.9%*
	% Surface Water		88.2%	75.3%	86.2%	86.8%	83.0%	85.6%	73.8%	83.6%
	Confidence Interval		*± 5.5%*	*± 7.8%*	*± 10.8%*	*± 5.9%*	*± 5.9%*	*± 6.3%*	*± 3.7%*	*± 3.3%*
	% Purchased Water		4.9%	0.0%	7.5%	5.0%	5.3%	4.5%	9.9%	6.0%
	Confidence Interval		*± 6.5%*	*± 0.0%*	*± 7.3%*	*± 5.3%*	*± 3.3%*	*± 2.9%*	*± 6.7%*	*± 2.0%*
Observations		52	79	48	67	64	82	60	58	510
Primarily Purchased Systems										
100%	Avg. Daily Production	0.007	0.089	0.088	0.240	0.620	4.256	8.455	20.852	0.741
	Confidence Interval	*± 0.002*	*± 0.106*	*± 0.024*	*± 0.039*	*± 0.190*	*± 1.870*	*± 1.829*	*± 2.860*	*± 0.169*
Mostly	Avg. Daily Production		0.047	0.154	0.123	1.071	2.804	12.135	45.814	5.142
	Confidence Interval		*± 0.049*	*± 0.216*	*± 0.027*	*± 0.349*	*± 1.064*	*± 4.614*	*± 3.226*	*± 2.205*
	% Ground Water		4.0%	32.3%	19.3%	17.6%	13.0%	27.3%	18.9%	20.9%
	Confidence Interval		*± 13.9%*	*± 14.3%*	*± 6.3%*	*± 12.5%*	*± 8.0%*	*± 6.5%*	*± 6.3%*	*± 5.9%*
	% Surface Water		0.0%	0.7%	0.0%	11.0%	12.4%	0.0%	1.9%	5.3%
	Confidence Interval		*± 0.0%*	*± 2.0%*	*± 0.0%*	*± 18.4%*	*± 11.6%*	*± 0.0%*	*± 0.8%*	*± 5.7%*
	% Purchased Water		96.0%	67.0%	80.7%	71.4%	74.7%	72.7%	79.2%	73.8%
	Confidence Interval		*± 13.9%*	*± 15.3%*	*± 6.3%*	*± 10.2%*	*± 5.7%*	*± 6.5%*	*± 6.3%*	*± 4.5%*
Observations		34	109	87	73	65	30	26	26	450

Data: Q. 4

Notes: To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each type of water source within each Mostly category may represent a slightly different set of systems overall; the sum of water source types by percent may not equal 100% (See General Note 3)

Definitions: 100%: system obtains all water from indicated type of source
Mostly: system obtains highest percentage of water from indicated type of source

Table 2 - 5
Average Number of Wells
by Primary Water Source

Primary Water Source/ Type of Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Wells								
Mean	1.5	2.0	2.3	3.1	4.6	9.8	16.1	49.9
Confidence Interval	± *0.2*	± *0.2*	± *0.2*	± *0.3*	± *1.1*	± *1.8*	± 2.2	± *1.4*
Median	1.0	2.0	2.0	3.0	4.0	7.0	14.0	34.0
Observations	125	187	129	139	146	114	48	38
Primarily Surface Systems								
Wells								
Mean	0.0	0.1	0.2	0.1	0.4	0.5	3.1	14.1
Confidence Interval	± *0.0*	± *0.1*	± *0.3*	± *0.1*	± *0.2*	± *0.1*	± 2.5	± *12.7*
Median	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	33	57	42	59	64	80	59	58
Primarily Purchased Systems								
Wells								
Mean	0.0	0.4	1.0	0.6	2.0	2.1	8.7	14.7
Confidence Interval	± *0.0*	± *0.7*	± *0.3*	± *0.7*	± *1.4*	± *0.8*	± *6.6*	± *8.5*
Median	0.0	0.0	1.0	0.0	0.0	1.0	5.0	5.0
Observations	2	15	9	11	16	16	13	17

Data: Q. 18, Q. 20

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 6
Comparison of Average Daily Treated Production to Maximum Daily Treatment Design Capacity by Primary Water Source
(MGD)

Primary Water Source/ Maximum Daily Capacity & Average Daily Production	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Average Daily Treated Production	0.012	0.034	0.093	0.314	0.933	4.081	11.201	60.700	1.350
Confidence Interval	*± 0.008*	*± 0.006*	*± 0.020*	*± 0.057*	*± 0.078*	*± 0.376*	*± 1.200*	*± 5.788*	*± 0.114*
Maximum Daily Treatment Design Capacity	0.075	0.215	0.465	1.404	2.536	9.985	27.263	124.778	3.262
Confidence Interval	*± 0.047*	*± 0.094*	*± 0.112*	*± 0.625*	*± 0.214*	*± 1.056*	*± 2.995*	*± 13.989*	*± 0.282*
Ratio: Average to Maximum	0.27	0.32	0.32	0.36	0.41	0.46	0.45	0.51	0.34
Confidence Interval	*± 0.08*	*± 0.04*	*± 0.06*	*± 0.02*	*± 0.03*	*± 0.03*	*± 0.03*	*± 0.02*	*± 0.02*
Observations	74	145	129	149	168	180	94	82	1,021
Primarily Ground Systems									
Average Daily Treated Production	0.011	0.031	0.091	0.298	0.895	3.781	9.795	55.137	0.647
Confidence Interval	*± 0.008*	*± 0.006*	*± 0.022*	*± 0.069*	*± 0.094*	*± 0.449*	*± 1.872*	*± 0.900*	*± 0.053*
Maximum Daily Treatment Design Capacity	0.075	0.209	0.476	1.260	2.523	10.054	25.660	119.524	1.801
Confidence Interval	*± 0.047*	*± 0.102*	*± 0.122*	*± 0.666*	*± 0.218*	*± 1.268*	*± 4.706*	*± 2.278*	*± 0.184*
Ratio: Average to Maximum	0.27	0.31	0.32	0.35	0.40	0.43	0.40	0.52	0.33
Confidence Interval	*± 0.09*	*± 0.05*	*± 0.07*	*± 0.03*	*± 0.04*	*± 0.04*	*± 0.06*	*± 0.00*	*± 0.02*
Observations	50	108	91	94	110	102	42	29	626
Primarily Surface Systems									
Average Daily Treated Production	0.021	0.087	0.116	0.366	1.016	4.519	12.424	62.684	5.027
Confidence Interval	*± 0.014*	*± 0.045*	*± 0.037*	*± 0.051*	*± 0.118*	*± 0.535*	*± 1.233*	*± 7.926*	*± 0.672*
Maximum Daily Treatment Design Capacity	0.078	0.319	0.355	1.869	2.564	9.883	28.658	126.651	10.899
Confidence Interval	*± 0.045*	*± 0.184*	*± 0.088*	*± 1.229*	*± 0.525*	*± 2.109*	*± 4.590*	*± 18.918*	*± 1.499*
Ratio: Average to Maximum	0.31	0.38	0.38	0.38	0.45	0.50	0.49	0.51	0.43
Confidence Interval	*± 0.05*	*± 0.05*	*± 0.05*	*± 0.04*	*± 0.06*	*± 0.04*	*± 0.05*	*± 0.02*	*± 0.02*
Observations	24	37	38	55	58	78	52	53	395

Data: Q. 18, Q. 5B

Notes: The maximum daily treatment design capacity shown above may differ slightly from that reported in Table 2-7. Although the same variable is tabulated in both tables, the tables report mean values based on different sets of observations. Each table uses the maximum number of observations containing responses for both variables needed to calculate each ratio reported in the respective table.
Similarly, the reported ratio of average to maximum may not be replicable by dividing the reported average by the reported maximum, since more observations may have been available to calculate the average and maximum separately than were available to calculate the ratio. The latter could be calculated only for systems that reported both their average their maximum. (See General Notes 2 & 3)

Definitions: Primarily: system obtains all or highest percentage of water from stated source
All: excludes primarily purchased water systems

Table 2 - 7
Comparison of Peak Daily Production to Maximum Daily Treatment Design Capacity
by Primary Water Source
(MGD)

Primary Water Source/ Production Data	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Peak Daily Production	0.024	0.068	0.204	0.615	1.615	6.379	17.861	87.769	2.134
Confidence Interval	*± 0.014*	*± 0.014*	*± 0.061*	*± 0.137*	*± 0.188*	*± 0.449*	*± 2.154*	*± 8.283*	*± 0.139*
Maximum Daily Treatment Design Capacity	0.059	0.166	0.444	1.236	2.595	9.799	25.648	120.123	3.186
Confidence Interval	*± 0.022*	*± 0.037*	*± 0.112*	*± 0.406*	*± 0.247*	*± 0.898*	*± 3.177*	*± 14.637*	*± 0.233*
Ratio: Peak to Maximum Production	0.50	0.55	0.58	0.60	0.67	0.70	0.72	0.75	0.58
Confidence Interval	*± 0.05*	*± 0.05*	*± 0.05*	*± 0.05*	*± 0.03*	*± 0.04*	*± 0.03*	*± 0.02*	*± 0.02*
Primarily Ground Systems									
Peak Daily Production	0.023	0.057	0.202	0.553	1.647	6.286	18.425	93.741	1.079
Confidence Interval	*± 0.014*	*± 0.012*	*± 0.067*	*± 0.139*	*± 0.249*	*± 0.521*	*± 3.497*	*± 1.543*	*± 0.086*
Maximum Daily Treatment Design Capacity	0.058	0.152	0.450	1.041	2.672	10.052	25.564	125.287	1.691
Confidence Interval	*± 0.024*	*± 0.039*	*± 0.123*	*± 0.227*	*± 0.290*	*± 1.311*	*± 4.729*	*± 2.474*	*± 0.157*
Ratio: Peak to Maximum Production	0.50	0.54	0.57	0.57	0.66	0.69	0.73	0.77	0.56
Confidence Interval	*± 0.05*	*± 0.05*	*± 0.05*	*± 0.06*	*± 0.05*	*± 0.06*	*± 0.03*	*± 0.00*	*± 0.03*
Primarily Surface Systems									
Peak Daily Production	0.043	0.248	0.224	0.759	1.644	6.695	19.120	93.130	7.972
Confidence Interval	*± 0.025*	*± 0.135*	*± 0.053*	*± 0.202*	*± 0.323*	*± 1.100*	*± 2.468*	*± 9.678*	*± 1.141*
Maximum Daily Treatment Design Capacity	0.078	0.422	0.398	1.898	2.537	9.700	27.750	128.331	11.437
Confidence Interval	*± 0.043*	*± 0.094*	*± 0.088*	*± 1.317*	*± 0.515*	*± 2.160*	*± 4.561*	*± 18.934*	*± 1.715*
Ratio: Peak to Maximum Production	0.57	0.60	0.61	0.66	0.69	0.72	0.74	0.77	0.67
Confidence Interval	*± 0.05*	*± 0.10*	*± 0.08*	*± 0.05*	*± 0.04*	*± 0.07*	*± 0.05*	*± 0.01*	*± 0.03*
Primarily Purchased Systems									
Peak Daily Production		0.060	0.235	1.628	1.184	4.592	9.253	24.672	3.149
Confidence Interval		*± 0.057*	*± 0.065*	*± 2.568*	*± 0.786*	*± 3.032*	*± 6.742*	*± 8.120*	*± 1.290*
Maximum Daily Treatment Design Capacity		0.095	0.368	1.822	2.064	7.101	15.513	35.069	4.805
Confidence Interval		*± 0.094*	*± 0.190*	*± 2.562*	*± 1.887*	*± 4.279*	*± 9.849*	*± 10.709*	*± 1.925*
Ratio: Peak to Maximum Production		0.85	0.80	0.72	0.71	0.62	0.58	0.58	0.71
Confidence Interval		*± 0.20*	*± 0.20*	*± 0.25*	*± 0.20*	*± 0.25*	*± 0.11*	*± 0.07*	*± 0.11*

Data: Q. 5A, Q. 5B

Notes: The maximum daily treatment design capacity shown above may differ slightly from that reported in Table 2-6. Although the same variable is tabulated in both tables, the tables report mean values based on different sets of observations. Each table uses the maximum number of observations containing responses for both variables needed to calculate each ratio reported in the respective table.
Similarly, the reported ratio of peak to maximum may not be replicable by dividing the reported peak by the reported maximum, since more observations may have been available to calculate the peak and maximum separately than were available to calculate the ratio. The latter could be calculated only for systems that reported both their peak and their maximum. (See General Notes 2 & 3)

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 8
Service Connection Profile
by Ownership Type and Customer Category
(Number of Connections)

Ownership Type/ Connection Data/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Total Connections								
Mean	28.4	114.2	309.5	732.0	2,145.2	7,501.6	20,972.0	90,882.0
Confidence Interval	*± 3.2*	*± 12.5*	*± 17.9*	*± 30.5*	*± 136.6*	*± 637.0*	*± 1,108.5*	*± 5,538.6*
Median	25.0	93.0	280.0	666.0	1,938.0	6,504.0	21,200.0	58,600.5
Observations	131	243	196	208	197	159	102	87
Mean by Customer Category								
Residential	27.6	109.9	288.8	638.6	1,859.8	6,522.1	18,216.3	81,342.6
Confidence Interval	*± 2.4*	*± 11.4*	*± 21.0*	*± 47.1*	*± 151.2*	*± 406.4*	*± 1,229.8*	*± 5,147.9*
Commercial/Industrial	0.3	4.4	14.3	45.5	156.9	587.6	1,541.5	5,705.7
Confidence Interval	*± 0.4*	*± 1.0*	*± 3.5*	*± 5.6*	*± 24.1*	*± 142.8*	*± 233.0*	*± 859.8*
Wholesale	0.0	0.1	0.2	0.5	1.2	2.8	2.8	16.5
Confidence Interval	*± 0.0*	*± 0.1*	*± 0.2*	*± 0.3*	*± 1.1*	*± 2.9*	*± 1.2*	*± 3.2*
Governmental	0.0	0.6	2.1	1.9	6.2	34.4	57.8	201.5
Confidence Interval	*± 0.0*	*± 0.4*	*± 2.8*	*± 1.1*	*± 1.8*	*± 11.6*	*± 18.8*	*± 44.1*
Agricultural	0.1	0.4	0.7	2.6	0.7	8.7	27.4	25.8
Confidence Interval	*± 0.1*	*± 0.3*	*± 0.3*	*± 2.4*	*± 0.5*	*± 12.8*	*± 20.4*	*± 3.8*
Other (includes combined)	0.5	1.0	4.7	54.9	158.0	442.6	1,151.1	3,947.2
Confidence Interval	*± 0.8*	*± 1.3*	*± 10.9*	*± 30.2*	*± 56.6*	*± 433.0*	*± 1,002.6*	*± 1,622.4*
Public Systems								
Total Connections								
Mean	43.5	132.9	334.6	754.6	2,231.0	7,388.5	20,760.7	91,176.9
Confidence Interval	*± 13.7*	*± 19.6*	*± 24.2*	*± 36.2*	*± 176.5*	*± 799.1*	*± 1,277.4*	*± 6,064.1*
Median	29.0	114.0	310.0	700.0	2,025.0	6,300.0	21,439.0	59,087.0
Observations	38	110	107	124	101	96	84	74
Mean by Customer Category								
Residential	41.5	123.9	314.1	649.6	1,901.1	6,403.0	18,549.2	81,877.5
Confidence Interval	*± 13.9*	*± 18.7*	*± 23.2*	*± 52.7*	*± 181.6*	*± 562.5*	*± 1,064.0*	*± 5,656.1*
Commercial/Industrial	0.5	7.4	19.3	53.5	183.2	590.6	1,612.0	5,643.4
Confidence Interval	*± 0.3*	*± 2.1*	*± 5.6*	*± 7.9*	*± 30.0*	*± 158.1*	*± 255.6*	*± 946.8*
Wholesale	0.0	0.1	0.3	0.5	1.3	3.1	3.1	18.2
Confidence Interval	*± 0.0*	*± 0.2*	*± 0.3*	*± 0.4*	*± 1.3*	*± 3.4*	*± 1.3*	*± 3.6*
Governmental	0.1	1.0	0.9	2.3	7.7	32.5	51.5	203.7
Confidence Interval	*± 0.2*	*± 0.7*	*± 0.5*	*± 1.5*	*± 2.6*	*± 12.5*	*± 21.6*	*± 49.2*
Agricultural	0.5	0.5	0.9	1.7	0.6	7.0	29.8	28.6
Confidence Interval	*± 0.4*	*± 0.5*	*± 0.4*	*± 2.3*	*± 0.2*	*± 13.6*	*± 23.7*	*± 4.5*
Other (includes combined)	1.1	2.0	1.1	56.2	184.6	465.8	375.9	3,754.3
Confidence Interval	*± 2.1*	*± 3.1*	*± 0.6*	*± 34.1*	*± 64.1*	*± 506.8*	*± 432.1*	*± 1,787.8*
Private Systems								
Total Connections								
Mean	25.9	104.6	268.0	658.8	1,867.2	8,181.3	22,417.4	88,177.2
Confidence Interval	*± 1.9*	*± 15.1*	*± 25.4*	*± 61.5*	*± 152.3*	*± 1,216.2*	*± 964.3*	*± 8,223.2*
Median	22.0	75.0	247.0	590.0	1,614.0	6,655.0	19,988.0	56,638.0
Observations	61	98	87	84	96	63	18	13
Mean by Customer Category								
Residential	25.0	103.7	245.7	602.0	1,729.0	7,232.8	15,837.4	76,436.7
Confidence Interval	*± 1.2*	*± 13.3*	*± 40.0*	*± 104.2*	*± 170.0*	*± 1,115.9*	*± 4,563.0*	*± 6,938.3*
Commercial/Industrial	0.1	3.0	6.9	19.7	71.1	570.1	1,075.9	6,273.1
Confidence Interval	*± 0.2*	*± 0.9*	*± 2.9*	*± 10.3*	*± 28.8*	*± 256.0*	*± 311.2*	*± 471.2*
Wholesale	0.0	0.0	0.0	0.5	0.9	1.2	1.0	1.7
Confidence Interval	*± 0.0*	*± 0.0*	*± 0.0*	*± 0.6*	*± 0.5*	*± 0.9*	*± 0.3*	*± 0.3*
Governmental	0.0	0.2	4.1	0.8	1.6	45.9	96.4	182.2
Confidence Interval	*± 0.0*	*± 0.3*	*± 7.4*	*± 0.4*	*± 1.5*	*± 30.1*	*± 26.7*	*± 10.5*
Agricultural	0.0	0.3	0.4	5.3	1.2	17.8	13.6	0.0
Confidence Interval	*± 0.0*	*± 0.2*	*± 0.5*	*± 5.5*	*± 2.0*	*± 31.3*	*± 4.2*	*± 0.0*
Other (includes combined)	0.8	0.4	10.9	51.1	74.6	315.2	5,982.4	5,827.5
Confidence Interval	*± 1.2*	*± 0.5*	*± 25.6*	*± 55.6*	*± 71.7*	*± 287.6*	*± 3,782.0*	*± 1,164.7*

Table 2 - 8
Service Connection Profile
by Ownership Type and Customer Category
(Number of Connections)

Ownership Type/ Connection Data/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Ancillary Systems								
Total Connections								
Mean	27.5	88.9	310.0					
Confidence Interval	*± 5.5*	*± 12.5*	*± 53.7*					
Median	26.0	62.0	336.0					
Observations	32	35	2					
Mean by Customer Category								
Residential	27.1	88.6	310.0					
Confidence Interval	*± 4.8*	*± 12.4*	*± 53.7*					
Commercial/Industrial	0.5	0.0	0.0					
Confidence Interval	*± 0.9*	*± 0.0*	*± 0.0*					
Wholesale								
Confidence Interval								
Governmental								
Confidence Interval								
Agricultural								
Confidence Interval								
Other (includes combined)	0.0	0.0	0.0					
Confidence Interval	*± 0.0*	*± 0.0*	*± 0.0*					

Data: Q. 11B, Q. 31

Notes: Question 11B was the source of data for Total Connections, while Question 31 was the source for Mean by Customer category. To ensure reasonable comparability, the table includes only systems whose total connections, as reported for explicit categories (Q. 31), account for an amount within +/- 10% of total connections as reported in Q. 11B.

The sum of the individual customer category values may not equal the reported total connections:
- The 10% tolerance was allowed between report by category and total report
- To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within ownership type may represent a slightly different set of systems overall (See General Note 3)

Definitions: Connections: Includes metered and unmetered connections
Other: Includes connections for miscellaneous customer categories and connections for which systems that could not distinguish between two or more customer categories

Table 2 - 9
Annual Deliveries per Customer Service Connection
by Ownership Type and Customer Category
(Thousands of Gallons)

Ownership Type / Delivery Data/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Annual Deliveries/Connection								
Mean	139	114	113	128	138	205	193	222
Confidence Interval	*± 76*	*± 23*	*± 22*	*± 13*	*± 21*	*± 44*	*± 15*	*± 23*
Median	64	78	76	98	112	147	170	191
Observations	101	214	185	201	193	153	100	81
Mean by Customer Category								
Residential	123	99	104	87	97	109	119	125
Confidence Interval	*± 47*	*± 21*	*± 26*	*± 9*	*± 20*	*± 10*	*± 9*	*± 9*
Commercial/Industrial	50	313	432	1,018	965	582	1,873	1,011
Confidence Interval	*± 29*	*± 161*	*± 165*	*± 366*	*± 445*	*± 109*	*± 335*	*± 68*
Wholesale		9,953	9,752	19,082	41,201	91,002	146,390	589,736
Confidence Interval		*± 7,943*	*± 12,852*	*± 7,120*	*± 23,234*	*± 34,313*	*± 46,709*	*± 150,078*
Governmental	90	110	344	3,067	1,409	14,218	30,347	20,872
Confidence Interval	*± 136*	*± 40*	*± 217*	*± 3,658*	*± 739*	*± 12,918*	*± 28,105*	*± 8,952*
Agricultural	195	97	505	1,029	587	754	3,663	3,030
Confidence Interval	*± 243*	*± 39*	*± 214*	*± 674*	*± 487*	*± 344*	*± 3,254*	*± 29*
Other (includes combined)	87	205	4,041	1,615	7,592	6,037	42,344	55,924
Confidence Interval	**	*± 183*	*± 2,604*	*± 1,602*	*± 11,485*	*± 4,503*	*± 58,249*	*± 11,549*
Public Systems								
Annual Deliveries/Connection								
Mean	82	105	108	128	136	207	195	229
Confidence Interval	*± 19*	*± 22*	*± 14*	*± 17*	*± 22*	*± 50*	*± 16*	*± 25*
Median	67	71	78	100	113	155	180	195
Observations	28	93	102	121	100	93	83	68
Mean by Customer Category								
Residential	81	93	97	82	87	108	122	127
Confidence Interval	*± 21*	*± 29*	*± 23*	*± 6*	*± 10*	*± 11*	*± 10*	*± 9*
Commercial/Industrial	48	229	383	1,061	855	602	962	1,052
Confidence Interval	*± 36*	*± 94*	*± 169*	*± 453*	*± 390*	*± 134*	*± 240*	*± 75*
Wholesale		7,703	9,919	22,438	45,575	95,185	126,889	632,135
Confidence Interval		*± 6,245*	*± 15,621*	*± 7,868*	*± 33,030*	*± 36,333*	*± 47,615*	*± 172,248*
Governmental	90	112	391	2,675	1,493	16,442	34,482	24,566
Confidence Interval	*± 136*	*± 42*	*± 225*	*± 4,203*	*± 773*	*± 15,364*	*± 31,380*	*± 9,872*
Agricultural	195	101	298	1,096	797	531	3,117	3,030
Confidence Interval	*± 243*	*± 51*	*± 175*	*± 772*	*± 584*	*± 0*	*± 3,422*	*± 29*
Other (includes combined)	87	53	5,257	1,594	8,302	4,012	53,702	59,237
Confidence Interval	*± 0*	*± 27*	*± 7,665*	*± 1,985*	*± 12,576*	*± 4,159*	*± 75,518*	*± 12,758*
Private Systems								
Annual Deliveries/Connection								
Mean	136	136	98	128	144	192	175	169
Confidence Interval	*± 121*	*± 49*	*± 25*	*± 16*	*± 33*	*± 68*	*± 2*	*± 13*
Median	80	81	77	90	96	130	175	170
Observations	46	89	81	80	93	60	17	13
Mean by Customer Category								
Residential	92	110	88	102	124	110	96	114
Confidence Interval	*± 23*	*± 38*	*± 26*	*± 23*	*± 54*	*± 14*	*± 1*	*± 12*
Commercial/Industrial		534	583	836	1,488	493	8,114	729
Confidence Interval		*± 481*	*± 456*	*± 277*	*± 1,705*	*± 132*	*± 657*	*± 52*
Wholesale		25,413	8,021	9,264	31,140	50,674	343,625	194,286
Confidence Interval		*± 35,572*	*± 852*	*± 8,008*	*± 17,887*	*± 23,013*	*± 62,146*	*± 0*
Governmental		95	180	7,015	832	1,479	2,026	1,763
Confidence Interval		*± 51*	*± 218*	*± 8,587*	*± 508*	*± 516*	*± 38*	*± 108*
Agricultural		83	879	474	262	1,113	8,500	
Confidence Interval		*± 51*	*± 800*	*± 291*	*± 285*	*± 708*	*± 0*	
Other (includes combined)		475	1,656	1,685	4,654	12,930	516	346
Confidence Interval		*± 47*	*± 3,317*	*± 3,024*	*± 8,543*	*± 15,456*	*± 311*	*± 18*

Table 2 - 9
Annual Deliveries per Customer Service Connection
by Ownership Type and Customer Category
(Thousands of Gallons)

Ownership Type	Service Population Category							
Delivery Data/ Customer Category	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Ancillary Systems								
Annual Deliveries/Connection								
Mean	159	85	475					
Confidence Interval	*± 71*	*± 12*	*± 780*					
Median	56	70	504					
Observations	27	32	2					
Mean by Customer Category								
Residential	169	85	475					
Confidence Interval	*± 85*	*± 12*	*± 780*					
Commercial/Industrial	57							
Confidence Interval	**							
Wholesale								
Confidence Interval								
Governmental								
Confidence Interval								
Agricultural								
Confidence Interval								
Other (includes combined)								
Confidence Interval								

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 11B, Q. 31

Notes: Question 11B is the source of connection data for total Annual Deliveries/Connection, while Question 31 is the source for Mean by Customer Category. To ensure reasonable comparability, the table includes only systems whose total connections, as reported for explicit categories (Q. 31), account for an amount within +/- 10% of total connections as reported in Q. 11B.

The sum of the individual customer category values may not equal the reported total annual deliveries per connection, for the following reason: Averages are calculated in each customer category only for systems reporting non-zero deliveries in the category, that is, individual customer category line items represent the average only across systems having that customer category; however, the line item Annual Deliveries/Connection represents the average across all customer categories and all systems.

Definitions: Connections: Includes metered and unmetered connections
Other: Includes connections for miscellaneous customer categories and connections for which systems that could not distinguish between two or more customer categories

Table 2 - 10
Water Systems Not Providing Any Treatment
by Primary Water Source

Primary Water Source/ Non-treatment Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Percent of Systems	30.5%	15.7%	10.7%	11.8%	4.7%	0.9%	0.0%	0.9%
Confidence Interval	*± 8.6%*	*± 4.1%*	*± 8.2%*	*± 3.5%*	*± 1.8%*	*± 1.4%*	*± 0.0%*	*± 0.2%*
# of Wells or Intakes	1.4	1.7	2.2	2.8	6.1	12.2		23.0
Confidence Interval	*± 0.1*	*± 0.4*	*± 0.4*	*± 0.6*	*± 3.9*	*± 14.1*		*± 0.0*
Primarily Ground Systems								
Percent of Systems	31.2%	16.5%	11.6%	14.6%	6.3%	1.5%	0.0%	2.8%
Confidence Interval	*± 8.8%*	*± 4.5%*	*± 8.8%*	*± 4.3%*	*± 2.2%*	*± 2.4%*	*± 0.0%*	*± 0.2%*
# of Wells or Intakes	1.4	1.7	2.2	2.8	6.1	12.2		23.0
Confidence Interval	*± 0.1*	*± 0.4*	*± 0.4*	*± 0.6*	*± 3.9*	*± 14.1*		*± 0.0*
Primarily Surface Systems								
Percent of Systems	6.1%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 3.3%*	*± 6.1%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
# of Wells or Intakes	1.4	2.0						
Confidence Interval	*± 0.7*	**						

** : Insufficient observations to calculate confidence interval

Data: Q. 18

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 11
Treatment Facilities per System
by Primary Water Source

Primary Water Source/ Facility Characteristics/ Water Source Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
# Treatment Facilities/System	1.1	1.3	1.5	1.5	1.9	3.0	3.4	5.8
Confidence Interval	*± 0.1*	*± 0.1*	*± 0.2*	*± 0.2*	*± 0.2*	*± 0.5*	*± 0.6*	*± 2.0*
# Wells/Facility	1.3	1.5	1.6	1.8	2.1	2.8	3.7	8.5
Confidence Interval	*± 0.2*	*± 0.2*	*± 0.2*	*± 0.2*	*± 0.3*	*± 1.1*	*± 1.5*	*± 2.5*
% Facilities Treating Surface Water	99.4%	99.0%	96.1%	94.0%	87.3%	90.3%	84.5%	83.2%
Confidence Interval	*± 1.2%*	*± 1.0%*	*± 2.2%*	*± 5.9%*	*± 5.1%*	*± 3.5%*	*± 7.3%*	*± 6.3%*
Primarily Ground Systems								
# Treatment Facilities/System	1.1	1.3	1.5	1.6	2.1	4.1	5.0	8.4
Confidence Interval	*± 0.1*	*± 0.1*	*± 0.2*	*± 0.2*	*± 0.2*	*± 0.9*	*± 0.8*	*± 0.5*
# Wells/Facility	1.4	1.7	1.8	2.3	3.0	4.7	5.6	24.6
Confidence Interval	*± 0.2*	*± 0.2*	*± 0.3*	*± 0.3*	*± 0.5*	*± 1.8*	*± 1.6*	*± 2.6*
% Facilities Treating Surface Water	98.4%	97.4%	95.4%	65.1%	65.6%	57.6%	44.5%	39.8%
Confidence Interval	*± 3.5%*	*± 2.5%*	*± 7.8%*	*± 41.0%*	*± 18.8%*	*± 28.8%*	*± 23.1%*	*± 0.2%*
Primarily Surface Systems								
# Treatment Facilities/System	1.0	1.1	1.1	1.1	1.3	1.3	2.4	5.0
Confidence Interval	*± 0.0*	*± 0.1*	*± 0.1*	*± 0.1*	*± 0.2*	*± 0.1*	*± 0.8*	*± 3.3*
# Wells/Facility	0.0	0.1	0.0	0.0	0.2	0.3	1.2	2.1
Confidence Interval	*± 0.0*	*± 0.1*	*± 0.0*	*± 0.0*	*± 0.1*	*± 0.1*	*± 1.4*	*± 2.4*
% Facilities Treating Surface Water	100.0%	99.4%	96.0%	97.7%	92.2%	94.4%	86.8%	86.3%
Confidence Interval	*± 0.0%*	*± 1.2%*	*± 2.5%*	*± 2.4%*	*± 5.3%*	*± 1.8%*	*± 7.4%*	*± 6.9%*
Primarily Purchased Systems								
# Treatment Facilities/System	1.0	1.1	1.0	1.1	2.1	2.6	1.6	4.6
Confidence Interval	*± 0.0*	*± 0.1*	*± 0.0*	*± 0.2*	*± 0.9*	*± 0.6*	*± 0.5*	*± 3.0*
# Wells/Facility	0.0	0.3	1.0	0.6	0.8	0.6	7.9	6.9
Confidence Interval	*± 0.0*	*± 0.5*	*± 0.3*	*± 0.7*	*± 0.6*	*± 0.2*	*± 7.1*	*± 3.1*
% Facilities Treating Surface Water	100.0%	100.0%	100.0%	100.0%	86.8%	81.4%	93.8%	78.0%
Confidence Interval	**	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 25.9%*	*± 8.4%*	*± 16.5%*	*± 14.9%*

**** :** Insufficient observations to calculate confidence interval

Data: Q. 18

Notes: Table includes systems reporting zero wells or surface intakes

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 12
Wells and Intakes Not Receiving Treatment
by Primary Water Source

Primary Water Source/ Overall System Data/ Data by Type of Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
# Sources Untreated/System	1.4	1.8	2.1	2.5	5.1	6.1	12.4	15.4
Confidence Interval	± 0.1	± 0.3	± 0.3	± 0.5	± 3.6	± 4.3	± 6.6	± 2.1
# Wells Untreated/System	1.4	1.8	2.1	2.4	5.2	6.1	12.4	15.4
Confidence Interval	± 0.1	± 0.3	± 0.3	± 0.6	± 3.2	± 4.3	± 6.6	± 2.1
# Surface Intakes Untreated/System	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Confidence Interval	± 0.0	± 0.0	± 0.0	± 0.1	± 0.2	± 0.0	± 0.0	± 0.0
Primarily Ground Systems								
# Sources Untreated/System	1.4	1.8	2.1	2.5	5.5	7.3	15.7	16.0
Confidence Interval	± 0.1	± 0.4	± 0.3	± 0.5	± 4.6	± 5.2	± 7.2	± 0.2
# Wells Untreated/System	1.4	1.8	2.1	2.5	5.8	7.3	15.7	16.0
Confidence Interval	± 0.1	± 0.3	± 0.4	± 0.6	± 3.9	± 5.2	± 7.2	± 0.2
# Surface Intakes Untreated/System	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Confidence Interval	± 0.0	± 0.0	± 0.0	± 0.1	± 0.0	± 0.0	± 0.0	± 0.0
Primarily Surface Systems								
# Sources Untreated/System	1.3	1.8	4.0	3.0	1.1	1.0	5.0	21.0
Confidence Interval	± 0.6	± 0.4	± 0.0	± 0.0	± 1.7	**	± 0.0	± 28.3
# Wells Untreated/System	0.2	0.8	4.0	3.0	0.3	1.0	5.0	21.0
Confidence Interval	± 0.2	± 0.4	± 0.0	± 0.0	± 3.3	**	± 0.0	± 28.3
# Surface Intakes Untreated/System	1.1	1.0	0.0	0.0	0.9	0.0	0.0	0.0
Confidence Interval	± 0.6	± 0.0	± 0.0	± 0.0	± 1.7	± 0.0	± 0.0	± 0.0
Primarily Purchased Systems								
# Sources Untreated/System		1.0		1.0		1.0	3.9	8.7
Confidence Interval		**		± 0.0		**	± 0.5	± 0.2
# Wells Untreated/System		1.0		0.0		1.0	3.9	8.7
Confidence Interval		**		± 0.0		**	± 0.5	± 0.2
# Surface Intakes Untreated/System		0.0		1.0		0.0	0.0	0.0
Confidence Interval		± 0.0		**		± 0.0	± 0.0	± 0.0

**** :** Insufficient observations to calculate confidence interval

Data: Q. 20

Notes: Table includes systems that treat none or only part of their sources

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 13
Treatment Facility Flow Characteristics
by Primary Water Source and Type of Water Source
(Gallons/Day)

Primary Water Source/ Type of Water Source/ Water Source Flow Characteristics	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Ground Water Sources								
Combined Average Daily Flow	10,325	27,193	72,894	226,074	547,119	1,836,187	4,027,283	15,660,059
Confidence Interval	*± 6,351*	*± 4,311*	*± 14,874*	*± 41,588*	*± 55,117*	*± 548,001*	*± 1,015,296*	*± 513,865*
Combined Potential Flow	76,457	138,178	551,808	1,142,112	1,658,138	4,294,325	9,692,928	39,469,975
Confidence Interval	*± 23,965*	*± 11,833*	*± 425,483*	*± 557,387*	*± 277,680*	*± 1,147,462*	*± 2,107,293*	*± 1,657,433*
Surface Intakes								
Combined Average Daily Flow	10,012	22,455		48,300	335,690	197,934	1,203,035	2,995,719
Confidence Interval	*± 13,800*	*± 36,152*		*± 31,054*	*± 136,136*	*± 155,581*	*± 876,268*	*± 147,783*
Combined Potential Flow	10,112	128,452		829,280	1,085,515	3,922,070	4,510,389	7,084,335
Confidence Interval	*± 6,912*	*± 236,943*		*± 985,183*	*± 500,284*	*± 3,556,198*	*± 5,376,188*	*± 423,250*
Primarily Surface Systems								
Ground Water Sources								
Combined Average Daily Flow			8,659	33,160	51,794	652,834	709,411	4,076,396
Confidence Interval			*± 4,895*	*± 47,403*	*± 22,101*	*± 390,566*	*± 741,002*	*± 1,934,274*
Combined Potential Flow	130,000		97,775	113,622	441,363	1,479,591	3,508,381	9,927,426
Confidence Interval	**		*± 75,450*	*± 54,380*	*± 245,283*	*± 614,653*	*± 2,837,619*	*± 3,404,211*
Surface Intakes								
Combined Average Daily Flow	20,362	68,534	107,893	353,166	921,269	3,743,489	7,581,103	34,557,346
Confidence Interval	*± 12,849*	*± 33,368*	*± 38,946*	*± 71,650*	*± 113,186*	*± 393,541*	*± 1,212,744*	*± 6,613,755*
Combined Potential Flow	66,022	180,150	310,570	1,051,809	2,513,054	9,770,367	21,171,210	82,418,156
Confidence Interval	*± 46,295*	*± 54,903*	*± 58,539*	*± 85,032*	*± 645,119*	*± 3,371,554*	*± 4,819,668*	*± 8,340,901*
Primarily Purchased Systems								
Ground Water Sources								
Combined Average Daily Flow		4,863	89,508	24,925	285,933	302,237	2,630,319	17,960,414
Confidence Interval		*± 5,947*	*± 180,689*	*± 10,361*	*± 397,526*	*± 288,173*	*± 846,316*	*± 7,239,524*
Combined Potential Flow		698,745	183,793	496,291	1,149,646	965,492	7,979,357	23,003,840
Confidence Interval		*± 853,134*	*± 254,868*	*± 395,187*	*± 930,133*	*± 341,879*	*± 3,743,428*	*± 8,564,913*
Surface Intakes								
Combined Average Daily Flow		25,734	38,341	109,624	425,128	2,787,779	8,044,975	8,110,146
Confidence Interval		*± 14,690*	*± 15,985*	*± 65,028*	*± 212,825*	*± 2,094,009*	*± 8,844,654*	*± 329,981*
Combined Potential Flow		426,095	302,266	1,017,498	949,128	5,482,871	15,671,652	28,151,766
Confidence Interval		*± 339,263*	*± 420,997*	*± 1,319,497*	*± 121,116*	*± 2,354,017*	*± 9,564,163*	*± 9,375,978*

**** :** Insufficient observations to calculate confidence interval

Data: Q. 18

Definitions: Combined Average Daily Flow: total of average flows for each individual treated source in the system, totaled separately for ground and water sources
Combined Potential Flow: total of potential flows for each individual treated source in the system, totaled separately for ground and water sources
Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 14
Source Water Protection Methods
by Primary Water Source
(Percent of Systems)

Primary Water Source/ Source Water Protection Program/ Specific Protection Measure	Service Population Category: 100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	Row Total
All Systems									
% Systems with source water protection	27.5%	31.2%	38.5%	35.0%	40.1%	49.2%	51.1%	57.0%	33.8%
Confidence Interval	*± 4.7%*	*± 9.4%*	*± 9.4%*	*± 9.8%*	*± 6.1%*	*± 8.2%*	*± 7.3%*	*± 10.2%*	*± 4.1%*
Education on land use impacts	59.5%	58.6%	68.3%	69.7%	70.2%	65.6%	58.9%	70.0%	63.8%
Confidence Interval	*± 16.9%*	*± 15.3%*	*± 13.9%*	*± 9.8%*	*± 9.2%*	*± 7.8%*	*± 13.7%*	*± 5.1%*	*± 7.3%*
Watershed ownership	37.9%	28.1%	36.5%	49.0%	34.9%	48.2%	42.8%	42.4%	37.4%
Confidence Interval	*± 15.9%*	*± 15.1%*	*± 9.8%*	*± 11.0%*	*± 15.3%*	*± 16.7%*	*± 13.9%*	*± 11.4%*	*± 6.9%*
Zoning or land use controls	58.9%	54.9%	71.9%	69.7%	77.6%	68.0%	67.7%	66.8%	64.2%
Confidence Interval	*± 16.5%*	*± 8.2%*	*± 12.3%*	*± 14.5%*	*± 5.5%*	*± 6.5%*	*± 15.9%*	*± 12.3%*	*± 5.3%*
Best management practices	62.6%	53.5%	66.3%	64.5%	59.9%	56.3%	56.9%	70.1%	60.1%
Confidence Interval	*± 20.0%*	*± 15.5%*	*± 10.2%*	*± 13.1%*	*± 10.4%*	*± 6.3%*	*± 10.4%*	*± 11.0%*	*± 5.3%*
Other	11.2%	16.6%	0.2%	2.0%	8.9%	15.3%	18.4%	33.8%	10.2%
Confidence Interval	*± 7.3%*	*± 7.6%*	*± 0.4%*	*± 1.0%*	*± 6.7%*	*± 5.9%*	*± 11.2%*	*± 5.5%*	*± 2.5%*
Primarily Ground Systems									
% Systems with source water protection	28.0%	33.3%	44.4%	40.3%	48.0%	59.4%	78.8%	75.1%	35.9%
Confidence Interval	*± 5.1%*	*± 10.4%*	*± 11.2%*	*± 14.7%*	*± 5.3%*	*± 9.4%*	*± 8.8%*	*± 5.1%*	*± 4.9%*
Education on land use impacts	59.9%	58.9%	70.3%	75.0%	73.5%	71.6%	55.5%	77.4%	65.3%
Confidence Interval	*± 17.1%*	*± 16.1%*	*± 14.7%*	*± 9.2%*	*± 11.6%*	*± 9.4%*	*± 14.7%*	*± 0.2%*	*± 8.0%*
Watershed ownership	37.7%	28.8%	35.6%	49.0%	30.0%	47.1%	36.4%	39.0%	36.3%
Confidence Interval	*± 16.1%*	*± 16.3%*	*± 9.8%*	*± 13.1%*	*± 19.2%*	*± 8.0%*	*± 20.0%*	*± 0.4%*	*± 7.8%*
Zoning or land use controls	58.9%	55.1%	71.2%	74.0%	78.1%	68.6%	64.4%	88.0%	64.3%
Confidence Interval	*± 16.7%*	*± 8.6%*	*± 13.7%*	*± 17.2%*	*± 5.9%*	*± 10.2%*	*± 29.2%*	*± 0.8%*	*± 6.1%*
Best management practices	62.8%	53.0%	69.1%	68.0%	60.7%	59.8%	36.7%	68.8%	61.0%
Confidence Interval	*± 20.2%*	*± 16.7%*	*± 10.6%*	*± 15.9%*	*± 13.7%*	*± 7.8%*	*± 9.4%*	*± 0.2%*	*± 6.1%*
Other	11.1%	16.5%	0.0%	1.0%	8.5%	17.5%	19.9%	27.5%	9.9%
Confidence Interval	*± 7.3%*	*± 8.0%*	*± 0.0%*	*± 1.8%*	*± 9.0%*	*± 7.6%*	*± 17.2%*	*± 0.2%*	*± 2.9%*

Table 2 - 14
Source Water Protection Methods by Primary Water Source (Percent of Systems)

Primary Water Source/ Source Water Protection Program/ Specific Protection Measure	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
Primarily Surface Systems									
% Systems with source water protection	21.0%	27.8%	24.5%	33.8%	40.4%	41.4%	40.4%	57.6%	35.0%
Confidence Interval	*± 9.8%*	*± 10.4%*	*± 8.8%*	*± 10.0%*	*± 18.2%*	*± 15.5%*	*± 12.0%*	*± 13.5%*	*± 5.3%*
Education on land use impacts	0.0%	63.2%	68.6%	38.7%	64.0%	56.1%	58.3%	71.3%	55.0%
Confidence Interval	*± 0.0%*	*± 33.1%*	*± 13.1%*	*± 27.2%*	*± 16.3%*	*± 27.6%*	*± 23.7%*	*± 7.3%*	*± 12.0%*
Watershed ownership	61.3%	22.9%	77.6%	54.9%	57.4%	53.2%	48.4%	40.3%	50.6%
Confidence Interval	*± 25.5%*	*± 18.2%*	*± 30.8%*	*± 18.2%*	*± 16.9%*	*± 41.9%*	*± 11.8%*	*± 16.3%*	*± 10.6%*
Zoning or land use controls	61.3%	41.4%	66.5%	62.1%	77.2%	66.7%	66.2%	60.1%	64.0%
Confidence Interval	*± 39.8%*	*± 33.5%*	*± 23.9%*	*± 13.9%*	*± 24.7%*	*± 9.0%*	*± 13.5%*	*± 23.1%*	*± 6.1%*
Best management practices	22.7%	54.4%	50.8%	48.8%	58.8%	51.6%	71.6%	74.8%	54.9%
Confidence Interval	*± 17.2%*	*± 22.0%*	*± 40.8%*	*± 14.1%*	*± 34.5%*	*± 13.7%*	*± 8.6%*	*± 20.6%*	*± 9.8%*
Other	38.7%	28.0%	4.5%	7.3%	14.9%	9.0%	16.4%	37.3%	14.6%
Confidence Interval	*± 25.5%*	*± 22.3%*	*± 8.0%*	*± 10.8%*	*± 15.5%*	*± 13.1%*	*± 12.5%*	*± 12.2%*	*± 6.1%*
Primarily Purchased Systems									
% Systems with source water protection	6.8%	10.9%	14.0%	12.7%	17.5%	25.4%	26.4%	31.9%	14.5%
Confidence Interval	*± 8.0%*	*± 8.4%*	*± 13.3%*	*± 7.3%*	*± 8.8%*	*± 16.1%*	*± 17.1%*	*± 10.8%*	*± 4.1%*
Education on land use impacts	46.0%	41.2%	7.1%	89.4%	55.7%	45.3%	74.9%	43.2%	51.3%
Confidence Interval	*± 89.6%*	*± 42.7%*	*± 98.2%*	*± 16.9%*	*± 31.0%*	*± 44.3%*	*± 22.3%*	*± 26.1%*	*± 18.4%*
Watershed ownership	46.0%	14.8%	7.1%	23.8%	32.7%	37.5%	54.9%	62.5%	27.5%
Confidence Interval	*± 89.6%*	*± 22.1%*	*± 98.2%*	*± 32.9%*	*± 33.9%*	*± 42.7%*	*± 38.8%*	*± 22.9%*	*± 13.7%*
Zoning or land use controls	46.0%	67.7%	95.1%	14.8%	74.2%	67.0%	86.2%	41.7%	63.4%
Confidence Interval	*± 89.6%*	*± 39.0%*	*± 40.8%*	*± 23.3%*	*± 16.5%*	*± 35.5%*	*± 15.9%*	*± 26.7%*	*± 16.3%*
Best management practices	100.0%	68.5%	7.1%	58.3%	56.0%	40.9%	100.0%	50.1%	53.8%
Confidence Interval	*± 0.0%*	*± 38.8%*	*± 98.2%*	*± 33.7%*	*± 32.9%*	*± 43.3%*	*± 0.0%*	*± 31.6%*	*± 19.0%*
Other	0.0%	4.5%	0.0%	0.0%	0.0%	22.1%	17.4%	33.3%	5.9%
Confidence Interval	*± 0.0%*	*± 9.4%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 30.0%*	*± 18.8%*	*± 22.5%*	*± 5.5%*

Data: Q. 21, Q. 22

Notes: Table includes only systems participating in a source-water or wellhead protection program
Percentages may not add to 100% because a system may use no measures or more than one measure.

Definitions: Primarily: system obtains all or highest percentage of water from stated source
Best Management Practices: e.g., run-off controls, fertilizer scheduling, less toxic road maintenance materials

Table 2 - 15
Source Water Protection -- Management Area Delineation
by Primary Water Source
(Percent of Systems with Each Type of Area Delineation)

Primary Water Source/ Type of Area Delineation/ Linear Distance	Service Population Category								Row Total
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Watershed Boundaries (%)	19.2%	20.5%	18.5%	29.6%	28.8%	42.6%	49.8%	58.4%	24.8%
Confidence Interval	*± 10.6%*	*± 6.1%*	*± 10.2%*	*± 12.9%*	*± 6.5%*	*± 14.7%*	*± 9.0%*	*± 8.8%*	*± 3.7%*
Aquifer Boundaries (%)	11.4%	25.4%	27.5%	23.0%	18.0%	28.4%	26.3%	25.0%	21.9%
Confidence Interval	*± 8.0%*	*± 14.3%*	*± 6.1%*	*± 7.6%*	*± 10.6%*	*± 7.1%*	*± 6.3%*	*± 15.3%*	*± 5.5%*
Fixed Radius Around Well (%)	69.1%	64.5%	71.8%	67.6%	44.7%	38.2%	21.9%	27.6%	62.0%
Confidence Interval	*± 18.2%*	*± 13.9%*	*± 14.1%*	*± 7.8%*	*± 10.4%*	*± 17.2%*	*± 12.3%*	*± 9.8%*	*± 5.1%*
Mean Radius (Feet)	683	495	745	877	1,349	825	898	344	719
Confidence Interval	*± 418*	*± 361*	*± 263*	*± 181*	*± 931*	*± 482*	*± 449*	*± 103*	*± 175*
Fixed Distance from Surface Water (%)	0.7%	9.4%	5.8%	11.1%	6.4%	8.2%	5.7%	10.7%	6.8%
Confidence Interval	*± 1.0%*	*± 9.2%*	*± 6.1%*	*± 8.0%*	*± 5.3%*	*± 9.0%*	*± 5.7%*	*± 10.8%*	*± 2.7%*
Mean Distance (Feet)	294	628	595	591	3,412	1,641	514	3,778	1,069
Confidence Interval	*± 104*	*± 663*	*± 482*	*± 914*	*± 5,741*	*± 2,555*	*± 612*	*± 11,386*	*± 449*
Primarily Ground Systems									
Watershed Boundaries (%)	18.9%	18.2%	16.9%	24.8%	20.2%	29.6%	25.8%	29.8%	20.1%
Confidence Interval	*± 10.8%*	*± 6.7%*	*± 10.4%*	*± 14.1%*	*± 8.4%*	*± 18.6%*	*± 12.3%*	*± 0.4%*	*± 3.9%*
Aquifer Boundaries (%)	11.6%	26.7%	28.3%	27.0%	20.9%	35.5%	37.8%	30.2%	23.7%
Confidence Interval	*± 8.0%*	*± 15.5%*	*± 6.3%*	*± 9.8%*	*± 13.1%*	*± 12.2%*	*± 8.6%*	*± 0.4%*	*± 6.1%*
Fixed Radius Around Well (%)	70.5%	66.4%	73.5%	76.1%	54.4%	52.4%	26.5%	56.0%	67.6%
Confidence Interval	*± 18.0%*	*± 14.9%*	*± 14.3%*	*± 7.8%*	*± 15.5%*	*± 19.0%*	*± 18.0%*	*± 0.6%*	*± 5.5%*
Mean Radius (Feet)	683	497	755	888	1,291	863	954	416	719
Confidence Interval	*± 418*	*± 363*	*± 270*	*± 182*	*± 968*	*± 502*	*± 583*	*± 11*	*± 178*
Fixed Distance from Surface Water (%)	0.0%	9.3%	4.5%	6.6%	0.8%	3.6%	2.3%	4.8%	4.8%
Confidence Interval	*± 0.0%*	*± 9.8%*	*± 6.1%*	*± 9.4%*	*± 1.0%*	*± 5.9%*	*± 3.9%*	*± 0.6%*	*± 2.9%*
Mean Distance (Feet)		638	457	113	125	150	200	340	462
Confidence Interval		*± 676*	*± 363*	*± 68*	*± 185*	**	**	*± 11*	*± 375*
Primarily Surface Systems									
Watershed Boundaries (%)	37.2%	67.4%	60.1%	57.6%	60.4%	72.7%	84.2%	74.7%	65.0%
Confidence Interval	*± 23.1%*	*± 35.9%*	*± 28.2%*	*± 17.8%*	*± 10.8%*	*± 10.4%*	*± 4.9%*	*± 11.8%*	*± 6.9%*
Aquifer Boundaries (%)	0.0%	0.0%	4.8%	0.0%	7.2%	12.2%	10.0%	22.0%	6.8%
Confidence Interval	*± 0.0%*	*± 0.0%*	*± 9.4%*	*± 0.0%*	*± 13.9%*	*± 6.7%*	*± 7.6%*	*± 24.5%*	*± 3.5%*
Fixed Radius Around Well (%)	0.0%	25.8%	28.8%	18.4%	8.9%	5.7%	15.4%	11.5%	13.7%
Confidence Interval	*± 0.0%*	*± 36.5%*	*± 45.7%*	*± 13.3%*	*± 8.2%*	*± 10.0%*	*± 13.7%*	*± 16.1%*	*± 6.7%*
Mean Radius (Feet)		200	196	615	2,350	94	400	175	707
Confidence Interval		**	*± 44*	*± 564*	*± 651*	*± 397*	**	*± 168*	*± 506*
Fixed Distance from Surface Water (%)	34.1%	11.1%	39.9%	37.4%	26.9%	18.7%	10.7%	14.0%	24.3%
Confidence Interval	*± 28.0%*	*± 13.9%*	*± 26.3%*	*± 11.8%*	*± 24.3%*	*± 26.3%*	*± 12.3%*	*± 17.2%*	*± 8.0%*
Mean Distance (Feet)	294	200	904	1,264	3,781	1,745	660	4,512	2,030
Confidence Interval	*± 104*	**	*± 1,316*	*± 1,075*	*± 7,304*	*± 2,680*	**	*± 24,535*	*± 1,166*

**** :** Insufficient observations to calculate confidence interval

Data: Q. 24

Notes: Table includes only systems participating in a source water or wellhead protection program
Percentages may not add to 100% because a system may use more than one method of delineation

Definitions: All Systems: excludes primarily purchased systems
Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 16
Total Revenues
by Ownership Type
(Thousands of Dollars)

Ownership Type/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	2.4	20.1	78.4	196.5	605.1	2,445.3	7,363.4	29,864.5
Confidence Interval	*± 0.3*	*± 2.7*	*± 11.2*	*± 21.5*	*± 57.2*	*± 206.9*	*± 780.9*	*± 2,230.9*
Median	0.0	8.8	65.0	156.4	543.3	1,898.4	6,492.7	17,520.9
% Not Charging Directly for Water	11.4%	6.6%	0.8%	0.9%	0.1%	0.0%	0.0%	0.0%
Confidence Interval	*± 3.5%*	*± 4.1%*	*± 1.0%*	*± 1.2%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	245	402	276	282	282	230	139	124
Public Systems								
Mean	6.9	29.4	84.3	204.8	613.6	2,360.6	7,392.3	29,815.3
Confidence Interval	*± 1.3*	*± 4.2*	*± 10.1*	*± 29.3*	*± 70.2*	*± 198.4*	*± 881.6*	*± 2,452.1*
Median	3.9	18.2	71.4	164.7	566.8	1,886.2	6,492.7	17,018.2
% Not Charging Directly for Water	3.9%	7.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 4.5%*	*± 3.3%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	60	161	151	164	150	143	109	105
Private Systems								
Mean	3.9	25.4	73.2	177.1	575.3	3,007.9	7,163.2	30,330.0
Confidence Interval	*± 0.7*	*± 5.6*	*± 20.7*	*± 34.4*	*± 64.3*	*± 618.9*	*± 737.6*	*± 2,098.8*
Median	2.7	18.8	63.0	128.0	457.5	2,304.5	6,399.7	18,993.1
% Not Charging Directly for Water	25.5%	6.2%	2.2%	3.5%	0.2%	0.0%	0.0%	0.0%
Confidence Interval	*± 9.2%*	*± 8.2%*	*± 2.9%*	*± 4.1%*	*± 0.4%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	97	143	120	117	132	87	30	19
Ancillary Systems								
Mean	0.6	3.0	26.3	0.0				
Confidence Interval	*± 0.1*	*± 1.6*	*± 54.1*	**				
Median	0.0	0.0	0.0	0.0				
% Not Charging Directly for Water	1.5%	5.5%	0.0%	0.0%				
Confidence Interval	*± 3.1%*	*± 5.9%*	*± 0.0%*	**				
Observations	88	98	5	1				

** : Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 2 - 17
Total Revenues -- Private Systems
by Private Ownership Category
(Thousands of Dollars)

Private Ownership Category/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Investor-Owned - Dependent on Parent Co.								
Mean	0.0	46.6	178.3	140.6	434.8	3,677.5	10,757.9	20,763.3
Confidence Interval	*± 0.0*	*± 37.1*	*± 267.8*	*± 136.3*	*± 1,491.3*	*± 402.0*	*± 62.6*	*± 1,139.5*
Median	0.0	52.9	236.7	82.3	71.3	3,810.1	11,548.2	19,528.2
% Not Charging Directly for Water	52.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 127.8%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	2	5	3	8	7	16	13	6
Investor-Owned - Not Dependent on Parent Co.								
Mean	4.6	34.6	101.8	226.7	628.0	3,338.3	7,736.5	46,703.9
Confidence Interval	*± 3.4*	*± 12.6*	*± 28.4*	*± 46.9*	*± 82.7*	*± 1,005.1*	*± 2,029.4*	*± 900.9*
Median	4.3	25.8	81.1	183.0	521.5	2,172.7	5,629.4	28,439.5
% Not Charging Directly for Water	14.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 17.2%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	25	45	31	44	55	41	7	9
Mutual Association (Homeowners Assoc., etc.)								
Mean	3.9	23.7	77.4	136.7	435.6	2,373.6	6,186.2	
Confidence Interval	*± 2.2*	*± 12.4*	*± 49.0*	*± 20.3*	*± 104.8*	*± 883.1*	*± 0.0*	
Median	2.2	15.7	54.4	115.9	304.1	1,401.6	6,186.2	
% Not Charging Directly for Water	38.3%	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	
Confidence Interval	*± 9.4%*	*± 10.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	
Observations	32	40	33	20	22	8	2	
Other								
Mean	5.9	19.3	88.4	276.5	862.8	4,244.8		
Confidence Interval	*± 3.4*	*± 21.2*	*± 52.3*	*± 192.7*	*± 219.0*	*± 3,313.3*		
Median	6.3	7.9	80.8	186.9	678.6	2,610.1		
% Not Charging Directly for Water	19.8%	1.8%	0.0%	0.0%	0.0%	0.0%		
Confidence Interval	*± 39.2%*	*± 3.3%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*		
Observations	6	11	15	16	24	5		

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 2 - 18
Total Revenues
by Primary Water Source
(Thousands of Dollars)

Primary Water Source/ Total Revenue Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Mean	2.3	16.6	68.3	167.2	543.5	2,082.1	6,602.1	25,640.6
Confidence Interval	*± 0.3*	*± 3.0*	*± 13.2*	*± 26.2*	*± 35.2*	*± 356.3*	*± 1,557.0*	*± 665.9*
Median	0.0	7.9	61.4	136.3	498.9	1,635.3	4,832.8	17,488.3
% Not Charging Directly for Water	11.5%	7.0%	0.8%	1.2%	0.1%	0.0%	0.0%	0.0%
Confidence Interval	*± 3.5%*	*± 4.9%*	*± 1.4%*	*± 1.8%*	*± 0.2%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	159	214	141	142	153	118	53	40
Primarily Surface Systems								
Mean	4.1	46.0	96.4	296.4	709.5	2,617.0	7,578.9	36,260.2
Confidence Interval	*± 2.0*	*± 17.8*	*± 32.3*	*± 46.6*	*± 112.8*	*± 158.0*	*± 1,102.4*	*± 4,237.6*
Median	0.0	16.2	85.9	233.6	642.5	2,282.8	7,454.6	22,592.7
% Not Charging Directly for Water	17.4%	4.4%	1.8%	0.3%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 12.3%*	*± 2.9%*	*± 2.5%*	*± 0.6%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	52	79	48	67	64	82	60	58
Primarily Purchased Systems								
Mean	6.7	37.9	116.8	220.6	670.5	3,530.9	8,138.4	18,110.3
Confidence Interval	*± 2.1*	*± 8.8*	*± 22.4*	*± 36.6*	*± 131.5*	*± 1,054.7*	*± 1,890.4*	*± 3,110.3*
Median	4.8	24.0	91.9	184.3	572.2	2,551.9	6,492.7	13,953.7
% Not Charging Directly for Water	0.0%	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Confidence Interval	*± 0.0%*	*± 5.3%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Observations	34	109	87	73	65	30	26	26

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities
Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 19
Percentage of Systems Having Each Type of Revenue Source by Ownership Type

Ownership Type/ Revenue Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Sales	31.5%	54.6%	80.9%	88.0%	90.1%	92.7%	92.2%	92.3%
Confidence Interval	*± 7.3%*	*± 7.4%*	*± 6.7%*	*± 4.3%*	*± 3.9%*	*± 2.4%*	*± 6.3%*	*± 2.5%*
Water-Related Operations	14.3%	38.8%	71.1%	85.3%	88.8%	89.5%	82.5%	90.2%
Confidence Interval	*± 5.7%*	*± 5.1%*	*± 5.5%*	*± 2.9%*	*± 2.7%*	*± 2.5%*	*± 9.4%*	*± 4.1%*
General Fund	0.8%	2.0%	7.2%	5.9%	9.7%	14.3%	9.9%	10.8%
Confidence Interval	*± 0.8%*	*± 0.6%*	*± 3.1%*	*± 2.0%*	*± 2.0%*	*± 4.9%*	*± 4.7%*	*± 5.3%*
Other Revenue Sources	3.5%	11.6%	25.4%	35.4%	41.8%	54.8%	52.8%	66.6%
Confidence Interval	*± 1.6%*	*± 2.7%*	*± 6.5%*	*± 5.7%*	*± 6.1%*	*± 4.1%*	*± 12.2%*	*± 3.1%*
Public Systems								
Water Sales	72.6%	72.9%	88.8%	90.5%	92.0%	93.3%	94.1%	92.9%
Confidence Interval	*± 11.2%*	*± 6.7%*	*± 3.5%*	*± 4.9%*	*± 5.9%*	*± 2.5%*	*± 7.1%*	*± 2.9%*
Water-Related Operations	36.5%	59.7%	78.0%	89.0%	90.3%	90.9%	86.8%	91.6%
Confidence Interval	*± 12.0%*	*± 8.0%*	*± 6.7%*	*± 3.9%*	*± 2.7%*	*± 2.5%*	*± 10.6%*	*± 4.5%*
General Fund	10.8%	5.7%	11.8%	8.0%	12.5%	16.4%	11.3%	12.0%
Confidence Interval	*± 8.0%*	*± 1.4%*	*± 4.9%*	*± 2.5%*	*± 2.2%*	*± 5.9%*	*± 5.3%*	*± 5.9%*
Other Revenue Sources	5.2%	21.4%	29.5%	36.4%	44.3%	54.5%	54.7%	66.0%
Confidence Interval	*± 4.3%*	*± 5.1%*	*± 9.6%*	*± 5.7%*	*± 7.4%*	*± 4.3%*	*± 13.9%*	*± 3.5%*
Private Systems								
Water Sales	51.9%	71.3%	72.6%	82.9%	83.3%	89.1%	79.2%	86.5%
Confidence Interval	*± 12.9%*	*± 9.0%*	*± 13.5%*	*± 7.6%*	*± 9.4%*	*± 5.5%*	*± 7.1%*	*± 2.4%*
Water-Related Operations	23.9%	47.2%	66.0%	76.3%	83.8%	80.6%	52.9%	76.6%
Confidence Interval	*± 10.2%*	*± 10.8%*	*± 10.6%*	*± 7.3%*	*± 7.6%*	*± 10.0%*	*± 9.0%*	*± 3.5%*
Other Revenue Sources	7.3%	9.5%	20.5%	33.4%	33.1%	56.5%	40.0%	71.7%
Confidence Interval	*± 3.5%*	*± 5.5%*	*± 8.8%*	*± 10.2%*	*± 9.0%*	*± 12.5%*	*± 10.8%*	*± 4.3%*
Ancillary Systems								
Water Sales	9.2%	13.1%	25.3%	0.0%				
Confidence Interval	*± 5.7%*	*± 11.2%*	*± 51.9%*	**				
Water-Related Operations	3.5%	4.2%	0.0%	0.0%				
Confidence Interval	*± 4.3%*	*± 4.5%*	*± 0.0%*	**				
Other Revenue Sources	0.1%	2.7%	0.0%	0.0%				
Confidence Interval	*± 0.2%*	*± 3.7%*	*± 0.0%*	**				

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 30

Notes: Table includes systems reporting zero revenues

Definitions: Water Sales Revenues: revenues from the actual sale of water
Water-Related Revenues: revenues from activities related to water operations other than the actual sale of water, e.g., connection fees
Other Revenues: revenues from activities not related to water service, e.g., sewer fees, trailer pad rental, etc.

Table 2 - 20
Total Revenue Breakdown: Percentage of Revenues from Each Type of Revenue Source by Ownership Type

Ownership Type/ Type of Revenue	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Sales	89.8%	90.8%	90.3%	88.3%	88.4%	87.3%	86.4%	88.0%
Confidence Interval	*± 10.0%*	*± 2.9%*	*± 2.4%*	*± 1.4%*	*± 1.2%*	*± 2.2%*	*± 2.2%*	*± 1.0%*
Water-Related Operations	9.3%	8.8%	8.5%	8.7%	11.0%	9.2%	10.0%	10.7%
Confidence Interval	*± 10.4%*	*± 3.5%*	*± 1.6%*	*± 3.3%*	*± 2.2%*	*± 1.6%*	*± 2.2%*	*± 2.4%*
General Fund	0.4%	0.5%	1.5%	1.5%	1.0%	1.3%	0.9%	0.3%
Confidence Interval	*± 0.4%*	*± 0.2%*	*± 0.8%*	*± 0.6%*	*± 0.6%*	*± 0.8%*	*± 0.8%*	*± 0.2%*
Other Revenue Sources	3.9%	4.9%	2.8%	3.8%	3.5%	4.1%	3.3%	3.5%
Confidence Interval	*± 4.5%*	*± 2.2%*	*± 1.2%*	*± 0.8%*	*± 1.2%*	*± 1.6%*	*± 1.4%*	*± 0.2%*
Public Systems								
Water Sales	93.3%	87.0%	89.7%	87.2%	87.9%	86.7%	85.1%	87.1%
Confidence Interval	*± 2.4%*	*± 2.7%*	*± 2.9%*	*± 1.8%*	*± 1.8%*	*± 2.2%*	*± 2.5%*	*± 1.0%*
Water-Related Operations	5.8%	9.6%	7.6%	9.2%	9.8%	9.8%	11.1%	11.6%
Confidence Interval	*± 3.1%*	*± 3.7%*	*± 2.2%*	*± 4.5%*	*± 1.6%*	*± 1.8%*	*± 2.5%*	*± 2.5%*
General Fund	6.8%	1.8%	2.5%	2.0%	1.3%	1.5%	1.1%	0.3%
Confidence Interval	*± 6.1%*	*± 0.6%*	*± 1.2%*	*± 0.8%*	*± 0.8%*	*± 1.0%*	*± 0.8%*	*± 0.2%*
Other Revenue Sources	1.7%	7.7%	3.3%	4.5%	3.5%	4.1%	3.5%	3.7%
Confidence Interval	*± 1.0%*	*± 3.5%*	*± 2.0%*	*± 1.0%*	*± 1.2%*	*± 1.4%*	*± 1.6%*	*± 0.2%*
Private Systems								
Water Sales	87.4%	93.7%	91.2%	92.1%	90.5%	91.3%	96.9%	97.7%
Confidence Interval	*± 13.7%*	*± 4.9%*	*± 2.2%*	*± 2.5%*	*± 2.0%*	*± 3.5%*	*± 1.8%*	*± 0.4%*
Water-Related Operations	8.2%	9.1%	10.5%	6.9%	15.2%	4.9%	1.4%	0.8%
Confidence Interval	*± 9.0%*	*± 6.3%*	*± 3.7%*	*± 2.5%*	*± 10.0%*	*± 1.0%*	*± 0.8%*	*± 0.2%*
Other Revenue Sources	5.3%	2.4%	1.7%	1.5%	3.3%	3.9%	1.7%	1.4%
Confidence Interval	*± 6.5%*	*± 3.3%*	*± 1.2%*	*± 0.8%*	*± 3.5%*	*± 3.5%*	*± 1.0%*	*± 0.2%*
Ancillary Systems								
Water Sales	98.0%	96.9%	100.0%					
Confidence Interval	*± 2.9%*	*± 2.4%*	**					
Water-Related Operations	17.7%	1.1%	0.0%					
Confidence Interval	*± 31.0%*	*± 0.6%*	**					
Other Revenue Sources	0.1%	2.0%	0.0%					
Confidence Interval	*± 0.2%*	*± 2.0%*	**					

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 30

Notes: Table includes only systems reporting non-zero revenues

General Fund revenues apply only to Public Systems; to calculate the percentage revenue breakdown across All systems, Private and Ancillary systems are regarded as receiving zero revenues from this source

To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each revenue source within each ownership type may represent a slightly different set of systems overall; the sum of revenue source type percentages may not equal 100% (See General Note 3)

Definitions: Water Sales Revenues: revenues from the actual sale of water

Water-Related Revenues: revenues from activities related to water operations other than the actual sale of water, e.g., connection fees

Other Revenues: revenues from activities not related to water service, e.g., sewer fees, trailer pad rental, etc.

Table 2 - 21
Water Sales Revenue Profile
by Ownership Type
(Percentage of Revenues from Each Customer Category)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential	94.5%	81.9%	73.5%	62.6%	58.3%	52.4%	56.5%	49.5%
Confidence Interval	*± 3.5%*	*± 5.9%*	*± 4.5%*	*± 8.2%*	*± 5.5%*	*± 3.1%*	*± 4.1%*	*± 2.9%*
Observations	97	224	212	241	248	202	119	114
Non-Residential:								
Commercial/Industrial	1.0%	6.2%	8.6%	12.4%	14.0%	19.2%	19.9%	20.9%
Confidence Interval	*± 1.6%*	*± 1.6%*	*± 1.6%*	*± 1.6%*	*± 1.6%*	*± 4.7%*	*± 3.1%*	*± 2.0%*
Observations	98	224	212	242	250	203	121	113
Wholesale	0.0%	1.5%	0.3%	1.8%	2.7%	2.9%	2.5%	9.0%
Confidence Interval	*± 0.0%*	*± 1.4%*	*± 0.4%*	*± 1.0%*	*± 1.2%*	*± 1.6%*	*± 1.0%*	*± 1.6%*
Observations	98	225	212	242	249	203	120	114
Governmental	0.2%	0.7%	0.8%	1.2%	1.2%	1.6%	3.2%	2.2%
Confidence Interval	*± 0.2%*	*± 0.4%*	*± 0.8%*	*± 1.0%*	*± 0.8%*	*± 0.4%*	*± 1.0%*	*± 0.8%*
Observations	98	225	212	242	249	204	121	114
Agricultural	0.3%	0.7%	0.5%	0.6%	0.5%	0.1%	0.1%	0.8%
Confidence Interval	*± 0.2%*	*± 1.0%*	*± 0.2%*	*± 0.6%*	*± 0.8%*	*± 0.0%*	*± 0.0%*	*± 0.4%*
Observations	98	225	212	242	250	205	121	114
Other	6.0%	9.7%	16.7%	22.1%	25.1%	27.1%	18.7%	18.0%
Confidence Interval	*± 7.1%*	*± 5.1%*	*± 4.7%*	*± 7.4%*	*± 5.9%*	*± 6.1%*	*± 5.5%*	*± 3.9%*
Observations	98	220	207	238	241	194	118	113
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	98	225	212	242	250	205	121	114
Public Systems								
Residential	84.2%	72.4%	69.6%	59.0%	55.9%	50.6%	57.2%	48.5%
Confidence Interval	*± 16.5%*	*± 7.8%*	*± 5.5%*	*± 9.4%*	*± 6.3%*	*± 3.7%*	*± 4.9%*	*± 3.1%*
Observations	41	105	126	145	135	126	97	98
Non-Residential:								
Commercial/Industrial	1.6%	8.4%	10.5%	14.4%	15.7%	19.7%	19.2%	20.0%
Confidence Interval	*± 1.4%*	*± 2.0%*	*± 2.2%*	*± 1.8%*	*± 2.0%*	*± 5.3%*	*± 3.3%*	*± 2.0%*
Observations	41	105	126	146	136	127	98	97
Wholesale	0.0%	2.5%	0.4%	1.6%	2.7%	3.1%	2.7%	9.8%
Confidence Interval	*± 0.0%*	*± 3.1%*	*± 0.6%*	*± 1.0%*	*± 1.4%*	*± 1.8%*	*± 1.0%*	*± 1.8%*
Observations	41	106	126	146	135	127	97	98
Governmental	1.0%	1.0%	1.1%	1.3%	1.4%	1.4%	3.1%	2.1%
Confidence Interval	*± 1.4%*	*± 0.6%*	*± 1.2%*	*± 1.2%*	*± 1.0%*	*± 0.6%*	*± 1.2%*	*± 0.8%*
Observations	41	106	126	146	135	128	98	98
Agricultural	1.9%	0.4%	0.6%	0.5%	0.1%	0.0%	0.1%	0.8%
Confidence Interval	*± 1.4%*	*± 0.4%*	*± 0.4%*	*± 0.6%*	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 0.6%*
Observations	41	106	126	146	136	129	98	98
Other	11.2%	16.9%	18.5%	24.2%	26.3%	28.8%	18.4%	19.2%
Confidence Interval	*± 15.7%*	*± 7.8%*	*± 6.9%*	*± 8.6%*	*± 6.9%*	*± 6.9%*	*± 6.5%*	*± 4.1%*
Observations	41	103	122	142	128	120	95	97
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	41	106	126	146	136	129	98	98

Table 2 - 21
Water Sales Revenue Profile
by Ownership Type
(Percentage of Revenues from Each Customer Category)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Residential	96.1%	88.8%	80.5%	73.9%	67.4%	64.0%	50.7%	60.2%
Confidence Interval	*± 5.1%*	*± 5.3%*	*± 10.4%*	*± 8.8%*	*± 7.6%*	*± 7.1%*	*± 9.8%*	*± 0.6%*
Observations	46	104	85	96	113	76	22	16
Non-Residential:								
Commercial/Industrial	1.1%	4.4%	5.2%	6.2%	7.4%	15.7%	25.0%	29.6%
Confidence Interval	*± 2.2%*	*± 2.2%*	*± 3.5%*	*± 2.9%*	*± 2.7%*	*± 3.3%*	*± 5.7%*	*± 0.6%*
Observations	47	104	85	96	114	76	23	16
Wholesale	0.0%	0.8%	0.2%	2.4%	2.8%	1.4%	1.3%	1.6%
Confidence Interval	*± 0.0%*	*± 1.0%*	*± 0.2%*	*± 2.2%*	*± 1.6%*	*± 0.6%*	*± 0.2%*	*± 0.2%*
Observations	47	104	85	96	114	76	23	16
Governmental	0.0%	0.5%	0.3%	1.1%	0.5%	2.9%	3.7%	3.1%
Confidence Interval	*± 0.0%*	*± 0.4%*	*± 0.2%*	*± 0.4%*	*± 0.4%*	*± 0.8%*	*± 0.8%*	*± 0.2%*
Observations	47	104	85	96	114	76	23	16
Agricultural	0.0%	1.0%	0.3%	1.0%	2.0%	0.3%	0.1%	0.0%
Confidence Interval	*± 0.0%*	*± 1.8%*	*± 0.4%*	*± 1.2%*	*± 3.5%*	*± 0.6%*	*± 0.0%*	*± 0.0%*
Observations	47	104	85	96	114	76	23	16
Other	5.9%	4.6%	13.6%	15.3%	20.7%	15.9%	20.8%	5.5%
Confidence Interval	*± 7.3%*	*± 5.3%*	*± 10.6%*	*± 7.3%*	*± 7.6%*	*± 6.1%*	*± 14.9%*	*± 0.2%*
Observations	47	102	84	96	113	74	23	16
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Observations	47	104	85	96	114	76	23	16
Ancillary Systems								
Residential	100.0%	94.2%	100.0%					
Confidence Interval	*± 0.0%*	*± 6.1%*	**					
Observations	10	15	1					
Non-Residential:								
Commercial/Industrial	0.0%	5.2%	0.0%					
Confidence Interval	*± 0.0%*	*± 6.1%*	**					
Observations	10	15	1					
Wholesale	0.0%	0.0%	0.0%					
Confidence Interval	*± 0.0%*	*± 0.0%*	**					
Observations	10	15	1					
Governmental	0.0%	0.0%	0.0%					
Confidence Interval	*± 0.0%*	*± 0.0%*	**					
Observations	10	15	1					
Agricultural	0.0%	0.6%	0.0%					
Confidence Interval	*± 0.0%*	*± 1.0%*	**					
Observations	10	15	1					
Other	0.0%	0.0%	0.0%					
Confidence Interval	*± 0.0%*	*± 0.0%*	**					
Observations	10	15	1					
Total	100.0%	100.0%	100.0%					
Observations	10	15	1					

**** :** Insufficient observations to calculate confidence intervals

Data: Q. 29

Notes: Table includes only systems that charge directly for water
To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within each ownership type may represent a slightly different set of systems overall; the sum of customer category revenue percentages may not equal 100% (See General Note 3)

Definitions: Water Sales Revenues: revenues from the actual sale of water
Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 2 - 22
Total Revenues
by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	345	342	356	295	293	240	220	189
Confidence Interval	*± 36*	*± 60*	*± 26*	*± 16*	*± 29*	*± 23*	*± 20*	*± 12*
Median	288	285	308	255	245	209	196	173
Observations	83	207	208	235	244	201	126	108
Public Systems								
Mean	434	362	339	282	278	232	218	181
Confidence Interval	*± 144*	*± 117*	*± 38*	*± 14*	*± 34*	*± 25*	*± 23*	*± 12*
Median	320	269	290	241	229	203	196	166
Observations	32	97	125	145	134	129	103	92
Private Systems								
Mean	333	326	395	342	354	303	242	263
Confidence Interval	*± 25*	*± 39*	*± 37*	*± 52*	*± 46*	*± 34*	*± 15*	*± 21*
Median	262	295	359	300	322	278	224	245
Observations	41	96	82	90	110	72	23	16
Ancillary Systems								
Mean	286	324	318					
Confidence Interval	*± 63*	*± 58*	**					
Median	266	276	318					
Observations	10	14	1					

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 30

Notes: Table includes only systems reporting non-zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 2 - 23
Water Sales Revenues
by Ownership Type and Service Population Size
(Cents per 1,000 Gallons Sold)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	321	306	312	255	252	205	188	164
Confidence Interval	± *23*	± *52*	± *23*	± *16*	± *23*	± *15*	± *19*	± *11*
Median	271	256	284	213	219	181	174	150
Observations	83	207	208	235	244	201	126	108
Public Systems								
Mean	335	315	291	239	240	196	182	154
Confidence Interval	± *44*	± *100*	± *37*	± *15*	± *28*	± *16*	± *21*	± *11*
Median	280	252	256	198	210	179	170	140
Observations	32	97	125	145	134	129	103	92
Private Systems								
Mean	327	298	357	308	302	271	236	258
Confidence Interval	± *29*	± *42*	± *31*	± *46*	± *27*	± *32*	± *18*	± *22*
Median	244	256	346	285	281	267	217	240
Observations	41	96	82	90	110	72	23	16
Ancillary Systems								
Mean	276	298	318					
Confidence Interval	± *45*	± *44*	**					
Median	266	276	318					
Observations	10	14	1					

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29

Notes: Table includes only systems reporting non-zero revenues

Definitions: Water Sales Revenues: revenues from the actual sale of water

Table 2 - 24
Water Sales Revenues -- Customer Breakdown
by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential								
Mean	334	293	321	283	291	235	212	195
Confidence Interval	*± 26*	*± 25*	*± 33*	*± 21*	*± 19*	*± 20*	*± 16*	*± 12*
Median	271	252	293	250	254	210	186	172
Observations	69	165	165	180	182	148	102	88
Commercial/Industrial								
Mean	343	287	288	243	227	201	186	154
Confidence Interval	*± 41*	*± 89*	*± 36*	*± 49*	*± 28*	*± 22*	*± 30*	*± 6*
Median	360	217	229	171	178	176	158	145
Observations	4	62	79	113	124	119	95	73
Wholesale								
Mean		160	117	163	221	150	157	106
Confidence Interval		*± 58*	*± 199*	*± 29*	*± 62*	*± 28*	*± 29*	*± 6*
Median		179	77	166	178	132	143	99
Observations	0	10	5	20	46	49	46	50
Governmental								
Mean	691	404	429	289	204	189	168	149
Confidence Interval	*± 133*	*± 76*	*± 94*	*± 119*	*± 32*	*± 27*	*± 27*	*± 20*
Median	674	411	314	196	171	166	146	144
Observations	2	19	23	37	46	78	59	51
Agricultural								
Mean	517	405	255	259	294	189	175	163
Confidence Interval	*± 80*	*± 176*	*± 128*	*± 107*	*± 135*	*± 95*	*± 10*	*± 19*
Median	521	316	203	279	250	219	183	124
Observations	3	12	18	16	12	6	10	13
Other								
Mean	185	263	276	247	244	238	183	275
Confidence Interval	*± 43*	*± 108*	*± 38*	*± 65*	*± 56*	*± 54*	*± 44*	*± 46*
Median	219	177	254	182	210	167	172	152
Observations	3	26	44	59	73	81	53	62
Total								
Mean	329	306	312	255	252	205	188	164
Confidence Interval	*± 27*	*± 56*	*± 23*	*± 16*	*± 23*	*± 15*	*± 19*	*± 11*
Median	271	253	281	213	219	181	174	150
Observations	73	193	207	235	244	201	126	108

Table 2 - 24
Water Sales Revenues -- Customer Breakdown
by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Public Systems								
Residential								
Mean	353	279	301	263	274	223	199	180
Confidence Interval	*± 47*	*± 36*	*± 44*	*± 21*	*± 19*	*± 24*	*± 20*	*± 12*
Median	351	237	257	244	228	195	182	163
Observations	30	76	94	104	94	88	82	72
Commercial/Industrial								
Mean	304	308	300	224	212	193	186	146
Confidence Interval	*± 123*	*± 96*	*± 49*	*± 56*	*± 30*	*± 27*	*± 34*	*± 6*
Median	240	230	243	163	177	173	158	139
Observations	3	40	57	75	73	66	75	58
Wholesale								
Mean		174	99	143	222	140	155	101
Confidence Interval		*± 72*	*± 174*	*± 22*	*± 92*	*± 31*	*± 33*	*± 7*
Median		179	77	140	178	130	135	93
Observations	0	6	3	12	19	28	36	40
Governmental								
Mean	674	392	429	311	183	171	152	139
Confidence Interval	**	*± 69*	*± 129*	*± 145*	*± 33*	*± 34*	*± 29*	*± 23*
Median	674	411	304	175	153	156	143	130
Observations	1	14	18	25	25	40	45	39
Agricultural								
Mean	517	423	280	243	166	167	184	163
Confidence Interval	*± 80*	*± 104*	*± 180*	*± 108*	*± 155*	*± 102*	*± 9*	*± 19*
Median	521	316	246	279	200	63	183	124
Observations	3	7	10	11	4	2	8	13
Other								
Mean	147	296	265	253	228	225	176	273
Confidence Interval	*± 145*	*± 123*	*± 22*	*± 78*	*± 66*	*± 60*	*± 50*	*± 49*
Median	173	207	256	182	196	155	172	152
Observations	2	19	31	43	41	50	43	56
Total								
Mean	335	315	291	239	240	196	182	154
Confidence Interval	*± 44*	*± 100*	*± 37*	*± 15*	*± 28*	*± 16*	*± 21*	*± 11*
Median	280	252	256	198	210	179	170	140
Observations	32	97	125	145	134	129	103	92

Table 2 - 24
Water Sales Revenues -- Customer Breakdown
by Ownership Type
(Cents per 1,000 Gallons Sold)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Residential								
Mean	328	304	361	338	350	301	316	299
Confidence Interval	*± 30*	*± 30*	*± 48*	*± 53*	*± 44*	*± 39*	*± 6*	*± 27*
Median	244	270	346	296	318	270	297	293
Observations	39	89	71	76	88	60	20	16
Commercial/Industrial								
Mean	360	253	241	334	307	241	190	210
Confidence Interval	**	*± 104*	*± 103*	*± 86*	*± 53*	*± 37*	*± 6*	*± 10*
Median	360	207	229	296	279	227	185	202
Observations	1	22	22	38	51	53	20	15
Wholesale								
Mean		118	273	205	219	209	173	139
Confidence Interval		*± 92*	*± 58*	*± 58*	*± 35*	*± 44*	*± 4*	*± 0*
Median		76	207	211	208	192	188	146
Observations	0	4	2	8	27	21	10	10
Governmental								
Mean	758	454	423	212	332	272	278	195
Confidence Interval	**	*± 137*	*± 100*	*± 87*	*± 84*	*± 24*	*± 16*	*± 5*
Median	758	554	486	216	236	250	231	187
Observations	1	5	5	12	21	38	14	12
Agricultural								
Mean		373	172	341	487	243	115	
Confidence Interval		*± 387*	*± 102*	*± 270*	*± 166*	*± 161*	*± 0*	
Median		238	124	363	404	219	114	
Observations	0	5	8	5	8	4	2	0
Other								
Mean	219	172	306	213	313	319	233	305
Confidence Interval	**	*± 93*	*± 140*	*± 52*	*± 72*	*± 85*	*± 39*	*± 7*
Median	219	168	237	187	273	279	195	208
Observations	1	7	13	16	32	31	10	6
Total								
Mean	327	298	357	308	302	271	236	258
Confidence Interval	*± 29*	*± 42*	*± 31*	*± 46*	*± 27*	*± 32*	*± 18*	*± 22*
Median	244	256	346	285	281	267	217	240
Observations	41	96	82	90	110	72	23	16

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29

Notes: Table includes only systems reporting non-zero revenues

Definitions: All Systems: excludes ancillary systems
Water Sales Revenues: revenues from the actual sale of water
Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 2 - 25
Total Revenues Per Capita
by Ownership Type
(Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	111	109	121	110	110	117	113	96
Confidence Interval	*± 8*	*± 16*	*± 13*	*± 7*	*± 9*	*± 16*	*± 9*	*± 4*
Median	79	83	93	97	99	100	93	90
Observations	94	231	214	233	250	208	126	115
Public Systems								
Mean	134	108	121	107	109	115	112	94
Confidence Interval	*± 37*	*± 20*	*± 15*	*± 7*	*± 11*	*± 18*	*± 10*	*± 4*
Median	81	78	91	97	99	98	92	89
Observations	36	118	131	147	137	133	104	99
Private Systems								
Mean	98	111	121	119	114	133	126	111
Confidence Interval	*± 18*	*± 22*	*± 25*	*± 16*	*± 17*	*± 19*	*± 11*	*± 0*
Median	76	93	106	92	97	115	106	112
Observations	47	98	82	86	113	75	22	16
Ancillary Systems								
Mean	133	98	181					
Confidence Interval	*± 59*	*± 31*	**					
Median	107	84	181					
Observations	11	15	1					

**** :** Insufficient observations to calculate confidence interval

Data: Q. 29, Q. 30, Q. 11A

Notes: Table includes only systems reporting non-zero revenues

Definitions: Total Revenues: revenues from actual sale of water and from other water-related activities

Table 2 - 26
Metered Customer Connections
by Ownership Type and Customer Category
(Percent of Connections That Are Metered)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Residential	57.8%	76.4%	82.0%	82.1%	81.0%	84.6%	83.5%	80.0%
Confidence Interval	*± 12.7%*	*± 6.7%*	*± 3.9%*	*± 5.7%*	*± 6.9%*	*± 2.0%*	*± 6.3%*	*± 4.3%*
Commercial/Industrial	0.3%	3.1%	4.1%	7.1%	8.3%	9.0%	9.5%	7.0%
Confidence Interval	*± 0.2%*	*± 1.2%*	*± 0.8%*	*± 2.2%*	*± 2.2%*	*± 1.8%*	*± 3.1%*	*± 1.0%*
Wholesale	0.0%	0.2%	0.0%	0.9%	1.9%	0.5%	0.0%	5.1%
Confidence Interval	*± 0.0%*	*± 0.2%*	*± 0.0%*	*± 1.0%*	*± 2.5%*	*± 0.8%*	*± 0.0%*	*± 1.8%*
Governmental	0.0%	0.4%	1.1%	0.7%	0.3%	1.0%	0.6%	0.3%
Confidence Interval	*± 0.0%*	*± 0.2%*	*± 1.6%*	*± 0.6%*	*± 0.2%*	*± 1.0%*	*± 0.4%*	*± 0.0%*
Agricultural	0.2%	1.7%	0.4%	0.3%	1.2%	0.1%	0.1%	0.1%
Confidence Interval	*± 0.2%*	*± 2.4%*	*± 0.2%*	*± 0.2%*	*± 1.6%*	*± 0.2%*	*± 0.2%*	*± 0.0%*
Other	0.0%	0.9%	2.7%	6.4%	7.1%	4.1%	5.3%	7.6%
Confidence Interval	*± 0.0%*	*± 1.0%*	*± 4.1%*	*± 2.9%*	*± 2.7%*	*± 2.7%*	*± 4.5%*	*± 3.3%*
Total	36.6%	71.8%	87.4%	93.7%	92.0%	97.2%	97.2%	96.6%
Confidence Interval	*± 10.2%*	*± 6.3%*	*± 4.7%*	*± 2.4%*	*± 4.1%*	*± 2.5%*	*± 3.3%*	*± 2.4%*
Public Systems								
Residential	79.1%	81.7%	84.4%	81.9%	79.1%	84.3%	85.1%	79.7%
Confidence Interval	*± 18.0%*	*± 9.2%*	*± 3.5%*	*± 6.5%*	*± 7.4%*	*± 2.0%*	*± 6.1%*	*± 4.7%*
Commercial/Industrial	0.8%	5.1%	5.2%	8.4%	9.3%	9.3%	10.0%	6.7%
Confidence Interval	*± 1.2%*	*± 1.4%*	*± 1.4%*	*± 2.7%*	*± 2.5%*	*± 2.0%*	*± 3.5%*	*± 1.2%*
Wholesale	0.0%	0.1%	0.0%	0.6%	2.5%	0.6%	0.0%	5.7%
Confidence Interval	*± 0.0%*	*± 0.0%*	*± 0.0%*	*± 1.0%*	*± 3.3%*	*± 1.0%*	*± 0.0%*	*± 2.0%*
Governmental	0.3%	0.5%	1.4%	0.8%	0.4%	1.1%	0.6%	0.3%
Confidence Interval	*± 0.4%*	*± 0.2%*	*± 2.4%*	*± 1.0%*	*± 0.2%*	*± 1.0%*	*± 0.4%*	*± 0.0%*
Agricultural	1.5%	0.3%	0.3%	0.2%	0.8%	0.1%	0.1%	0.1%
Confidence Interval	*± 1.2%*	*± 0.2%*	*± 0.2%*	*± 0.2%*	*± 1.4%*	*± 0.2%*	*± 0.2%*	*± 0.0%*
Other	0.0%	1.4%	2.0%	5.9%	7.9%	4.2%	2.3%	7.5%
Confidence Interval	*± 0.0%*	*± 2.2%*	*± 2.5%*	*± 3.1%*	*± 2.5%*	*± 3.1%*	*± 2.2%*	*± 3.7%*
Total	71.7%	82.4%	90.2%	94.4%	93.4%	97.5%	97.0%	96.3%
Confidence Interval	*± 17.4%*	*± 12.3%*	*± 5.1%*	*± 2.2%*	*± 4.5%*	*± 2.7%*	*± 3.7%*	*± 2.5%*

Table 2 - 26
Metered Customer Connections
by Ownership Type and Customer Category
(Percent of Connections That Are Metered)

Ownership Type/ Customer Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Private Systems								
Residential	59.1%	81.8%	79.5%	82.5%	87.6%	85.9%	68.8%	82.6%
Confidence Interval	*± 16.3%*	*± 7.4%*	*± 11.8%*	*± 8.8%*	*± 6.5%*	*± 5.1%*	*± 18.8%*	*± 1.2%*
Commercial/Industrial	0.2%	2.3%	2.5%	3.0%	4.9%	6.8%	5.3%	9.3%
Confidence Interval	*± 0.4%*	*± 2.2%*	*± 1.0%*	*± 1.4%*	*± 4.3%*	*± 2.7%*	*± 1.6%*	*± 0.2%*
Wholesale	0.0%	0.3%	0.0%	1.7%	0.1%	0.1%	0.0%	0.0%
Confidence Interval	*± 0.0%*	*± 0.6%*	*± 0.0%*	*± 2.2%*	*± 0.0%*	*± 0.2%*	*± 0.0%*	*± 0.0%*
Governmental	0.0%	0.2%	0.6%	0.1%	0.1%	0.4%	0.4%	0.3%
Confidence Interval	*± 0.0%*	*± 0.2%*	*± 0.6%*	*± 0.2%*	*± 0.0%*	*± 0.2%*	*± 0.2%*	*± 0.0%*
Agricultural	0.0%	3.1%	0.5%	0.7%	2.6%	0.1%	0.0%	0.0%
Confidence Interval	*± 0.0%*	*± 4.5%*	*± 0.8%*	*± 0.8%*	*± 4.9%*	*± 0.2%*	*± 0.0%*	*± 0.0%*
Other	0.0%	0.7%	4.3%	8.0%	4.7%	3.8%	33.1%	8.8%
Confidence Interval	*± 0.0%*	*± 1.2%*	*± 10.4%*	*± 8.4%*	*± 4.7%*	*± 2.2%*	*± 21.4%*	*± 2.0%*
Total	43.1%	77.7%	84.4%	91.4%	87.4%	95.6%	99.8%	99.2%
Confidence Interval	*± 14.1%*	*± 9.8%*	*± 9.2%*	*± 5.7%*	*± 10.6%*	*± 4.1%*	*± 0.0%*	*± 0.0%*
Ancillary Systems								
Residential	44.2%	42.8%	53.6%					
Confidence Interval	*± 23.1%*	*± 19.6%*	*± 95.8%*					
Commercial/Industrial	0.2%	0.0%	0.0%					
Confidence Interval	*± 0.4%*	*± 0.0%*	*± 0.0%*					
Wholesale								
Confidence Interval								
Governmental								
Confidence Interval								
Agricultural								
Confidence Interval								
Other	0.0%	0.0%	0.0%					
Confidence Interval	*± 0.0%*	*± 0.0%*	*± 0.0%*					
Total	19.5%	30.3%	53.6%					
Confidence Interval	*± 13.7%*	*± 18.0%*	*± 95.8%*					

Data: Q. 31

Notes: Tabulations are based on the percentage that a system's metered connections in a given category represent out of all connections in the system, both metered and unmetered (e.g., the Residential percentage means the percentage of all connections that are metered residential connections; Total percentage means the percentage of all connections that are metered connections)
To achieve highest accuracy for each line item, each one is based on all available observations for that item. As a result, the calculations for each customer category within each ownership type may represent a slightly different set of systems overall; the sum of customer category metered percentages may not equal the total percentage (See General Note 3)

Definitions: Other: Includes miscellaneous customer categories and combined categories for which systems could not distinguish between two or more customer categories

Table 2 - 27
Total Expenses
by Ownership Type
(Thousands of Dollars)

Ownership Type/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	7	30	86	206	570	2,106	7,096	28,098
Confidence Interval	± *2*	± *4*	± *14*	± *14*	± *37*	± *285*	± *1,797*	± *3,505*
Median	4	17	61	165	499	1,719	5,154	15,480
Observations	160	306	228	252	255	209	124	116
Public Systems								
Mean	13	36	87	209	571	2,023	7,056	27,862
Confidence Interval	± *2*	± *5*	± *13*	± *16*	± *47*	± *300*	± *2,005*	± *3,832*
Median	7	20	66	171	504	1,689	5,071	13,672
Observations	39	136	134	150	138	134	102	100
Private Systems								
Mean	6	32	87	201	568	2,699	7,438	30,555
Confidence Interval	± *2*	± *7*	± *31*	± *34*	± *48*	± *446*	± *904*	± *2,410*
Median	4	21	55	151	465	1,955	5,803	17,190
Observations	68	108	92	101	117	75	22	16
Ancillary Systems								
Mean	6	16	51	23				
Confidence Interval	± *3*	± *7*	± *68*	**				
Median	3	8	84	23				
Observations	53	62	2	1				

**** :** Insufficient observations to calculate confidence interval

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 2 - 28
Total Expenses -- Private Systems
by Private Ownership Category
(Thousands of Dollars)

Private Ownership Category/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Investor-Owned - Dependent on Parent Co.								
Mean	40.1	57.3	165.0	145.9	523.2	2,801.6	8,198.2	16,738.4
Confidence Interval	*± 1.6*	*± 76.3*	*± 221.8*	*± 127.0*	*± 772.1*	*± 335.2*	*± 9.9*	*± 510.2*
Median	39.5	50.0	271.6	91.2	335.3	3,140.1	8,857.8	15,523.0
Observations	2	5	3	8	7	16	13	6
Investor-Owned - Not Dependent on Parent Co.								
Mean	6.2	33.8	84.4	233.1	558.4	2,811.2	6,892.6	41,581.8
Confidence Interval	*± 2.8*	*± 9.6*	*± 28.9*	*± 38.8*	*± 74.9*	*± 672.3*	*± 2,358.4*	*± 728.0*
Median	5.8	22.3	51.4	165.7	471.6	1,749.0	5,320.8	24,639.2
Observations	25	45	31	44	55	41	7	9
Mutual Association (Homeowners Assoc., etc.)								
Mean	7.0	28.6	87.9	140.5	428.9	1,801.4	5,168.0	
Confidence Interval	*± 4.4*	*± 11.7*	*± 59.9*	*± 25.8*	*± 127.8*	*± 787.3*	*± 0.0*	
Median	4.4	21.6	55.4	112.4	274.3	1,167.0	5,168.0	
Observations	32	40	33	20	22	8	2	
Other Private Ownership								
Mean	4.1	29.1	85.2	271.5	700.5	3,411.1		
Confidence Interval	*± 3.5*	*± 20.8*	*± 60.1*	*± 137.2*	*± 149.1*	*± 2,656.6*		
Median	2.5	19.9	71.2	206.7	586.5	2,177.2		
Observations	6	11	14	16	24	5		

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 2 - 29
Total Expenses
by Primary Water Source
(Thousands of Dollars)

Primary Water Source/ Total Expenses Data	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
Primarily Ground Systems								
Mean	6.3	22.4	77.1	167.2	517.1	1,925.9	7,674.6	23,060.5
Confidence Interval	*± 2.4*	*± 4.3*	*± 16.8*	*± 13.2*	*± 44.9*	*± 358.9*	*± 4,846.7*	*± 1,005.2*
Median	3.6	14.7	54.9	147.5	468.7	1,274.5	4,025.5	13,187.0
Observations	106	156	109	125	134	110	45	36
Primarily Surface Systems								
Mean	13.9	80.6	121.4	265.4	670.7	2,128.0	6,368.0	34,426.5
Confidence Interval	*± 5.1*	*± 36.0*	*± 39.5*	*± 57.7*	*± 99.0*	*± 247.1*	*± 882.5*	*± 6,313.5*
Median	8.8	34.2	103.1	206.7	551.6	1,980.6	5,153.7	17,107.9
Observations	28	55	39	59	58	71	56	56
Primarily Purchased Systems								
Mean	9.3	59.0	108.5	313.8	615.7	2,854.6	7,496.5	16,495.9
Confidence Interval	*± 2.5*	*± 15.5*	*± 21.3*	*± 53.0*	*± 72.1*	*± 867.6*	*± 1,922.7*	*± 2,268.4*
Median	9.4	38.4	83.2	192.3	558.0	1,996.2	5,083.8	12,479.8
Observations	26	95	80	68	63	28	23	24

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Primarily: system obtains all or highest percentage of water from stated source
Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 2 - 30
Total Expenses Breakdown - Major Categories as Percentage of Total by Ownership Type

Ownership Type/ Major Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Routine Operating Expenses	98.3%	94.7%	90.4%	89.6%	89.2%	89.1%	84.7%	87.4%
Confidence Interval	*± 1.4%*	*± 1.6%*	*± 1.4%*	*± 2.5%*	*± 1.0%*	*± 1.6%*	*± 2.9%*	*± 1.8%*
Debt Service Expenses	1.2%	5.2%	9.5%	9.9%	10.5%	10.7%	14.9%	11.7%
Confidence Interval	*± 1.0%*	*± 1.6%*	*± 1.4%*	*± 2.5%*	*± 1.0%*	*± 1.6%*	*± 2.7%*	*± 1.6%*
Other Expenses	0.5%	0.1%	0.1%	0.5%	0.3%	0.2%	0.4%	0.9%
Confidence Interval	*± 0.8%*	*± 0.2%*	*± 0.0%*	*± 0.4%*	*± 0.2%*	*± 0.2%*	*± 0.6%*	*± 1.0%*
Public Systems								
Routine Operating Expenses	93.9%	93.8%	90.0%	89.5%	89.9%	88.8%	83.9%	87.2%
Confidence Interval	*± 2.7%*	*± 2.4%*	*± 1.8%*	*± 3.3%*	*± 1.0%*	*± 1.8%*	*± 3.3%*	*± 2.0%*
Debt Service Expenses	6.1%	6.0%	9.9%	10.0%	9.8%	11.0%	15.6%	11.8%
Confidence Interval	*± 2.7%*	*± 2.4%*	*± 1.8%*	*± 3.1%*	*± 1.2%*	*± 1.8%*	*± 3.1%*	*± 1.8%*
Other Expenses	0.0%	0.1%	0.1%	0.6%	0.3%	0.2%	0.5%	1.0%
Confidence Interval	*± 0.0%*	*± 0.2%*	*± 0.0%*	*± 0.6%*	*± 0.2%*	*± 0.2%*	*± 0.8%*	*± 1.0%*
Private Systems								
Routine Operating Expenses	98.2%	93.9%	90.6%	90.1%	86.9%	91.0%	90.9%	89.1%
Confidence Interval	*± 2.4%*	*± 2.9%*	*± 2.2%*	*± 2.5%*	*± 2.2%*	*± 1.8%*	*± 1.8%*	*± 0.6%*
Debt Service Expenses	1.5%	6.1%	9.3%	9.7%	13.0%	8.8%	9.1%	10.7%
Confidence Interval	*± 2.4%*	*± 2.9%*	*± 2.2%*	*± 2.5%*	*± 2.2%*	*± 1.8%*	*± 1.8%*	*± 0.6%*
Other Expenses	0.3%	0.0%	0.1%	0.3%	0.1%	0.1%	0.0%	0.2%
Confidence Interval	*± 0.2%*	*± 0.0%*	*± 0.2%*	*± 0.2%*	*± 0.2%*	*± 0.0%*	*± 0.0%*	*± 0.0%*
Ancillary Systems								
Routine Operating Expenses	99.1%	97.0%	100.0%					
Confidence Interval	*± 1.8%*	*± 1.4%*	*± 0.0%*					
Debt Service Expenses	0.1%	2.8%	0.0%					
Confidence Interval	*± 0.2%*	*± 1.6%*	*± 0.0%*					
Other Expenses	0.8%	0.2%	0.0%					
Confidence Interval	*± 1.6%*	*± 0.4%*	*± 0.0%*					

Data: Q. 33

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions

Table 2 - 31
Total Expenses per Capita
by Ownership Type
(Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	205	100	112	107	99	101	101	83
Confidence Interval	*± 226*	*± 14*	*± 16*	*± 8*	*± 5*	*± 27*	*± 23*	*± 6*
Median	60	72	81	88	89	77	75	76
Observations	143	286	211	231	245	205	122	113
Public Systems								
Mean	197	109	112	106	97	101	101	82
Confidence Interval	*± 44*	*± 15*	*± 16*	*± 10*	*± 7*	*± 30*	*± 26*	*± 6*
Median	123	79	85	88	88	77	74	75
Observations	33	127	127	140	133	131	101	97
Private Systems								
Mean	99	110	112	112	104	103	102	95
Confidence Interval	*± 33*	*± 16*	*± 40*	*± 14*	*± 7*	*± 11*	*± 10*	*± 1*
Median	68	83	76	88	96	90	87	100
Observations	61	99	82	90	112	74	21	16
Ancillary Systems								
Mean	289	74	86	19				
Confidence Interval	*± 419*	*± 33*	*± 126*	**				
Median	45	42	147	19				
Observations	49	60	2	1				

**** :** Insufficient observations to calculate confidence interval

Data: Q. 33, Q. 11A

Notes: Table includes only systems reporting non-zero expenses

Definitions: Total Expenses: Includes all operating expenses, interest payments, depreciation, and other expenses; excludes any principal payments, capital improvements, and advance sinking fund contributions
Total Expenses per Capita: Total expenses per person served with piped drinking water

Table 2 - 32
Total Assets
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	31.9	333.6	522.8	1,268.7	3,866.6	15,707.6	63,119.5	187,617.8
Confidence Interval	*± 7.1*	*± 119.4*	*± 94.1*	*± 231.0*	*± 380.6*	*± 2,843.8*	*± 29,693.7*	*± 16,287.1*
Median	15.2	100.5	254.5	860.7	3,069.4	10,701.0	39,868.9	112,565.5
Observations	79	190	181	200	218	168	107	97
Primarily Ground Systems								
Mean	30.6	306.3	480.0	1,124.2	3,540.9	15,020.0	85,438.0	163,767.8
Confidence Interval	*± 7.3*	*± 147.4*	*± 81.6*	*± 313.5*	*± 480.8*	*± 4,761.2*	*± 89,747.4*	*± 935.3*
Median	15.0	75.0	243.0	789.8	3,064.3	9,913.0	32,540.9	96,222.1
Observations	49	85	87	100	118	89	38	28
Primarily Surface Systems								
Mean	73.3	402.0	645.1	1,735.7	5,709.2	17,322.8	55,039.3	221,484.1
Confidence Interval	*± 49.9*	*± 156.7*	*± 317.3*	*± 549.7*	*± 1,534.5*	*± 4,023.1*	*± 5,406.7*	*± 24,823.4*
Median	31.1	167.6	329.5	1,196.7	4,458.5	13,450.0	46,298.0	137,488.7
Observations	16	39	29	43	49	54	47	49
Primarily Purchased Systems								
Mean	27.5	446.7	639.6	1,435.4	3,073.7	14,649.5	46,939.1	122,037.7
Confidence Interval	*± 13.1*	*± 354.3*	*± 273.6*	*± 431.5*	*± 593.1*	*± 2,830.5*	*± 17,357.5*	*± 22,928.1*
Median	21.6	149.3	376.5	783.1	2,554.7	9,558.0	35,404.4	69,791.9
Observations	14	66	65	57	51	25	22	20

Data: Q. 34

Notes: Table includes only systems reporting non-zero total assets

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 33
Total Assets
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	30.7	343.5	527.7	1,268.7	3,866.6	15,707.6	63,119.5	187,617.8
Confidence Interval	*± 6.7*	*± 141.7*	*± 94.9*	*± 231.0*	*± 380.6*	*± 2,843.8*	*± 29,693.7*	*± 16,287.1*
Median	11.4	102.0	274.1	860.7	3,069.4	10,701.0	39,868.9	112,565.5
Observations	61	176	180	200	218	168	107	97
Public Systems								
Mean	93.7	463.2	565.1	1,417.8	3,979.1	15,784.3	66,143.2	190,795.6
Confidence Interval	*± 39.2*	*± 245.0*	*± 114.4*	*± 285.9*	*± 467.3*	*± 3,157.4*	*± 33,357.6*	*± 18,132.1*
Median	42.2	156.0	329.5	952.5	3,132.2	10,701.0	39,868.9	112,565.5
Observations	23	93	94	115	109	110	89	84
Private Systems								
Mean	18.5	211.8	464.1	870.4	3,514.4	15,113.3	37,527.4	155,321.2
Confidence Interval	*± 5.0*	*± 141.6*	*± 197.9*	*± 196.3*	*± 544.5*	*± 3,094.6*	*± 3,840.5*	*± 14,122.9*
Median	10.1	59.1	240.2	541.7	2,921.2	12,188.2	40,236.4	83,522.5
Observations	38	83	86	85	109	58	18	13

Data: Q. 34

Notes: Table includes only systems reporting non-zero total assets

Definitions: All: excludes ancillary systems

Table 2 - 34
Total Liabilities
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	29.3	207.8	286.7	731.8	1,857.8	6,395.4	42,015.6	84,772.3
Confidence Interval	*± 24.0*	*± 84.7*	*± 59.4*	*± 249.0*	*± 221.7*	*± 1,493.0*	*± 28,875.0*	*± 12,034.1*
Median	8.5	50.0	140.0	412.0	1,230.3	3,528.7	15,056.3	41,180.3
Observations	40	136	160	187	207	160	101	94
Primarily Ground Systems								
Mean	29.6	195.4	257.0	702.1	1,658.4	6,182.2	64,684.8	67,204.8
Confidence Interval	*± 27.3*	*± 130.7*	*± 45.9*	*± 356.4*	*± 315.7*	*± 2,508.6*	*± 84,555.6*	*± 1,186.0*
Median	8.0	39.7	131.9	394.7	997.4	3,791.9	9,075.2	43,109.6
Observations	23	60	80	89	114	85	36	28
Primarily Surface Systems								
Mean	33.9	159.9	681.5	860.1	3,074.2	7,782.1	34,066.2	109,735.9
Confidence Interval	*± 21.8*	*± 105.5*	*± 471.1*	*± 312.1*	*± 805.8*	*± 2,749.3*	*± 11,103.5*	*± 21,095.9*
Median	29.1	42.0	288.8	469.0	2,443.9	4,240.6	21,426.2	54,436.3
Observations	6	24	25	43	43	51	43	46
Primarily Purchased Systems								
Mean	22.0	281.8	277.6	721.7	1,338.4	3,970.4	25,409.3	40,455.4
Confidence Interval	*± 20.8*	*± 308.3*	*± 116.8*	*± 234.7*	*± 342.9*	*± 1,096.8*	*± 13,335.3*	*± 8,097.8*
Median	12.9	72.8	179.1	365.5	1,230.3	2,456.9	17,480.0	22,262.6
Observations	11	52	55	55	50	24	22	20

Data: Q. 34

Notes: Table includes only systems reporting non-zero total liabilities

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 35
Total Liabilities
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	34.1	204.2	286.7	731.8	1,857.8	6,395.4	42,015.6	84,772.3
Confidence Interval	*± 16.1*	*± 107.4*	*± 59.4*	*± 249.0*	*± 221.7*	*± 1,493.0*	*± 28,875.0*	*± 12,034.1*
Median	8.5	55.0	140.0	412.0	1,230.3	3,528.7	15,056.3	41,180.3
Observations	36	125	160	187	207	160	101	94
Public Systems								
Mean	60.3	223.4	289.9	814.0	1,899.0	6,334.2	44,639.7	87,470.2
Confidence Interval	*± 40.2*	*± 159.8*	*± 78.1*	*± 313.6*	*± 267.1*	*± 1,736.2*	*± 32,111.5*	*± 13,400.2*
Median	29.1	62.5	116.9	469.0	1,267.2	3,528.7	14,783.3	40,117.0
Observations	18	73	89	110	105	107	85	83
Private Systems								
Mean	24.5	178.1	280.9	495.8	1,725.7	6,890.3	17,985.1	52,997.9
Confidence Interval	*± 13.6*	*± 148.9*	*± 115.5*	*± 124.9*	*± 409.6*	*± 2,068.8*	*± 2,401.2*	*± 5,566.1*
Median	8.0	45.9	170.6	359.8	1,128.5	3,262.8	16,601.7	44,840.4
Observations	18	52	71	77	102	53	16	11

Data: Q. 34

Notes: Table includes only systems reporting non-zero total liabilities

Definitions: All: excludes ancillary systems

Table 2 - 36
Total Debt Outstanding
by Primary Water Source
(Thousands of Dollars)

Primary Water Source	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	3.7	101.0	169.7	456.7	1,285.6	3,507.4	27,787.5	67,185.9
Confidence Interval	*± 3.0*	*± 61.4*	*± 54.0*	*± 177.1*	*± 216.1*	*± 547.4*	*± 19,278.6*	*± 8,724.7*
Median	0.0	0.8	42.6	195.0	763.1	2,110.8	10,625.4	31,572.5
Observations	79	190	181	200	218	168	107	97
Primarily Ground Systems								
Mean	3.6	95.7	146.3	385.9	1,114.1	3,084.0	45,909.1	65,146.1
Confidence Interval	*± 3.2*	*± 68.1*	*± 60.3*	*± 231.0*	*± 250.3*	*± 390.4*	*± 58,395.4*	*± 628.7*
Median	0.0	0.0	42.1	157.0	670.0	2,175.0	3,778.8	39,053.6
Observations	49	85	87	100	118	89	38	28
Primarily Surface Systems								
Mean	3.1	26.5	448.0	624.1	2,124.9	4,466.2	22,939.8	84,824.9
Confidence Interval	*± 4.4*	*± 8.9*	*± 374.5*	*± 227.1*	*± 1,063.5*	*± 1,805.4*	*± 8,336.5*	*± 13,353.7*
Median	0.0	0.0	120.0	263.0	1,160.1	1,570.5	11,700.0	42,490.1
Observations	16	39	29	43	49	54	47	49
Primarily Purchased Systems								
Mean	8.3	167.7	170.1	595.4	988.7	2,942.4	12,150.8	21,332.9
Confidence Interval	*± 5.5*	*± 197.9*	*± 92.3*	*± 243.8*	*± 295.7*	*± 1,110.0*	*± 4,609.0*	*± 5,755.7*
Median	0.0	39.9	28.4	210.0	962.0	1,655.1	12,474.8	8,085.2
Observations	14	66	65	57	51	25	22	20

Data: Q. 34

Notes: Table includes systems reporting zero as well as non-zero total debt, except those reporting zero total assets

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 37
Total Debt Outstanding
by Ownership Type
(Thousands of Dollars)

Ownership Type	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Mean	5.1	110.6	172.0	456.7	1,285.6	3,507.4	27,787.5	67,185.9
Confidence Interval	*± 3.7*	*± 66.3*	*± 53.9*	*± 177.1*	*± 216.1*	*± 547.4*	*± 19,278.6*	*± 8,724.7*
Median	0.0	1.0	43.1	195.0	763.1	2,110.8	10,625.4	31,572.5
Observations	61	176	180	200	218	168	107	97
Public Systems								
Mean	20.3	123.4	177.1	502.1	1,297.7	3,400.2	30,078.8	70,396.6
Confidence Interval	*± 7.5*	*± 111.2*	*± 63.1*	*± 230.6*	*± 256.4*	*± 604.6*	*± 21,644.6*	*± 9,843.6*
Median	0.0	3.6	23.5	198.0	740.0	2,084.3	10,625.4	32,890.0
Observations	23	93	94	115	109	110	89	84
Private Systems								
Mean	2.1	96.6	163.2	335.2	1,247.8	4,338.3	8,394.3	34,554.5
Confidence Interval	*± 3.4*	*± 84.3*	*± 85.7*	*± 96.8*	*± 351.8*	*± 1,481.5*	*± 2,245.8*	*± 6,143.8*
Median	0.0	1.0	70.2	158.9	871.4	2,665.0	9,198.3	17,000.0
Observations	38	83	86	85	109	58	18	13

Data: Q. 34

Notes: Table includes systems reporting zero as well as non-zero total debt, except those reporting zero total assets

Definitions: All: excludes ancillary systems

Table 2 - 38
Percentage of Systems Making Major Capital Improvements Since January 1,1987
by Ownership Type and Primary Water Source

Ownership Type/ Water Source	Service Population Category								ROW TOTAL
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000	
All Systems									
Primarily Ground	33.9%	38.5%	52.0%	47.7%	69.4%	73.4%	86.1%	96.5%	43.1%
Confidence Interval	*± 6.3%*	*± 9.8%*	*± 9.0%*	*± 6.3%*	*± 10.8%*	*± 7.8%*	*± 15.9%*	*± 0.6%*	*± 4.1%*
Primarily Surface	45.8%	32.9%	48.4%	50.2%	72.2%	77.1%	80.2%	90.0%	58.3%
Confidence Interval	*± 10.0%*	*± 12.2%*	*± 16.7%*	*± 12.0%*	*± 10.4%*	*± 7.6%*	*± 12.2%*	*± 11.2%*	*± 5.9%*
Primarily Purchased	13.9%	30.9%	45.7%	54.0%	51.5%	60.9%	90.1%	92.7%	45.5%
Confidence Interval	*± 7.3%*	*± 10.2%*	*± 15.1%*	*± 12.7%*	*± 14.1%*	*± 11.6%*	*± 8.6%*	*± 2.7%*	*± 6.7%*
Public Systems									
Primarily Ground	38.7%	43.9%	46.6%	46.0%	70.7%	72.5%	87.5%	100.0%	51.0%
Confidence Interval	*± 27.6%*	*± 12.0%*	*± 10.2%*	*± 7.3%*	*± 13.7%*	*± 8.8%*	*± 17.6%*	*± 0.0%*	*± 4.5%*
Primarily Surface	28.3%	37.7%	43.7%	49.9%	74.9%	78.8%	85.3%	90.3%	62.4%
Confidence Interval	*± 28.2%*	*± 18.4%*	*± 20.8%*	*± 14.1%*	*± 9.8%*	*± 8.8%*	*± 13.5%*	*± 12.2%*	*± 6.7%*
Primarily Purchased	7.6%	27.2%	49.3%	50.3%	51.2%	58.8%	92.4%	94.3%	45.9%
Confidence Interval	*± 3.1%*	*± 12.9%*	*± 20.4%*	*± 16.7%*	*± 14.9%*	*± 12.5%*	*± 7.1%*	*± 2.4%*	*± 8.2%*
Private Systems									
Primarily Ground	40.8%	46.8%	57.9%	50.4%	66.0%	77.7%	74.5%	77.9%	47.7%
Confidence Interval	*± 7.1%*	*± 12.5%*	*± 13.9%*	*± 10.8%*	*± 9.4%*	*± 8.0%*	*± 7.3%*	*± 0.0%*	*± 4.5%*
Primarily Surface	55.6%	29.0%	62.9%	52.0%	58.1%	59.0%	54.5%	86.8%	49.9%
Confidence Interval	*± 13.7%*	*± 20.0%*	*± 11.4%*	*± 19.2%*	*± 32.3%*	*± 11.2%*	*± 15.5%*	*± 3.7%*	*± 8.8%*
Primarily Purchased	29.4%	40.0%	36.8%	61.3%	52.9%	81.6%	64.5%	72.5%	46.8%
Confidence Interval	*± 22.3%*	*± 14.7%*	*± 15.1%*	*± 22.1%*	*± 23.3%*	*± 20.2%*	*± 29.0%*	*± 4.1%*	*± 8.6%*
Ancillary Systems									
Primarily Ground	28.0%	24.6%	74.1%	100.0%					27.9%
Confidence Interval	*± 7.3%*	*± 12.7%*	*± 53.5%*	**					*± 7.8%*
Primarily Surface	33.7%	24.9%	100.0%						29.9%
Confidence Interval	*± 16.9%*	*± 15.1%*	**						*± 7.4%*
Primarily Purchased	11.0%	10.5%							10.7%
Confidence Interval	*± 16.5%*	*± 19.4%*							*± 4.1%*

** : Insufficient observations to calculate confidence interval

Data: Q. 35

Definitions: Primarily: system obtains all or highest percentage of water from stated source

Table 2 - 39
Capital Investment Profile: Percentage of Capital Funds Invested in Each Major Capital Expense Category Since Jan. 1, 1987 by Ownership Type

Ownership Type/ Major Capital Expense Category	Service Population Category							
	100 or Less	101 - 500	501- 1,000	1,001 - 3,300	3,301 - 10,000	10,001 - 50,000	50,001 - 100,000	Over 100,000
All Systems								
Water Quality Improvement	16.6%	12.8%	21.4%	20.0%	14.7%	17.5%	15.6%	16.9%
Confidence Interval	*± 4.5%*	*± 4.7%*	*± 11.2%*	*± 4.5%*	*± 3.9%*	*± 5.5%*	*± 5.1%*	*± 0.8%*
Replacement or Major Repairs	73.1%	63.1%	41.3%	36.8%	33.9%	36.3%	37.1%	38.2%
Confidence Interval	*± 11.0%*	*± 8.2%*	*± 10.4%*	*± 4.3%*	*± 9.4%*	*± 10.6%*	*± 10.8%*	*± 4.7%*
System Expansion	10.3%	24.1%	37.4%	43.1%	51.4%	46.2%	47.3%	44.9%
Confidence Interval	*± 10.8%*	*± 11.8%*	*± 9.8%*	*± 5.3%*	*± 8.8%*	*± 8.4%*	*± 12.0%*	*± 3.9%*
Observations	60	110	100	111	156	126	91	85
Public Systems								
Water Quality Improvement	13.0%	11.1%	21.5%	23.3%	16.1%	16.9%	14.7%	16.3%
Confidence Interval	*± 22.5%*	*± 8.8%*	*± 10.8%*	*± 5.7%*	*± 3.9%*	*± 5.5%*	*± 5.3%*	*± 1.0%*
Replacement or Major Repairs	78.8%	64.7%	45.6%	35.5%	31.8%	35.5%	37.7%	38.5%
Confidence Interval	*± 14.9%*	*± 18.4%*	*± 13.5%*	*± 6.9%*	*± 9.4%*	*± 10.8%*	*± 11.8%*	*± 5.1%*
System Expansion	8.2%	24.2%	32.9%	41.2%	52.1%	47.6%	47.6%	45.2%
Confidence Interval	*± 16.3%*	*± 25.3%*	*± 14.9%*	*± 7.4%*	*± 8.2%*	*± 8.6%*	*± 12.9%*	*± 4.3%*
Observations	18	49	53	62	84	87	79	76
Private Systems								
Water Quality Improvement	-15.9%	15.1%	23.8%	12.1%	9.5%	21.8%	26.2%	24.6%
Confidence Interval	*± 16.5%*	*± 9.6%*	*± 25.7%*	*± 8.2%*	*± 8.8%*	*± 20.0%*	*± 1.0%*	*± 4.5%*
Replacement or Major Repairs	74.9%	54.7%	33.0%	36.3%	41.7%	42.7%	30.1%	34.1%
Confidence Interval	*± 32.1%*	*± 11.6%*	*± 11.4%*	*± 15.1%*	*± 14.3%*	*± 17.4%*	*± 0.8%*	*± 1.8%*
System Expansion	9.2%	30.2%	43.2%	51.6%	48.8%	35.5%	43.6%	41.3%
Confidence Interval	*± 16.9%*	*± 17.4%*	*± 26.3%*	*± 11.6%*	*± 14.7%*	*± 16.5%*	*± 0.0%*	*± 6.1%*
Observations	26	45	44	48	72	39	12	9
Ancillary Systems								
Water Quality Improvement	18.5%	11.9%	0.0%	0.0%				
Confidence Interval	*± 10.8%*	*± 11.2%*	*± 0.0%*	**				
Replacement or Major Repairs	69.2%	76.4%	49.0%	100.0%				
Confidence Interval	*± 15.3%*	*± 14.3%*	*± 86.4%*	**				
System Expansion	12.3%	11.7%	51.0%	0.0%				
Confidence Interval	*± 13.5%*	*± 12.7%*	*± 86.4%*	**				
Observations	16	16	3	1				

**** :** Insufficient observations to calculate confidence interval

Data: Q. 36

Notes: Table includes only systems reporting non-zero total capital investment since January 1, 1987

PART 3

METHODOLOGY REPORT

1. INTRODUCTION

Study Background and Survey Overview

1.1 Study Background

In compliance with Executive Order 12866, the Regulatory Flexibility Act, and the Safe Drinking Water Act (SDWA), EPA's Office of Ground Water and Drinking Water conducts periodic surveys of the financial and operating characteristics of community water systems. Previous surveys were conducted in 1976, 1982, and 1986. This report documents the methodology employed for the latest point in this series, the 1994 Community Water System Survey. The information in this survey will be used to help EPA and State program offices develop and implement the administration's proposals for reauthorizing the SDWA. It will be used, for example, to help make water system capacity-building evaluations, particularly for small systems, and to determine the need for and design of special Best Available Technology (BAT) programs, again primarily benefiting smaller systems. The information is also 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 will also be used to measure the financial burden of EPA's regulations on consumers and the water supply industry. Furthermore, data from the survey will help EPA identify, evaluate, and develop guidance for Best Management Practices (BMPs) used in water treatment and distribution systems.

1.2 Survey Overview

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

The Community Water System Survey (CWSS) was a mail survey designed to collect operating and financial information from a representative sample of community water systems. In order to identify the eligible systems and appropriate respondents for the mail questionnaire, the survey utilized a computer assisted telephone interview (CATI) questionnaire to conduct a preliminary screening of the sampled systems. An initial Phase I sample of 5,856 water systems was drawn from over 57,000 systems contained on the Federal Reporting Data System (FRDS) file, which was the source of the sample frame

for the CWSS. To meet EPA's analytical objectives, the sample was stratified into 38 groups (strata) defined by the system's type of ownership, water sources, and number of residents served.

Telephone interviewers contacted and screened the systems to verify FRDS data, collect additional data for stratifying the mail sample frame, and collect the name and address of the person who would complete the mail survey questionnaire. The CATI survey identified 4,729 eligible water systems. These systems were re-stratified based on the information they provided during the screening survey, to form the frame for the Phase II of the survey. From these 4,729 systems, 3,681 were subsampled to receive the main survey questionnaire.

Three versions of the survey questionnaire were developed to be administered by mail to publicly owned, privately owned, and ancillary community water systems. An ancillary system is one that operates a drinking water system as a secondary component of its main business, such as a trailer park. After the data collection instrument was pretested and revised, a complete pilot test of survey instruments, procedures, and operations was conducted with approximately 80 water systems. The instruments, systems, and procedures were then revised for the full study, as dictated by the findings of the pilot test.

Immediately prior to the mailout of the questionnaires, the systems received a notification call alerting them that they would receive a mail questionnaire. During mail data collection, a toll-free support line was manned to answer any technical or administrative questions that respondents might have. At appropriate points in time, reminder calls were also made to non-responding systems. Requests for questionnaire remailings were received through the support line and in conjunction with reminder calls; the requests were batched and remails were done on a weekly basis.

As the completed questionnaires were returned, they were logged into a receipt control system. Next, they went through an extensive data quality review and possible data retrieval to clarify or correct anomalous items or collect missing responses. The questionnaires were key-entered using independent double-key entry. Finally, they were 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 responding sampled water systems, so that the responses of the sampled systems could be properly expanded to represent the national universe of community water systems (CWSs).

Work on the planning and design of the Community Water System Survey began in July, 1993, and continued through July, 1994. The pilot test was conducted from August to September, 1994, and the final design was developed in October and November, 1994. Data collection occurred from November to December, 1994 (telephone screener) and from June, 1995, through March, 1996 (mail survey). Data processing, analysis, and reporting covered the period December, 1995, through September, 1996.

EPA secured the services of several contractors who performed a variety of tasks in support of the survey design, conduct, data processing, and analysis. Prime contractors included The Cadmus Group, and Westat, Inc. Other contractors included The Washington Consulting Group and The Government Finance Group. The Cadmus Group has been supporting EPA and other clients in the assessment and analysis of the water industry for over 15 years. Cadmus' primary responsibilities were for overall project management, expert QA review of survey data, and report preparation. Westat was responsible for assisting EPA with questionnaire design; for sample design and selection; design, conduct and management of the data collection process; editing and preparation of the data into final form for delivery; calculation of appropriate sample weights; data tabulations; and delivery of the final survey database with documentation. The Washington Consulting Group conducted advance notification calls to the sampled systems immediately prior to questionnaire mailout. EPA provided management and guidance across all of these tasks. The Government Finance Group (GFG), expert in the field of public finance, reviewed and helped design the financial section of the CWSS questionnaire. They also provided QA review of survey results. Grant Thornton, Inc., accountants and management consultants, conducted a peer review of the financial section of the survey questionnaire and provided insights on the classification of revenues and expenses based on the principles of Enterprise Fund accounting. Peer review of the CWSS questionnaires was also conducted by John Trax of the National Rural Water Association and by Vern Achtormann, Waterstats Manager for American Water Works Association until the Summer of 1996.

EPA also was supported by several well known consultants to the water industry. Mr. Jim McFarland, a consultant who has been conducting RIAs for EPA's Office of Ground Water and Drinking Water (OGWDW) for over a decade, has been involved in all facets of the CWSS project. He supported the design of the CWSS questionnaire, helped develop the QA review procedures that were applied, and participated in report preparation and review. Mr. Dan Fraser, an engineer and expert in the operational characteristics of water systems, participated in the review of the operational section of the survey questionnaire and QA review of survey results. Dr. Janice Beecher of Indiana University has conducted peer review of the CWSS Report. Dr. Beecher, an expert in the water industry, serves as Senior Research Scientist and Director of Regulatory Studies at Indiana University's Center for Urban Policy and the

Environment. She also serves as a Senior Institute Research Specialist at the National Regulatory Research Institute (NRRI).

2. SAMPLE DESIGN AND WEIGHTING

2.1 Sample Design and Selection

This section describes the sample design for the Community Water System Survey (CWSS). It includes a description of the sampling frame, target sample size, stratification variables and sampling method.

The survey utilized a two-phase, single stage, stratified sample design. Phase I was a telephone screening survey which provided a sampling frame for the main data collection effort in Phase II. The Phase II mail survey was tailored to the type of ownership of the water system and provided data for the substantive analysis. At both stages, sampling strata were defined by various combinations of the water systems' size (residential population served), ownership (public, private, or ancillary), and primary water source (ground or surface).

A screener questionnaire was administered by telephone to the sampled water systems to determine their eligibility and to obtain precise stratification and accurate contact information. In Phase II, the eligible Phase I respondents were stratified utilizing the screening data and a sample of 3,681 systems were selected for the mail survey.

2.1.1 FRDS Sampling Frame and Coverage

CWSS Sample Frame. The CWSS sample frame was developed from the Federal Reporting and Data System (FRDS), EPA's permanent database of all U.S. water systems. This database contains records of water systems and water system facilities; it consists of information that is reported to EPA on a quarterly basis by each individual state. FRDS's coverage of the target population is relatively complete. Alternate list frames all suffer from substantial undercoverage. An area frame approach would be more costly than the list frame approach in that the possible improvement in the sample would not justify the increased cost.

Because of the longitudinal nature of the FRDS file, the formal definition of a <u>community water system</u> (as specified in the Code of Federal Regulations), and the specific definition of systems eligible for this survey, not every record on the file represented a community water system that was eligible for the survey. Thus, to construct a valid operational sample frame, it was necessary to review the

standard FRDS data file documentation and to conduct summary and individual analyses of the FRDS records to assess what kinds of information were available. The information was targeted to fulfill three principal purposes:

- Eligibility: to determine whether a record represented a currently operating, sample-eligible community water system;
- Sample Stratification: to determine whether the necessary data elements (variables) existed on FRDS, containing suitable data values, to construct a frame for a sample design that would meet EPA's ultimate data and analytical needs from the survey; and
- Data Collection: to determine the quality and extent of the water system location and contact information available on FRDS to support an efficient and effective data collection effort.

In addition to the presence or absence of specific items, the frame development process also took steps to analyze the reliability and consistency of the data within and across records and to measure the degree to which data was present or missing for each data element. Finally, FRDS contains numerous data elements that were not relevant to the CWSS; and there are potentially multiple sources for certain pieces of information. Hence, the FRDS review developed a decision-list of all the specific FRDS data elements that would be used for sampling and data collection, as well as clear documentation of their contents in terms of the CWSS design definitions.

This review and analysis was conducted at two stages: prior to the first draft sample design, and again after the results of the survey pilot test identified additional issues concerning the structure, content, and quality of the FRDS data that could have a bearing on sample design and data collection.

Frame Preparation Protocol. To prepare the CWSS sample frame, the needed data elements were extracted from the FRDS database, then checked, processed and cleaned according to a documented protocol developed during the FRDS review and analysis. The principal processing goals during the extraction and frame building process included identifying and eliminating duplicate records, improving missing or ambiguous ownership data, checking for valid telephone numbers, and stratifying the resulting frame according to the sample design.

The sample design called for a stratified sample. Two of the stratification dimensions were the systems' size, as defined by residential population served, and type of ownership. Analysis determined

that population served was missing for about 0.5% of the FRDS records, and the frame preparation protocol imputed these missing values using a hot-deck imputation procedure. The survey design assumed that this imputation would be used only for the first phase of the sampling process, and that actual population data would be collected during the telephone screening of the first phase sample.

Ownership type was assigned to the CWSS ownership categories (publicly owned or privately owned) when values in the FRDS record mapped explicitly to the CWSS ownership definitions. However, these values were sometimes ambiguous or missing. In these cases, the frame development protocol incorporated a qualitative evaluation of the water system names to make a judgment as to the ownership type, based on certain types of names or specific words appearing in the name. A decision tree was implemented within both automated and manual review processes. If the automated processing identified certain key words, phrases, or abbreviations in the name, then the appropriate ownership type was assigned. For example, the presence of the word "Municipal" in its various forms, cases, and abbreviations was regarded as evidence of public ownership, while the similar variants of the word "Incorporated" was regarded as evidence of private ownership. A lengthy list of similar indicators was employed. If the automated decision logic could not make an explicit decision, the record was printed for review by the CWSS project staff, who used both the system name and other sources of information to assign the ownership category.

Several specific data content issues were dealt with during the processing of the FRDS records. Telephone numbers, which were needed for conducting the Phase I telephone screening, serve as a good example. The preliminary review of the rate of completely missing data in the telephone number fields identified the need for the CWSS data collection plan to incorporate procedures to acquire phone numbers from sources other than FRDS. However, during the actual frame processing, a more structured review of the telephone numbers indicated that the mere presence of numbers in the appropriate field did not necessarily provide useful telephone numbers. For example, the structured review of the telephone numbers looked for ones in which all characters consisted of a "9" or "0", or whose area codes began with "0" or "1." Such numbers were not valid numbers and would need to be identified prior to the data collection so that they could be put through the intensive tracing process described below in Section 3.3.

In general, most active water systems are considered part of the current FRDS inventory (i.e., FRDS data element C109 classifies their record as "current"), while systems that are no longer active water systems are classified as "historical." In some cases, however, a record for an active water system may become classified as historical, due to problems experienced during data processing for updating FRDS. The results of the pilot test confirmed that most of the FRDS records that were classified as historical were

not active systems. The final frame development protocol included file processing specifications for eliminating the historical records when the frame was prepared for drawing the sample, expect for rare instances when there was external evidence that records for specific groups of active water systems had been systematically classified as historical due to FRDS processing requirements.

2.1.2 Phase I Sample Design and Selection

Sample Eligibility. To be eligible for the CWSS, a water system had to meet several criteria. First, it had to 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 complete definition.) In addition, the CWSS excluded federally and state-owned or operated systems since these are not affected by regulatory and economic forces in the same way as other systems. To the extent possible, all ineligible systems were identified on FRDS and removed from the frame. However, many such systems either could not be identified on the frame or could not be so identified with confidence. Any such systems remaining on the frame were identified by the screening process and subsequently excluded from the Phase II sample.

The CWSS analytical plan specified minimum precision levels to be achieved for subpopulations, which meant that specific sample sizes be achieved for each subpopulation. The stratification variables that were available on the sampling frame were not accurate enough to ensure the initial selection of the given overall sample size needed for the required precision levels, in a cost-effective manner. Thus, it was necessary to draw a larger sample in Phase I, to ensure that enough sample would be available in Phase I to obtain accurate stratification information to be used in the Phase II sample size allocations within each stratum.

The domains of the population of interest for EPA are based on three major characteristics of the systems: size of the population served by the system, type of system ownership, and type of primary source of non-purchased water. The domains of the population are shown in Table 2-1. The regulatory impact models require as inputs estimates of parameters of reasonable precision in 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. Thus, the sample was designed to provide estimates of percentages with an error not exceeding 10 percent (except for a 1 in 20 chance) within each domain. For example, suppose 50 percent of the systems in a domain responded that they boost chlorine residuals in their distribution system. The sample was designed so that EPA could be 95 percent confident

that between 40 percent and 60 percent of the systems in this domain boost chlorine residuals. The minimum sample size required under this design would obtain an estimate for a 50 percent statistic with an error not exceeding ±10 percent (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.

For some domains, the FRDS frame could provide population counts only for broader domains than needed by EPA. For example, the data from FRDS were not sufficiently descriptive to divide privately owned systems into ancillary vs. nonancillary categories. Thus, the estimated proportions from the 1986 CWSS were used to estimate the population counts for the detailed subdivisions. The response and eligibility rates from the 1986 survey were used to obtain the estimates for the number of initially sampled systems required to yield the target number of completes.

The Phase I sample was obtained by drawing a systematic sample of systems from the cleaned, de-duplicated FRDS frame, within each sampling stratum. Thirty-two sampling strata were formed as the intersection of the eight population size classes, two ownership types, and two types of water source. Table 2-1 shows the frame and the sample counts for the Phase I sample. In total, 5,856 systems were selected for Phase I.

In order to reduce the response burden on the water systems, attempts were made to minimize the overlap between the 1995 Drinking Water Infrastructure Needs Survey (DWINS) and the CWSS samples. The systems in the mid-size strata, i.e., population served between 3,301 and 50,000, were selected conditional upon their selection to the DWINS sample. The conditional selection was used to reduce the overlap between the two samples. The overlap among small systems was anticipated to be quite small, and almost all large systems had to be selected according to both survey sample designs, so this procedure was only applied to mid-size systems. The systems in the mid-size strata were further stratified by the DWINS sample strata, and then were selected with probabilities conditional upon their inclusion for the DWINS sample. This modified Keyfitz (Brick, Morganstein, and Wolters, 1987) method of selection ensured the desired CWSS selection probabilities while minimizing the overlap between the DWINS and the CWSS samples.

The sampling method ensured that the unconditional chance of selection to the CWSS sample is equal to the desired CWSS sampling fraction while minimizing the overlap between the two samples. This selection procedure is optimal in that no other selection procedure which provides the desired CWSS

Table 2-1 Phase I Frame and Sample Sizes by the Phase I Strata

Phase I stratum					
Size of population served	Ownership type	Source of water	Frame size	Sample size	Sampling rate
100 or less	Public	Ground	1,300	161	0.124
100 or less	Public	Surface	272	119	0.438
100 or less	Private	Ground	14,268	783	0.055
100 or less	Private	Surface	593	401	0.676
101-500	Public	Ground	4,439	197	0.044
101-500	Public	Surface	1,191	180	0.151
101-500	Private	Ground	10,759	667	0.062
101-500	Private	Surface	778	418	0.537
501-1,000	Public	Ground	2,744	179	0.065
501-1,000	Public	Surface	778	159	0.204
501-1,000	Private	Ground	1,927	209	0.108
501-1,000	Private	Surface	324	149	0.460
1,001-3,300	Public	Ground	3,857	175	0.045
1,001-3,300	Public	Surface	1,757	167	0.095
1,001-3,300	Private	Ground	1,632	180	0.110
1,001-3,300	Private	Surface	536	154	0.287
3,301-10,000	Public	Ground	1,845	164	0.089
3,301-10,000	Public	Surface	1,497	165	0.110
3,301-10,000	Private	Ground	455	165	0.363
3,301-10,000	Private	Surface	193	128	0.663
10,001-50,000	Public	Ground	987	143	0.145
10,001-50,000	Public	Surface	1,276	157	0.123
10,001-50,000	Private	Ground	203	110	0.542
10,001-50,000	Private	Surface	127	84	0.661
50,001-100,000	Public	Ground	117	78	0.667
50,001-100,000	Public	Surface	244	106	0.434
50,001-100,000	Private	Ground	29	29	1.000
50,001-100,000	Private	Surface	31	31	1.000
> 100,000	Public	Ground	66	66	1.000
100,001-500,000	Public	Surface	177	44	0.249
> 100,000	Private	Ground	18	18	1.000
> 100,000	Private	Surface	35	35	1.000
> 500,000	Public	Surface	35	35	1.000
All	All	All	54,490	5,856	

unconditional selection probabilities would retain fewer DWINS sample units in the CWSS sample. In total, in mid-size strata 210 DWINS systems were retained. If the CWSS sample had been drawn independently of the DWINS sample, it was expected that approximately 506 DWINS sample systems would have been selected for the CWSS. Thus, the procedure provided a nearly 60 percent reduction in the size of the overlap.

In the small and large size strata, the systems, before selection, were placed in a sort order by the EPA region, and within the EPA region by the size of the population served. The direction of the size sort alternated across the regions. This implicit stratification ensured the geographical dispersion among the sample systems, and increased the probability that a range of population sizes within a stratum were sampled. With the systems in this sort order an equal probability systematic sample of systems was drawn within each stratum. The sampling was independent across the strata.

Table 2-1 shows the frame and sample sizes and the sampling rate for each stratum. The publicly owned systems with surface water serving more than 100,000 persons were selected with certainty.

2.1.3 Phase II Sample Design and Selection

Out of 5,856 water systems selected for the Phase I sample, 4,729 successfully completed the interviews and were eligible for sampling for Phase II. The screener collected data on the stratification variables, i.e. size of the population served by the system, ownership of the system, and the source of water to the system. The responses to the screener showed inaccuracies in the FRDS-based stratification of the water systems. This is consistent with experiences from previous surveys that have used the FRDS as a sampling frame (e.g., the National Pesticide Survey and the 1986 Survey of Community Water Systems).

The migration of the systems to different strata as a result of the screener responses introduced inefficiency in the sample design through a loss of sample size and/or by introducing unequal sampling rates. An iterative optimization algorithm was applied to achieve optimum sample size allocations within each screener-based stratum through equalizing the sampling rates across the FRDS based strata. The intersections of the FRDS-based strata and the screener-based-strata resulted in a total of 337 strata.

After the optimum sampling rates were determined, the systems were placed in a sort order by EPA region, and within the EPA region by the size of the population served within each stratum. The direction of the size sort alternated across the regions. In total, 3,681 systems were selected by drawing an equal probability systematic sample of systems in each of the 337 strata.

For each of the screener-based strata Table 2-2 shows the number of water systems that were eligible for Phase II sampling and the number of systems that were selected.

2.1.4 Stratum Migration

The errors in the FRDS frame classification of the water systems into size, ownership, and source of water categories introduced inefficiency in the sample design through a loss of sample size and/or by introducing unequal sampling rates. Among the Phase I respondents, 81 percent reported the same size class as the FRDS data indicated. A larger proportion, about 86 percent, reported the same ownership type, and about 91 percent reported the same water source as the FRDS data.

Size of the System

Table 2-3 shows the cross-tabulation of the eligible screener respondents by FRDS-based and screener-based system size classes. In all size classes, more than 94 percent of the systems confirmed their original size class or reported a service population in a class immediately adjacent. A greater percentage of systems migrated to smaller size classes than to larger size classes. In general, size confirmation rates for the FRDS data can be considered high. However, a few systems that were reported in small size classes in FRDS migrated to a much larger size class in the screener. Nine systems that were reported as smaller than 3,301 in FRDS migrated to size classes larger than 50,000. The systems migrating to larger size classes can have adverse effects on the precision of the estimates. This stratum migration and its effects on the precision of the estimates are discussed in detail below.

Ownership

Table 2-4 shows the cross-tabulation of the screener respondents by FRDS and screener-based system ownership classifications. About 91 percent of systems that were classified as publicly owned in FRDS were confirmed as publicly owned, while a smaller percentage, 82 percent, of the systems

Table 2-2. Phase II Frame and Sample Sizes by the Phase II Strata

Phase II stratum				
Size of population served	Ownership type	Source of water	Frame size	Sample size
100 or less	Public	Ground	98	98
100 or less	Public	Surface	68	68
100 or less	Private	Ground	263	158
100 or less	Private	Surface	101	101
100 or less	Ancillary	Ground	321	148
100 or less	Ancillary	Surface	76	76
101-500	Public	Ground	224	137
101-500	Public	Surface	194	150
101-500	Private	Ground	312	154
101-500	Private	Surface	170	170
101-500	Ancillary	Ground	212	163
101-500	Ancillary	Surface	57	57
501-1,000	Public	Ground	177	132
501-1,000	Public	Surface	145	145
501-1,000	Private	Ground	133	133
501-1,000	Private	Surface	83	83
1,001-3,300	Public	Ground	212	128
1,001-3,300	Public	Surface	198	127
1,001-3,300	Private	Ground	151	139
1,001-3,300	Private	Surface	83	83
3,301-10,000	Public	Ground	190	132
3,301-10,000	Public	Surface	172	127
3,301-10,000	Private	Ground	127	127
3,301-10,000	Private	Surface	66	66
10,001-50,000	Public	Ground	182	117
10,001-50,000	Public	Surface	166	114
10,001-50,000	Private	Ground	84	84
10,001-50,000	Private	Surface	48	48
50,001-100,000	Public	Ground	89	89
50,001-100,000	Public	Surface	90	90
50,001-100,000	Private	Ground	20	20
50,001-100,000	Private	Surface	30	30
> 100,000	Public	Ground	67	67
> 100,000	Public	Surface	82	82
> 100,000	Private	Ground	16	16
> 100,000	Private	Surface	22	22
All	All	All	4,729	3,681

Table 2-3 Eligible Screener Respondents by the FRDS-Based and Screener-Based Size Classes (Consistent Responses are Shown in Bold)

Screener-Based Size Class		FRDS-Based Size Class							
		100 or less	101-500	501-1,000	1,001-3,300	3,301-10,000	10,001-50,000	50,001-100,000	> 100,000
100 or less	Count	**756**	158	4	4	2	1	0	2
	Percent	**86**	14	1	1	0	0	0	1
101-500	Count	81	**914**	144	25	4	1	0	0
	Percent	9	**81**	23	4	1	0	0	0
501-1,000	Count	11	46	**416**	62	2	1	0	0
	Percent	1	4	**68**	10	0	0	0	0
1,001-3,300	Count	13	12	43	**501**	72	3	0	0
	Percent	1	1	7	**81**	12	1	0	0
3,301-10,000	Count	7	1	4	25	**478**	39	1	0
	Percent	1	0	1	4	**82**	8	0	0
10,001-50,000	Count	3	1	0	4	24	**413**	33	2
	Percent	0	0	0	1	4	**86**	12	1
50,001-100,000	Count	3	1	0	1	1	18	**193**	12
	Percent	0	0	0	0	0	4	**72**	8
> 100,000	Count	1	1	2	0	0	2	40	**141**
	Percent	0	0	0	0	0	0	15	**90**

Note: Percent is column percent, that is, the percentage of systems in the original FRDS-based size class that fell into each size class based on the screener data.

Table 2-4. Eligible Screener Respondents by the FRDS-Based and Screener-Based Ownership Types (Consistent Responses are Shown in Bold)

Screener-Based Ownership Type		FRDS-Based Ownership Type							
		Small		Mid-size		Large		All	
		Public	Private	Public	Private	Public	Private	Public	Private
Public	Count	**984**	317	**585**	127	**312**	29	**1,881**	473
	Percent	**85**	15	**96**	28	**99**	26	**91**	18
Private	Count	168	**1,775**	25	**324**	2	**81**	195	**2,180**
	Percent	15	**85**	4	**72**	1	**74**	9	**82**

Note: Percent is column percent, that is, the percentage of systems in the original FRDS-based ownership type that fell into each ownership type based on the screener data.

indicated as privately owned on FRDS were confirmed as privately owned. However, these percentages varied by system size. For small (size of the population served is 3,300 persons or less) systems, the percentages were equal, about 85 percent. For the systems identified on FRDS as publicly owned systems, the percentage confirmed as publicly owned increased by size of the system, to 99 percent for the largest systems. For the systems identified on FRDS as privately owned systems, the percentage confirmed as privately owned was lower for the larger systems, about 74 percent for the largest systems.

Water Source

Table 2-5 shows the cross tabulation of the eligible screener respondents by FRDS-based and screener-based water source classifications. About 97 percent of systems identified as ground-source water systems in FRDS confirmed this information; in the screener, however, only 86 percent of the systems identified as surface-source systems in FRDS were confirmed as surface in the screener. (The lower rate of confirmation for surface systems can be attributed to differences between the survey's definition of surface source water system and the FRDS definition of surface source water system.) This also varied by size of the system. For small and mid-size systems, about 97 percent of the ground water systems in FRDS confirmed while only 85 percent of the surface water systems confirmed FRDS data. For large systems (serving more than 50,000) the respective percentages were almost equal, about 88 percent.

In Table 2-6, it can be observed that in none of the domains did the effect of the stratum migration cause the projected sampling error to exceed 15 percent. Seven out of a total of thirty-six strata

Table 2-5. Eligible Screener Respondents by the FRDS-Based and Screener-Based Source of Water Types (Consistent Responses are Shown in Bold)

Screener-Based Water Source		FRDS-Based Water Source							
		Small		Mid-size		Large		All	
		Ground	Surface	Ground	Surface	Ground	Surface	Ground	Surface
Ground	Count	**1,878**	196	**543**	72	**162**	27	**2,583**	295
	Percent	**98**	15	**97**	14	**88**	11	**97**	14
Surface	Count	40	**1,130**	14	**432**	22	**213**	76	**1,775**
	Percent	2	**85**	3	**86**	12	**89**	3	**86**

Note: Percent is column percent, that is, the percentage of systems in the original FRDS-based water-source type that fell into each water-source type based on screener data.

have an expected error between ±14 and ±15 percent, fifteen have an expected error between ±11 and ±13 percent, and the remaining fourteen about ±10 percent. This table is discussed in detail in the following section.

Impact of Stratum Migration on the Accuracy of Domain Estimates

For each domain, Table 2-6 shows the minimum Phase II mail-out sample size required to obtain an estimate for a 50 percent statistic with an error not exceeding ±10 percent (except for a 1 out of 20 chance). The planned sample size assumed the FRDS frame correctly identified all subdomain members, while the required size is the number required to achieve this level of accuracy given the observed frame discrepancies, and the actual size is the mail-out sample size being implemented. The actual is smaller than the required sample size when the first-stage sample could not produce enough cases that were actually in the subdomain given the frame discrepancies. The Table also shows the half-width of the confidence interval resulting from actual mail sample sizes (and the anticipated response rate based on the 1986 CWSS) and the increase that represents over the planned 0.100 width.

The seven domains that had an anticipated sampling error between ±14 and ±15 percent were all in strata using surface water with a population served size of 50,000 or less. Six of the seven domains have private ownership. Lower precision in these domains mainly resulted from classification errors in the FRDS frame. As discussed above, a substantial number of systems that were classified as privately owned and surface water in FRDS reported in the screener as publicly owned and ground water. In fact, almost

Table 2-6. Phase II Sample Sizes and Impact on Accuracy, for Every Design Stratum

Stratum	Mail-out size			Half-width of 95% confidence interval	Increase in half-width over 0.100
	Planned	Required	Actual		
<100,Pub,Grd	111	154	98	0.125	0.025
<100,Pub,Srf	82	152	68	0.150	0.050
<100,Pvt,Grd	158	155	158	0.099	-
<100,Pvt,Srf	114	222	101	0.148	0.048
<100,Anc,Grd	148	146	148	0.099	-
<100,Anc,Srf	108	106	76	0.118	0.018
101-500,Pub,Grd	135	137	137	0.100	-
101-500,Pub,Srf	124	147	150	0.099	-
101-500,Pvt,Grd	154	152	154	0.099	-
101-500,Pvt,Srf	128	212	170	0.112	0.012
101-500,Anc,Grd	163	160	163	0.099	-
101-500,Anc,Srf	135	110	57	0.139	0.039
501-1,000,Pub,Grd	130	132	132	0.100	-
501-1,000,Pub,Srf	115	168	145	0.108	0.008
501-1,000,Pvt,Grd	140	167	133	0.112	0.012
501-1,000,Pvt,Srf	100	170	83	0.143	0.043
1,001-3,300,Pub,Grd	126	127	128	0.100	-
1,001-3,300,Pub,Srf	121	125	127	0.099	-
1,001-3,300,Pvt,Grd	121	139	139	0.100	-
1,001-3,300,Pvt,Srf	103	155	83	0.137	0.037
3,301-10,000,Pub,Grd	126	131	132	0.100	-
3,301-10,000,Pub,Srf	124	125	127	0.099	-
3,301-10,000,Pvt,Grd	108	193	127	0.123	0.023
3,301-10,000,Pvt,Srf	80	149	66	0.150	0.050
10,001-50,000,Pub,Grd	109	116	117	0.100	-
10,001-50,000,Pub,Srf	112	112	114	0.099	-
10,001-50,000,Pvt,Grd	82	128	84	0.123	0.023
10,001-50,000,Pvt,Srf	66	94	48	0.140	0.040
50,001-100,000,Pub,Grd	57	126	89	0.119	0.019
50,001-100,000,Pub,Srf	78	106	90	0.109	0.009
50,001-100,000,Pvt,Grd	23	24	20	0.110	0.010
50,001-100,000,Pvt,Srf	24	39	30	0.114	0.014
>100,000,Pub,Grd	42	115	67	0.131	0.031
>100,000,Pvt,Srf	75	105	82	0.113	0.013
>100,000,Pvt,Grd	15	19	16	0.109	0.009
>100,000,Pvt,Srf	26	26	22	0.109	0.009
Total	3,663	4,644	3,681		

50 percent of FRDS mid-size systems that were indicated as privately owned/surface water migrated to another ownership/water source type domain. This resulted in substantial sample size loss in the privately owned/surface water domains. At the same time, the systems that migrated to privately owned/surface water domains, although few in number, had in general smaller sampling rates than the systems originally sampled in those strata (and hence larger sampling weights) which further increased the variance.

The remaining one domain with an anticipated ±15 percent sampling error is the smallest publicly owned system size category with surface water. The ground water domain in this size/ownership category also was projected to have a somewhat lower precision, about ±13 percent. The lower precision expected in these domains resulted mainly from realization of lower than expected eligibility rates in these domains.

In two mid-size (3,301-50,000) privately owned/ground water domains the anticipated error percentages were about ±12 percent. The slightly lower precision levels were caused mainly by the differential sampling rates introduced by the migration of systems into these domains.

All privately owned systems that are larger than 50,000, as indicated by the FRDS data, were selected with certainty. In these domains, the projected error rate was slightly above ±10 percent (about ±11 percent). This is mainly due to the expected nonresponse rate for the mail survey (about 20 percent) in these domains. For surface water domains the variation in the sampling rates resulting from migration also contributed to slightly higher error percentages.

All systems that were classified using FRDS data as larger than 100,000/publicly owned/ground water were included in the Phase I sample. In this domain, the error is expected to be about ±13 percent. This is because of migration of a few systems to this domain from much smaller Phase I size classes that were selected with a much lower sampling rate for the Phase I (consequently having a large sampling weight). Although all the systems in this domain, as indicated by FRDS, were included in the sample, it was not possible to obtain a higher precision because of classification errors in FRDS. The projected precision level of ±11 percent for the 100,000/publicly owned/surface domain is somewhat overstated, because the systems that are larger than 500,000 in this domain were included with certainty.

2.2 Weighting and Estimation

A sampling weight is attached to each responding water system record (1) to account for differential probabilities of selection, (2) to reduce the potential bias resulting from nonresponse. The sampling weights are necessary for unbiased estimation of the population characteristics of interest.

2.2.1 Derivation of the Phase I Base Weight and Nonresponse Adjustment

The base weight for the Phase I sample was computed as the ratio of the number of water systems in the sampling frame to the number of systems sampled in each Phase I sampling stratum. That is, the Phase I weight for the h-th sampling stratum, $W_h^{(1)}$, is:

$$W_h^{(1)} = \frac{N_h}{n_h}$$

where N_h and n_h are the frame and sample sizes respectively for the h-th sampling stratum. Table 2-7 shows the Phase I sampling base weight for each Phase I sampling stratum.

Eligibility could be determined for 5,192 water systems out of a total of 5,856 systems sampled for Phase I. The 664 systems where eligibility could not be determined were included in the screener result categories as non-locatable, refusal, no answer, maximum contact, and other as discussed in detail in Section 3.4 (this includes 9 systems that were classified in Table 3-1 as ineligible through external sources). Out of a total 4,826 systems determined to be eligible, 4,729 were identified as eligible through the screener interview. The remaining 97 systems were initially identified as ineligible in the screener and consequently excluded from the Phase II sampling. However, these systems were later determined to be eligible through a review process of the screener results which is discussed in detail in Section 3.5. Table 2-7 presents the number of systems for which eligibility could be determined, the number of eligible systems, and the number of eligible systems that were identified as eligible through the screener questionnaire and consequently included for the Phase II sampling (the second-to-last column on Table 2-7).

The Phase I nonresponse adjustment factor was computed as a product of two factors. The first adjustment factor compensated for those 644 systems for which eligibility could not be determined. It was computed as the ratio of the number of sampled systems to the number of systems where eligibility

Table 2-7. The Phase I Base Weight and the Nonresponse Adjustment Factors by the Phase I Sampling Strata

First-phase stratum						Number of systems			
Size of population served	Ownership type	Source of water	Frame size	Sample size	Base weight	Eligibility determined	Eligible	Eligible respondent	Nonresponse adjustment factor
100 or less	Public	Ground	1,300	161	8.07	135	111	108	1.226
100 or less	Public	Surface	272	119	2.29	104	90	85	1.212
100 or less	Private	Ground	14,268	783	18.22	562	496	466	1.483
100 or less	Private	Surface	593	401	1.48	316	233	216	1.369
101-500	Public	Ground	4,439	197	22.53	180	175	172	1.114
101-500	Public	Surface	1,191	180	6.62	167	149	148	1.085
101-500	Private	Ground	10,759	667	16.13	546	516	509	1.238
101-500	Private	Surface	778	418	1.86	357	320	305	1.228
501-1,000	Public	Ground	2,744	179	15.33	168	165	165	1.065
501-1,000	Public	Surface	778	159	4.89	151	145	145	1.053
501-1,000	Private	Ground	1,927	209	9.22	185	178	177	1.136
501-1,000	Private	Surface	324	149	2.17	137	128	126	1.105
1,001-3,300	Public	Ground	3,857	175	22.04	170	167	167	1.029
1,001-3,300	Public	Surface	1,757	167	10.52	163	162	162	1.025
1,001-3,300	Private	Ground	1,632	180	9.07	168	155	154	1.078
1,001-3,300	Private	Surface	536	154	3.48	149	142	139	1.056
3,301-10,000	Public	Ground	1,845	164	11.25	162	161	161	1.012
3,301-10,000	Public	Surface	1,497	165	9.07	164	157	157	1.006
3,301-10,000	Private	Ground	455	165	2.76	157	150	149	1.058
3,301-10,000	Private	Surface	193	128	1.51	127	118	116	1.025
10,001-50,000	Public	Ground	987	143	6.90	141	141	141	1.014
10,001-50,000	Public	Surface	1,276	157	8.13	156	151	151	1.006
10,001-50,000	Private	Ground	203	110	1.85	108	106	106	1.019
10,001-50,000	Private	Surface	127	84	1.51	82	80	80	1.024
50,001-100,000	Public	Ground	117	78	1.50	78	78	76	1.026
50,001-100,000	Public	Surface	244	106	2.30	105	104	103	1.019
50,001-100,000	Private	Ground	29	29	1.00	28	28	28	1.036
50,001-100,000	Private	Surface	31	31	1.00	31	31	31	1.000
> 100,000	Public	Ground	66	66	1.00	65	64	64	1.015
100,001-500,000	Public	Surface	177	44	4.02	44	43	42	1.024
> 100,000	Private	Ground	18	18	1.00	16	16	16	1.125
> 100,000	Private	Surface	35	35	1.00	35	35	35	1.000
> 500,000	Public	Surface	35	35	1.00	35	31	29	1.069
All	All	All	54,490	5,856		5,192	4,826	4,729	

could be determined within each stratum. The adjustment was done under the assumption that within each sampling stratum, the eligibility rate for the systems with unknown eligibility was the same as for the systems with known eligibility. The second adjustment factor compensated for those 97 eligible systems that were excluded from Phase II sampling because they were not identified as eligible until the review process. It was derived as the ratio of the number of eligible systems to the number of eligible systems that were identified as eligible through the screener. That is, the screener nonresponse adjustment factor for the h-th stratum, λ_h, was computed as:

$$\lambda_h = \frac{n_h}{n_h^{(D)}} \frac{n_h^{(E)}}{n_h^{(C)}}$$

where $n_h^{(D)}$ is the number of systems for which eligibility could be determined in the h-th sampling stratum, $n_h^{(E)}$ is the number of eligible systems in the h-th sampling stratum, $n_h^{(C)}$ is the number of eligible systems that were identified as eligible through the screener questionnaire in the h-th sampling stratum. The component numbers that went into the screener nonresponse adjustment factors are shown in the second, fourth, fifth, and sixth numeric columns of Table 2-7.

2.2.2 Derivation of the Phase II Base Weight and Nonresponse Adjustment

Base Weight

As discussed in section 2.1.3, the intersections of the FRDS-based and screener-based strata resulted in 337 Phase II sampling strata. The Phase II base weight was computed for each Phase II sampling stratum as the ratio of the number of systems that were determined to be eligible based on the screener questionnaire to the number of systems that were selected for Phase II within the stratum.

After the Phase II base weight was obtained, the mail survey sampling weight was computed as the product of the Phase I base weight, Phase I nonresponse adjustment factor and the Phase II base weight. That is, for a water system in the h-th FRDS based stratum and the k-th screener-based stratum, the mail survey sampling weight, W_{hk}, was computed as:

$$W_{hk} = W_h^{(1)} \lambda_h W_{hk}^{(2|1)} \tag{2-1}$$

where $W_{hk}^{(2|1)}$ is the Phase II sample base weight.

Aggregated Cases

For a few cases, the water system management could respond to the mail questionnaire only by providing aggregated data for two or more systems from the sampling frame (including not only the sampled listings but also nonsampled listings). Those aggregated systems were recorded in the survey database as a single record. The mail survey sampling weights for each aggregate were therefore adjusted to reflect the joint chances of selection of all systems represented in the respective aggregate. This adjustment was made under the assumptions that the water systems included in the aggregate were sampled independently and the systems responded to the screener independently of each other. The water systems were selected independently across the strata, but the selection was not independent within the stratum. It was also assumed that the nonsampled systems represented in the aggregates would have responded to the screener with propensity equal to the average response rate of the sampled water systems in their FRDS-based stratum.

Thus, the sampling weight for the g-th aggregate, W_g, was computed as:

$$W_g = \frac{1}{1 - \prod_{i \in S_g} (1 - \frac{1}{W_{gi}})} \tag{2-2}$$

where S_g is the set of water systems that were included in aggregate g and W_{gi} is the mail survey sampling weight for the i-th listing in the g-th aggregate computed in Equation (2-1).

Nonresponse Adjustment

Out of 3,681 water systems selected for the mail survey, 3,664 were eligible (1 was found ineligible, 3 were out-of-business, and the remaining 13 responded but were retired cases because their data were aggregated with other sampled systems). Out of the 2,004 returned questionnaires, a total of 1,980 (54.0% of the sample) were included in the final weighted sample, after further adjustments for aggregated cases and unusable questionnaires. Nonresponse adjustment factors were computed to compensate for the water systems that did not respond to the mail survey. Since less than 1 percent of the respondents were

ineligible and all Phase II sampled systems had responded to the screener survey it was assumed that all nonrespondents were eligible.

Although nonresponse adjustment could potentially reduce bias, it can also increase the variance of the estimates. Small adjustment classes and/or low response rates (yielding large nonresponse adjustment factors) may increase the variance substantially and give rise to unstable estimates. In order to prevent excessive increases in variance and thereby adverse effects on the mean square error of the estimates, lower limits were placed on the size of the adjustment classes to avoid large adjustment factors.

In general, the nonresponse adjustment classes were equivalent to the screener-based strata. The only two exceptions were that the privately owned ground and privately owned surface water strata were collapsed across two size strata exceeding 50,000. The strata were collapsed to provide at least 20 respondents within the adjustment class to provide stable estimates. The nonresponse adjustment classes are shown in Table 2-8.

A nonresponse adjustment factor was computed for each nonresponse adjustment class. The nonresponse adjustment factor for the t-th adjustment class, δ_t, was computed as:

$$\delta_t = \frac{\sum_{i \in E_t} W_{ti}}{\sum_{i \in R_t} W_{ti}} \tag{2-3}$$

where

R_t is the set of water systems responding to the mail survey in the t-th nonresponse adjustment class,

E_t is the set of water systems that were found to be eligible in the mail survey in the t-th nonresponse adjustment class.

W_{ti} is the mail survey sampling weight (computed in Equation 2-1 or in Equation 2-2 for the aggregates) for the i-th water system in the t-th nonresponse adjustment class.

Table 2-8 shows the response rates and the nonresponse adjustment factors by nonresponse adjustment classes for the mail survey. The smallest adjustment class contained 24 completes and the adjustment factors varied from 1.315 to a maximum of 2.606.

Table 2-8. The Phase II Response Rates and the Nonresponse Adjustment Factors by the Phase II Nonresponse Adjustment Classes

Nonresponse adjustment class						
Size of population served	Ownership type	Source of water	Number of eligibles	Number of completes	Response rate (percent)	Nonresponse adjustment factor
100 or less	Public	Ground	98	49	50.0	1.879
100 or less	Public	Surface	63	32	50.8	1.725
100 or less	Private	Ground	158	64	40.5	2.453
100 or less	Private	Surface	101	41	40.6	2.292
100 or less	Ancillary	Ground	148	65	43.9	2.287
100 or less	Ancillary	Surface	76	30	39.5	2.249
101-500	Public	Ground	136	79	58.1	1.716
101-500	Public	Surface	149	74	49.7	1.956
101-500	Private	Ground	153	68	44.4	2.259
101-500	Private	Surface	169	86	50.9	1.829
101-500	Ancillary	Ground	163	70	42.9	2.330
101-500	Ancillary	Surface	57	27	47.4	2.304
501-1,000	Public	Ground	132	74	56.1	1.775
501-1,000	Public	Surface	143	79	55.2	1.882
501-1,000	Private	Ground	133	68	51.1	1.975
501-1,000	Private	Surface	83	50	60.2	1.627
1,001-3,300	Public	Ground	127	82	64.6	1.548
1,001-3,300	Public	Surface	128	70	54.7	1.812
1,001-3,300	Private	Ground	138	71	51.4	1.878
1,001-3,300	Private	Surface	83	47	56.6	2.224
3,301-10,000	Public	Ground	132	78	59.1	1.707
3,301-10,000	Public	Surface	127	69	54.3	1.826
3,301-10,000	Private	Ground	127	87	68.5	1.448
3,301-10,000	Private	Surface	66	39	59.1	1.808
10,001-50,000	Public	Ground	116	66	56.9	1.754
10,001-50,000	Public	Surface	114	74	64.9	1.542
10,001-50,000	Private	Ground	84	43	51.2	2.166
10,001-50,000	Private	Surface	47	30	63.8	1.725
50,001-100,000	Public	Ground	87	55	63.2	1.462
50,001-100,000	Public	Surface	90	66	73.3	1.315
> 50,000	Private	Ground	36	24	66.7	1.561
> 50,000	Private	Surface	52	27	51.9	2.059
> 100,000	Public	Ground	67	38	56.7	2.606
> 100,000	Public	Surface	81	58	71.6	1.392
All	All	All	3,664	1,980	54.0	

After the nonresponse adjustment factors were computed, the nonresponse adjusted weight for the respondents was obtained as a product of the mail survey sampling weight and the nonresponse adjustment factor. The nonresponse adjusted weight was set equal to zero for the nonrespondents and ineligibles.

2.2.3 The Final Weight

As discussed in section 2.1.4, the migration of the water systems across the size, ownership and water source strata, largely due to inaccuracies in the FRDS frame, resulted in considerable weight variation within the final reported strata, based on mail questionnaire data.

Such a large variation in weights would inflate the design effect and reduce the effective sample size. This would have a deleterious impact on the precision of the estimates. Trimming the largest weights can reduce this effect and increase the precision of the sampling estimates. However, at the same time trimming may introduce bias into the estimates. The goal of trimming is to balance any increase in bias with reduction in sampling error so as to minimize the mean square error.

The distribution of the nonresponse adjusted weights was examined within estimation strata. The estimation strata were formed as the intersections of eight population-served size classes and three water sources (ground, surface, and purchased), both obtained from the mail questionnaire, and the ownership types as originally reported in the screener survey. Within each stratum, the records were ranked from the highest weight value to the lowest. The weights were truncated sequentially at each level of the weight and the design effect for the unequal weights computed.

A sampling weight was trimmed when its trimming provided more than a 20 percent reduction in variance. In total, the weights of 13 water systems were trimmed. The trimmed portion of the weights were distributed across the water systems within the trimming (estimation) class to produce the original weight total. Table 2-9 shows the number of cases trimmed, the weight trimming level, and the factor applied to the weights to distribute the trimmed portion of the weight within each trimming (estimation) class. In the largest size class (larger than 100,000) the trimmed portion of the weights was not distributed (the weight redistribution factor is 1), because to do so would have resulted in a sample estimate much higher than the frame total for the number of systems in this size class.

Table 2-9 Weight Trimming Classes, Trimmed Weights and Weight Redistribution Factors

Weight trimming class			Number of cases trimmed	Weight before trimming	Weight cut-off value	Total number of cases in the class	Weight redistribution factor
Size of population served	Ownership type	Source of water					
100 or less	Public	Surface	1	17.1	4.8	11	1.267
100 or less	Private	Surface	1 1	61.9 45.8	6.3	24	1.807
101-500	Private	Surface	1 1	73.4 32.5	16.5	29	1.447
101-500	Private	Purchase	2 1	82.3 76.9	13.1	48	1.721
101-500	Ancillary	Surface	1	56.3	6.7	17	1.548
501-1,000	Private	Purchase	1	42.6	20.7	42	1.072
10,001-50,000	Private	Surface	1	14.1	3.4	25	1.157
> 100,000	Public	Ground	1	45.6	2.9	31	1.000
> 100,000	Public	Purchase	1	16.7	5.7	23	1.000

The weight trimming introduced some potential bias to the estimates to the extent that the trimmed cases differed in terms of the characteristics of interest from the other water systems in the estimation stratum. However, for all 13 trimmed cases, the reduction in variance was so large that it is anticipated to outweigh any potential bias introduced.

2.2.4 Variance Estimation

In this survey, a replication method, jackknife, was used to estimate the sampling variance. This method provides unbiased estimates of variance for the two-phase sample design used in this survey.

The variance estimation was carried out in three steps: (1) forming the replicates, (2) constructing the replicate weights, and (3) computing the estimates of the variances of the survey estimates.

After the replicates were formed and the replicate weights were constructed, the variance estimate (and the confidence interval) was computed easily for any statistic of interest using WesVarPC. The variance estimate for a statistic was computed as the sum of the squared differences between the estimates obtained using the replicate weights and estimate obtained using the full sample weight further multiplied by the finite population correction factor. That is, the estimate of the variance of a statistic, $\hat{Y}$, denoted as $v(\hat{Y})$, was:

$$v(\hat{Y}) = \sum_{r=1}^{M} \delta_r (\hat{Y}_r - \hat{Y})^2$$

where,

$\hat{Y}_r$ is the weighted estimate obtained using the r-th replicate weight,

$\hat{Y}$ is the weighted estimate obtained using the full sample weight,

δ_r is the finite population correction factor assigned for the r-th replicate, and

M is the number of replicate weights.

(See K.M. Wolter, 1985, for more information about variance estimation.) We now discuss the development of the replicates to estimate the variability within each Phase I variance stratum.

Replicates

The CWSS sample included 27 noncertainty Phase I sampling strata. The variability within each noncertainty sampling stratum was estimated by constructing two replicates for each stratum. Within each stratum the replicates were constructed as follows:

> The Phase I sample water systems were placed in their sample selection order and paired successively while in this sort order. Within each pair, the systems were alternately assigned to variance unit 1 and 2 with a random start. The pairs were further collapsed to form two clusters, and each cluster was then assigned to one of the two variance strata.

Thus, in total, 54 variance strata (two for each noncertainty variance stratum) were assigned to the systems that were selected from the noncertainty strata.

The water systems that were selected with certainty were not assigned to any variance stratum because they do not contribute to sampling variability.

Replicate Weights

The r-th replicate base weight for the k-th water system in the j-th variance unit and i-th variance stratum, $W_{ijk}^{(r)}$, was derived as:

$$W_{ijk}^{(r)} = \begin{cases} 2\,W_{ijk} & \text{if } r = i \text{ and } j = 1 \\ 0 & \text{if } r = i \text{ and } j = 2 \\ W_{ijk} & \text{if } r \neq i \end{cases}$$

where

$r = 1,2,.....,54$, and

W_{ijk} is the full sample base weight for the k-th water system in the j-th variance unit and i-th variance stratum.

The 54 replicate base weights were all set equal to the full sample base weight for those cases that were selected with certainty and consequently not assigned to a variance stratum.

All the remaining full sample weighting steps leading to the final full sample weight were performed on each replicate. These included the Phase I nonresponse adjustment, the weighting for the Phase II sampling, the weight adjustment for the aggregates, and the Phase II nonresponse adjustment.

By repeating the various weight adjustment procedures on each set of replicate weights, the effect of these procedures on the sampling variance of the estimator $\hat{Y}$ is appropriately reflected in the variance estimator, $v(\hat{Y})$, defined above.

Finite Population Correction Factor

A finite population correction factor was derived for each first-phase variance stratum. The factor was computed as 1 minus the ratio of the number of systems that completed the mail-out questionnaire to the estimated number of eligible systems in the frame for the stratum. The factors were then assigned to the replicates corresponding to the strata.

The confidence intervals that were computed using the replicate weights and WesVarPC are presented in Part 2 of this report. Each confidence interval presented in Part 2 is based on the assumption that the average values for the systems represented in a given table cell are normally distributed. In general, this assumption is true. However, 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.

References:

Brick, J.M.; Morganstein, D.R.; and Wolters, C.L. : "Additional Uses for Keyfitz Selection." Proceedings of the Section on Survey Research Methods, American Statistical Association, 1987.

Wolter, K.M., "Introduction to Variance Estimation." Springer-Verlag, New York, 1985.

3. TELEPHONE SCREENER SURVEY

3.1 CATI Screener Design and Programming

Westat developed a telephone screening questionnaire in cooperation with EPA (see Appendix A). The main purposes of this instrument were to screen the first phase sample for eligible water systems, collect the data needed to place the system in the correct sample stratum, and collect the name and address of the appropriate respondent for the mail survey.

The screener questionnaire was a computer-assisted telephone interview (CATI) instrument. This computerized questionnaire was programmed according to the document entitled Community Water System 1994 Survey, CATI Screening Questionnaire, CATI Specs #6 (Final), December 22, 1994. This document appears as Appendix A.

Because FRDS records often contained ambiguous or incomplete information about the water systems, Westat also developed a paper Contact Questionnaire that was used to assist the interviewers in finding the sampled water system and the appropriate person to complete the screener questionnaire. The Contact Questionnaire is presented in Appendix B.

3.2 Telephone Interviewer Training

Training for the telephone portion of the CWSS took place on November 17, 1994. The training was conducted by a Westat telephone operations manager and CWSS project staff using a prepared agenda and a series of prepared training scripts. The training agenda appears as Exhibit 3-1. Telephone supervisors who would be responsible for supervising the actual work of the interviewers also attended the training sessions.

The training of the telephone interviewers and supervisors maximized trainee involvement and participation in the learning experience while providing the trainers ample opportunity to observe and evaluate individual trainee performance.

Exhibit 3-1 CWSS Telephone Interviewer Training Agenda

Subject	Time
Introduction and Overview	30 Minutes
Interactive Exercise I	30 Minutes
Contact Procedures	60 Minutes
Break	20 Minutes
Contact Interactive Exercises and Roleplays	60 Minutes
Lunch	60 Minutes
Interactive Exercise II	60 Minutes
Refusal Avoidance	45 Minutes
Break	20 Minutes
Role Plays	90 Minutes
Questions and Answers	30 Minutes

Interviewers received eight hours of training in areas specific to the CWSS, including overview of the study, questionnaire content, specific question issues, sample, making contact, recording the call results, sensitivity to respondents, handling problems, and avoiding refusals. Previously, they had received eight hours of training in general telephone interviewing techniques and the use of the CATI system. The CWSS interviewing staff was comprised of experienced interviewers, who had previously conducted telephone surveys of business establishments.

Each CWSS interviewer received an Interviewer Manual containing general instructions, specific procedures for conducting the telephone interviews, and detailed explanations of each telephone interview question.

The principal training tool consisted of several interactive group exercises. Interviewers took turns administering the paper Contact Questionnaire and the CATI screener to the trainer (who played the role of the respondent), by reading the questions aloud and recording the responses in the instruments. The trainer's responses followed scripted answers prepared in advance. The answers were composed to simulate specific situations and problems that could be encountered in an actual interview. Because of the occasional ambiguity of information recorded in FRDS, emphasis was placed on making contact with and confirming the identity of the actual sampled water system.

At the conclusion of training, interviewers paired off to practice what they had learned by following scripted role-play interviews, using the actual instruments, telephones and CATI terminals in the interviewer carrels. For each role play, one interviewer conducted the interview, while the other played respondent. Training staff monitored the role plays, and interviewers were assigned to live calling only after having successfully conducted the role play interviews.

3.3 Telephone Data Collection

Pursuant to the sampling design discussed in Chapter 2, the CWSS Phase I (telephone) sample consisted of 5,856 water systems The remainder of this section documents the data collection procedures and results of the CWSS telephone effort.

Telephone Data Collection Procedures

Tracing. The starting point for contacting the water system was the name, address, and telephone number available in FRDS. However, 40 percent of the sampled systems had no valid phone number on their records. In addition, the presence of a number on the FRDS record was no guarantee that the number was correct. (It is important to keep in mind that a large number of water systems are very small and are managed out of private residences.) Therefore, prior to the start of telephone data collection, the sample was processed through Bizmatch, an automated telephone number look-up service for businesses. A new number found through this process was added to the contact information (if any) obtained from the FRDS records. Systems with no telephone number were, at this point, sent to trained tracers, who attempted to find them through Directory Assistance prior to the start of calling. As new telephone numbers were found, they were entered on the Respondent Information Sheet (RISs are described below), batched, and then entered into an automated telephone number updating system. Final RISs, with all available telephone numbers, were printed for the start of telephoning.

Systems whose telephone numbers were still non-locatable at the start of data collection, as well as those determined to have "bad" numbers during calling, went through additional tracing. Tracing steps consisted of a progressive series of contacts or lookups with the following potential sources of information about the identity and phone number of individual water systems.

- **Small Systems (< 1,000 residents served)**
  - Directory Assistance
  - National Rural Water Assoc. (NRWA) State Association
  - City/County Administrative Offices (e.g., City Hall, County Health Department)
- **Medium and Large Systems (1,000 or more residents served)**
  - Directory Assistance
  - Intensive searches of CD ROM telephone listing databases
  - NRWA State Association
  - City/County Administrative Offices (e.g., City Hall, County Health Department)

For smaller systems, tracers also looked for phone numbers under the names of any individuals listed as contacts in the FRDS records, since smaller systems are often operated as personal businesses out of an individual's residence, or are managed from the residence of an officer of a residential cooperative association. Tracers filled out a specially designed CWSS Tracing Procedures Report Form for each tracing case. It was used to record a detailed description of what was done for each step. This form stayed with the case throughout data collection; if further tracing was needed, the next logical step in the sequence was carried out. As a new telephone number was obtained, it was recorded on the RIS.

Case Management. Each water system was treated as an individual case to be carefully managed and controlled throughout the various steps of the telephone data collection process. Telephone interviewers for the CWSS used a Respondent Information Sheet, paper Contact Questionnaire, Call Record, and CATI questionnaire when working a case. Each of these is described below:

- **Respondent Information Sheet (RIS)** - Contained contact information about the CWS, including name, address, and possible telephone numbers. The form was used to identify the specific CWS the interviewer was trying to reach, how to reach it, and to record any new contact or location information.
- **Contact Questionnaire** - The Contact Questionnaire was a short series of questions administered on paper. It was used to verify that the interviewer had reached the exact CWS listed on the RIS, and to identify an appropriate respondent for the CATI interview.

- **Call Record** - Basic document that was used to record the results of all calls and to manage the flow of work. Each case was accompanied by a Call Record.

- **CATI Questionnaire** - The screening questionnaire that was administered to a person deemed knowledgeable about the CWS. It collected information about the CWS's size, ownership type, water sources, and related topics, and concluded by securing the name and address of the most appropriate person to respond to the mailed CWSS questionnaire.

Using these forms and systems, the interviewers were able to fulfill the objectives of the Phase I telephone screening process:

- Confirm or correct existing information about each system and collect some additional information about it, such as its size, type of ownership, and water sources, to determine if the system met the criteria to participate in the full study.

- Identify a person at the water system who was knowledgeable enough to respond for the CWS about the topics addressed in the telephone interview questions.

- Identify the name and address of the most appropriate representative of the water system to respond to the mail questionnaire.

3.4 Telephone Data Collection Results

The final outcomes of the telephone data collection process for the 5,856 Phase I water systems can be categorized into eight groups and are summarized in Table 3-1.

- **Complete** - The interview was successfully completed with the CWS and the responses to the screener determined that the water system was eligible to be sampled for the main survey.

- **Ineligible** - A system was considered ineligible for the survey under three different scenarios:

  - Based on responses to CATI Questionnaire items S1 - S3, it was determined that the system did not meet the definition of a Community Water System (Water systems that provide piped drinking water to at least 25 permanent residents or 15 household water connections)

  - Based on responses to CATI Questionnaire item S12, it was determined that the CWS is owned or operated by a state or the Federal government

- Without being able to administer the CATI Questionnaire, it was determined from other reported information that the CWS was ineligible (e.g., an institutional water system had ceased to provide water to a nearby community).

- **Non-locatable** - The CWS could not be located through any available telephone numbers or tracing efforts. Only five percent of the CWS sample was assigned this disposition.

- **Refusal** - The CWS refused the interview or refused to answer the critical eligibility questions S1 - S3. (To minimize any possible impact of the survey effort in relations between EPA and the regulated Community, the CWSS design omitted the survey technique of making a second effort to "convert" those who initially refuse cooperation.)

- **No Answer** -There was no answer at the best available phone for the CWS after at least eight calls; call attempts were spread out over several weeks at different times of day and days of the week, including weekends; directory assistance checks revealed no other possible phone number for any entity with a name similar to the CWS.

- **Maximum Contact** -After establishing contact with the CWS and making at least eight calls, it was not possible to complete an interview with the CWS.

- **Out of Business** - Telephone contact or other source provided definitive information that the CWS was no longer in business (ceased operations, integrated operationally into another system, etc.).

- **Other** - This code was used when no other final code applied.

Table 3-1 quantifies these results of telephone data collection. Due to the extensive tracing efforts, Westat succeeded in positively locating 93 percent of the sample; 5.2 percent were non-locatable and 1.8 percent never answered the phone. The final response rate was 89 percent. This was calculated by the following formula:

$$\frac{\text{Total Complete + Ineligibles}}{\text{Total Sample - Out of Business}}$$

Note that this response rate and Table 3-1 are presented as <u>operational</u> results, that is, they reflect the status of cases as of the end of telephone data collection. As discussed in Sections 2.1.3, 2.2.2, and 3.5, some further adjustments to these statuses and/or assumptions about the eligibility of non-interviewed cases were made at later stages of quality assurance and sample weighting.

Table 3-1 CWSS Telephone Screener Results

Screener Outcome	Number of Cases	Percent of Sample
Complete	4,729	80.8
Ineligible	393	6.7
Non-locatable	302	5.2
Refusal	149	2.5
No Answer	106	1.8
Maximum Contact	97	1.7
Out of Business	79	1.3
Other	1	0.0
Total	5,856	100.0

The Phase II (mail) sample was drawn from the 4,729 CWSs that completed the CATI interview.

3.5 Detailed Examination of Screener Outcomes

Section 2.2.3 discussed the derivations of the final CWSS sample weights. As part of the quality control process for the weighting, the estimate of the total number of active Community Water Systems derived from the initial round of weights was compared to independent estimates derived from ongoing EPA inventory efforts associated with the maintenance of the FRDS database. This comparison revealed a small difference between the two estimates that could not be explained, after allowing for normal sampling error or for definitional differences between the CWSs covered by the survey and the universe of Public Water Systems contained in FRDS. Further analysis revealed that the likeliest explanation for this small remaining difference lay in the eligibility rates encountered during the Phase I telephone survey.

Review of screening results suggested that a number of systems may have provided mistaken responses to screening questions that led to their being erroneously classified as ineligible (i.e., did not meet the CFR definitions of a CWS). To investigate how often this occurred, the Cadmus Group, Inc., worked with Westat, Inc., to review the attrition of systems from the FRDS file to the Phase I Sample Frame and the Phase II Sample Frame. Attrition was due principally to determination of either of two circumstances

during the two sampling phases: ineligibility (a system was not really a Community Water System under the CFR definition), or it was out of business (no longer actively operating as a water system). Specifically, the analysis investigated whether there might be evidence that systems classified as ineligible or out of business might actually have been eligible and actively operating, specifically within a timeframe reasonably close to the survey sampling reference period, late 1994. To alter the findings of the Phase I CATI screener, the types of evidence finally accepted by all analysts working on this issue included the following:

1. The system is a large system serving 10,000 or more people. Six systems met this criteria, and three of the six had populations over 100,000.

2. The system was classified as "out of business" during the CATI screener survey, but FRDS records indicate various activities that strongly suggest that the system was in business in late 1994. Examples of activity in FRDS include: violations, enforcement actions, or change is in inventory data such as population served or number of connections.

3. The system was classified as "not meeting the definition of a Community Water System" during the CATI screener survey, but FRDS records show that the system was an active CWS. A stricter standard was applied to these cases before reversing the screener findings, because survey interviewers had received information directly from the system personnel that led to classifying the system as "not meeting the definition of a CWS." If the FRDS inventory showed that the system met the definition of a CWS, and if FRDS also showed that the system had enforcement actions taken against it, the analysts concluded that the system was an active CWS. Enforcement actions require substantial investments of time and effort by State drinking water agencies, and it seemed unlikely that States would make such investments if the system were not an active CWS.

4. The system was classified as "not meeting the definition of a CWS" during the CATI screener survey, but FRDS records show that the system was a CWS. Again, a strict standard was required, for the same reason as in paragraph 3. The evidence required to prove that a system was a CWS was that the FRDS inventory showed that the system met the definition of a CWS, and a FRDS record of complex violation patterns (e.g., violation of a maximum contaminant level, a repeat or minor routine violation of the Total Coliform Rule, a violation of the Surface Water Treatment Rule treatment technique standard). These violations, like the enforcement activity above, require a substantial investment of time and energy by the State drinking water agency. It seemed unlikely that such investments would occur if the system were not an active CWS.

For consistency with the CATI Screener, evidence from FRDS was collected for the fourth calendar quarter of 1994 and also extended through all four calendar quarters of 1995, to reflect any lagging information about the system's status.

The result of this examination of screener outcomes was to increase the final estimated number of eligible CWSs on the FRDS frame by one to two percent over the preliminary estimates developed in the initial stages of the weighting process. Ninety-seven systems classified as ineligible or out of business during the telephone screening were reclassified as eligible and active by the review process. The revised estimate of eligible CWSs and the concomitant adjustments to the final sample weights resulted in survey estimates of a total number of CWSs that are reasonably similar to the estimates from independent EPA inventory activity.

4. MAIL SURVEY

The principal components of the CWS mail survey were the data collection instruments and the operational process of distributing the questionnaires, assuring a sufficient response rate, and handling the returned questionnaires. Chapter 4 describes the important aspects of these components.

4.1 Mail Questionnaire Design

EPA took the lead in designing the content of the mail questionnaires. Separate questionnaire forms were tailored to the specific requirements of the three types of ownership: Public (publicly owned), Private (privately owned), and Ancillary Community Water Systems. An ancillary system is one that operates a drinking water system as a secondary component of its main business, such as a trailer park. These instruments appear as Appendices C through E. The bulk of the contents of these three questionnaires consisted of an identical "core" series of questions pertaining to the water system's operating and financial characteristics; however, a few questions unique to ownership type were also developed for each of the three. These differences primarily occurred in the Financial Information section of the questionnaires. For example, questions about revenue sources and billing structures differed across the questionnaires.

Westat worked with EPA on methodological aspects, such as:

- Wording and organization of the questions;
- Feasibility of asking various kinds of questions;
- Maximizing response rates and data accuracy for certain detailed or complex items; and
- Layout and design of questionnaire forms.

Westat was also responsible for documenting and incorporating all revisions over the various design and test versions of the questionnaires.

During the initial design process, and during the redesigns following the pretest and pilot test (see Section 5.1, below), the EPA project officer consulted with a 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 questionnaires. These covered such areas as water production and storage, distribution, treatment plant operations, source water protection, detailed financial information about water sales revenue and customer data, operating expenses, balance sheet items, and capital investment. Experts inside and outside EPA were consulted in such areas as engineering, pollution control, finance, and regulatory development.

The goal of the mail questionnaire design process was to strike a balance between collecting complete, accurate, detailed data and reducing respondent burden. Towards this end, data from the pilot test responses were analyzed to determine areas that needed clarification or should simply be eliminated from the full study. In general, pilot respondents used the questionnaire form correctly and followed instructions. Most respondents seemed able and willing to provide the responses to most questions. For a more detailed discussion of the pilot test, refer to Section 5.1.

Prior to finalizing the forms for the full study, improvements were made to the general questionnaire layout, instructions, and some individual items. For example, one finding from the pilot test was that a surprising number of systems recorded dollar amounts to the penny, probably because they were transcribing from financial records. Since fractional dollars were not being entered into the data file, the reporting of pennies could introduce errors into the keyed data and the need to edit out the pennies added to processing time. Therefore, the forms were re-designed to make it very clear that only whole dollars should be recorded. It was also possible to significantly reduce the burden and complexity of the final instruments by eliminating a separate question that was asked for each line item in questions about financial data: an indicator of whether the data were being reported directly from accounting records. Based on response rates to these questions and EPA's assessment of the feasibility of incorporating these responses into future analyses, the entire set of questions was dropped from the final instruments.

4.2 Mail Survey Operations

EPA and Westat designed the questionnaire forms so that they were "self-mailers", that is, they did not require an external carrier envelope for mailing. The cover of the questionnaire was card stock, making it durable enough to withstand postal processing. An EPA logo, the name of the survey, and return address were placed in the upper left corner of one side of the cover. The other side contained a large EPA logo and the survey name, specific to ownership type (e.g., Survey of Public Community Water

Systems). The forms were designed so that a return envelope could be glued to the inside front cover. The package was closed with a "wafer" seal.

Westat prepared camera-ready versions of each of the three mail questionnaires as well as the business-reply envelope. Westat coordinated with EPA's print facility to produce the bulk copies.

Westat produced three mailing information and control labels for each sampled system's questionnaire. Information for the mailing labels (CWS Address Labels) was extracted from CATI screener Question S17, which recorded the name and address of the person the screener respondent felt would be best suited to respond to the mail questionnaire. Additionally, an indicator of the type of CWS (publicly owned, privately owned, or ancillary) was placed in the corner of the label. A second label, with the specific FRDS name and address of the CWS, was produced for the inside of the questionnaire, explicitly instructing the respondent to refer only to the sampled system when answering the questions. This CWS Information label was a critical quality assurance measure for the data collection process, since the appropriate respondents were often located somewhere other than at the address of the sampled system, worked for entities with different names from the sampled system, and/or managed more than one water system. While explicitly pinpointing the sampled system was essential to data validity, especially in multi-system operator situations, the effectiveness of this technique was marginally affected when the FRDS identifying information contained problematic data. However, it was better to provide anomalous information than to provide no indication: it was assumed that the data as recorded in FRDS would have meaning for personnel at the water system, since the system had at some point provided this information. The third label contained the Cadmus toll-free telephone support line information.

Actual mail processing operations occurred in three steps. Each of these is described below.

Pre-Production Processing

Prior to mail processing, there were several tasks than needed to be accomplished:

- Because it was decided to use a single color for the covers of all questionnaire booklets, Westat affixed color-coded wafers to the exterior back cover of each questionnaire. Doing so would make handling the questionnaires easier during the data processing stage. When the wafers were attached, the workers checked the print quality of every 50th questionnaire to ensure that there were no batch printing problems.

- Business-reply envelopes were glued into the interior front cover of all questionnaires.

- Telephone support line labels were affixed in the appropriate location inside the questionnaire.

Production Processing

The Washington Consulting Group, who conducted the advance notification calls to the CWSs to alert them that a questionnaire was being sent to them, provided the results of these calls to Westat in two waves. The mailing was dependent on call results because EPA honored the wishes of a few systems who indicated during the phone call that they did not choose to participate in the survey. These systems were immediately recorded in the CWSS receipt control system as refusals (see below). Therefore, questionnaires were processed in two waves: Wave 1 was mailed on June 1, 1995; Wave 2 was sent on June 9, 1995. The set of CWS Information and Address labels for each system was printed. Within each wave, questionnaires were processed in two batches: Multi-system respondents and all other cases ("regular" cases).

- **Multi-System Respondents** - For several hundred systems, the CATI screener identified respondents who would be responsible for anywhere from two to seven of the sampled systems. Often, these people were named independently on a case-by-case basis during the direct contacts with individual systems. Westat used a combination of computer logic and manual review of all sampled systems to identify situations where the same respondent had been identified for more than one system. For reasons of courtesy, improved response rate, and respondent efficiency, an extra effort was made to identify these multi-system respondents and send them all their questionnaires in a single batch. Special indicators were put on the computer records of multi-system respondents and a computer program segregated and associated the mailing labels for each multi-system respondent.

  The questionnaires for a given respondent were placed in a single envelope, along with a multi-system cover letter from EPA, acknowledging the respondent's extra effort in completing multiple questionnaires. Before the envelopes were sealed, cross checks were made against a listing of multi-system respondents to ensure that each respondent was being sent the correct questionnaires.

- **Regular Cases** - Regular questionnaires were processed in batches by system ownership type, thus ensuring that each respondent got the type of questionnaire appropriate to his system.

  The mail operations manager conducted spot checks of the questionnaires before they were sealed to ensure that the respondent was receiving the appropriate type of questionnaire for his system as determined by the type of system code on the

address label; and that the case control ID number on the Address Label and CWS Information Label matched.

Across the two mail waves, Westat sent questionnaires to 3,640 of the 3,681 systems sampled. The remaining 41 systems are accounted for as follows:

- **Pilot Test (11)** - For reasons of statistical validity, systems that had been sampled for the pilot test were not excluded from the sample frame for the full study. Some of these systems were sampled for the full study. However, questionnaires were sent only to systems that did not reply during the pilot test. The eleven pilot test systems that did reply were excluded from further contact during data collection either because they had returned a completed questionnaire during the pilot (n = 8), or they had refused to participate in the pilot (n = 3). Operationally, these eleven systems were handled as if they had responded to or refused participation in the full survey. Discrepancies between the pilot test questionnaire and final versions were reconciled during the expert review and data retrieval stage.

- **Large Multi-System Operator (15)** - A large operator of water systems was provided an advance copy of the questionnaire as a courtesy. Fifteen of these systems used the advance copy to respond slightly ahead of the data collection period, and therefore were not sent a questionnaire during the actual data collection.

- **Advance Calling (15)** - The Washington Consulting Group made advance calls to the water systems immediately before the questionnaires were mailed; 12 systems refused to participate and three were out of business.

Post-Production Processing

In order to enhance response rate as well as improve the quality of data, several operations were implemented after the questionnaires were mailed. These included:

- **Reminder Calls** - During the summer of 1995, Cadmus conducted a series of reminder calls to systems that had not yet responded to the survey. Callers stressed the importance of the survey data and encouraged systems to respond as soon as possible. Cadmus senior staff assisted respondents who requested help in completing the survey. Late in the response period, Cadmus conducted a second round of reminder calls to follow up on respondents who had indicated they would submit surveys during the first round of calls.

- **Toll-free Support Line** - During data collection, Cadmus maintained a toll-free support line to answer respondents' technical and administrative questions. Cadmus senior staff walked through survey questions with callers as necessary and provided

guidance on how to represent respondents' specific situations on the survey instrument.

- **Remails** - Respondents, either as a result of the reminder calls or from contacting the support line, sometimes requested that a new questionnaire be sent to them. Westat processed these requests in batches, typically on a weekly basis.

As questionnaires were received from the water systems, Westat logged them into a receipt control system. The typical path of a returned questionnaire was as follows. Completed questionnaires were first received at Westat. They were then sent in batches to The Cadmus Group for data quality review and possible data retrieval. Upon return to Westat, they were logged back into the system and then passed through a detailed data review and preparation process, to ensure consistent and clear recording of the responses on the forms. Any special problems were noted in a permanent log and resolved at the end of the process. The questionnaires were then 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, and checked skip patterns. Items failing these checks were examined and either confirmed or corrected. Questionnaires that reached this stage were considered to be entered and cleaned. (Subsequent to this point, the data were subjected to intensive computer checks that fell outside the scope of the mail receipt and processing operation. See Section 5.7.)

Table 4-1 presents an example of the information that was provided to The Cadmus Group and EPA in the weekly receipt control status report. By examining this report, project managers could easily track the progress of the survey. The status codes included:

- **Received/At Cadmus** - Cases assigned this code had been received by Westat and batched to The Cadmus Group for review.

- **Remailed** - Cases had been remailed a questionnaire.

- **Postal Return** - Cases with insufficient or incorrect address that were returned by the US Postal Service as undeliverable and were not relocated on subsequent contact.

- **Refused** - Respondents returned a blank questionnaire or a note indicating that they did not wish to participate.

- **Out of Business** - CWS was no longer in business.

- **Outstanding** - No returned questionnaire was received as yet and no remailing had been requested.

- **Back from Cadmus** - Cases that were returned to Westat from The Cadmus Group upon completion of the data quality review.

- **In Data Entry** - Cases whose data were being entered.

- **Clean** - Cases whose data had been entered and successfully passed the standard automated cleaning process.

Table 4-1 Example of Data from CWS Receipt Control Status Report

Number of Questionnaires	Public	Private	Ancillary	Total
Received/At Cadmus	3	2	0	5
Remailed	259	173	72	504
Postal Return	3	3	5	11
Refused	148	187	90	425
Out of Business	1	2	0	3
Outstanding	318	306	84	708
Back from Cadmus	0	0	0	0
In Data Entry	0	0	0	0
Clean	1,052	757	193	2,002
Total	1,784	1,430	444	3,658

4.3 Mail Survey Results

Receipt of returned questionnaires was closed out on March 28, 1996. Table 4-2 presents the final status of the entire CWSS mail sample. Of the 3,681 cases in the mail sample, 2,004 returned a questionnaire. The overall response rate for the mail survey is 54 percent. Table 4-3 shows the response rate broken down for each of the 38 sample strata.

Table 4-2 Final Status of CWS Mail Cases

Case Disposition	Number of Cases	Percent of Sample
Complete	2,004	54.4
Questionnaire not returned	1,212	32.9
Refused	425	11.5
Non-usable returns	25	0.7
Post office return	11	0.3
Ineligible/Out of Business	4	0.1
Total	3,681	100.0

Table 4-3 CWSS Mail Response Rates by Stratum

Phase II (Mail Survey) Sample Strata			Response Rate (%)
Ownership Type	Population Served	Primary Water Source	
Public	< 100	Ground	53.6
		Surface	56.7
Private	< 100	Ground	41.6
		Surface	42.4
Ancillary	< 100	Ground	43.9
		Surface	39.4
Public	100-500	Ground	58.4
		Surface	50.3
Private	100-500	Ground	45.0
		Surface	51.5
Ancillary	100-500	Ground	42.9
		Surface	48.2
Public	501-1,000	Ground	56.9
		Surface	55.6
Private	501-1,000	Ground	51.5
		Surface	61.0
Public	1,001-3,300	Ground	64.8
		Surface	56.3
Private	1,001-3,300	Ground	52.6
		Surface	56.6
Public	3,301-10,000	Ground	59.1
		Surface	54.3
Private	3,301-10,000	Ground	69.0
		Surface	59.1
Public	10,001-50,000	Ground	57.3
		Surface	64.9
Private	10,001-50,000	Ground	51.2
		Surface	64.6
Public	50,001-100,000	Ground	64.0
		Surface	73.3
Private	50,001-100,000	Ground	72.2
		Surface	51.7
Public	> 100,000	Ground	60.6
		Surface	75.9
Private	> 100,000	Ground	68.8
		Surface	54.5

5. QUALITY ASSURANCE AND PEER REVIEW

The quality assurance plan for the CWSS encompassed specific measures to check and ensure the validity of the survey data during the various data handling and data processing stages, as well as general quality assurance measures for the other survey components. Sections 5.1.1 and 5.1.2 discuss the questionnaire pretest and survey pilot test. Section 5.2 presents quality assurance measures taken during sampling. Sections 5.3 and 5.4 reference procedures undertaken during telephone and mail data collection. Sections 5.5 through 5.11 describe quality assurance measures pertaining to the processing of questionnaire data. In some instances, these discussions will highlight in summary form certain aspects of previous discussions that relate directly to the topic of quality assurance. Section 5.12 describes quality assurance measures taken during the preparation of this report to ensure accurate presentation of findings.

The Center for Environmental Statistics in EPA's Office of Policy, Planning and Evaluation peer-reviewed both this Methodology Chapter, to ensure adherence to sound surveying principles, and the data presented in Volumes 1 and 2, to ensure that the findings were appropriately represented. Particular aspects of this survey were peer-reviewed by subject matter experts at different stages of survey development. These reviews are described, where they occur, in the following sections of this chapter.

5.1 Draft Questionnaire Pretest 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. Confirming the validity and effectiveness of these designs, or revising them when the tests revealed problems, errors, or difficulties, led to design and process improvements that would have a positive effect on the quality of the survey in such areas as data reliability, data completeness, accuracy of the sample frame, and response rates. Peer review of draft questionnaires was provided by John Trax of the National Rural Water Association and by Vern Achtormann, Waterstats Manager for American Water Works Association until the Summer of 1996.

5.1.1 Pretest

When the questionnaire design had reached a point where the initial data collection objectives had been identified and shaped into a working draft instrument, EPA conducted a pretest of this draft with nine water systems in Maryland and Delaware, with the assistance of environmental engineer John Trax, from the National Rural Water Association. These systems were recruited knowing they were participating in a test. The main objective 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 March, 1994. All but one completed it. The EPA project manager then conducted in-person debriefings with the respondents to explore such areas as question comprehensibility, use of clear and appropriate terminology, provision of suitable response categories, questionnaire layout, respondent's ease or difficulty in providing answers, respondent's immediate knowledge of or access to the information required to fill out the questionnaire, and overall reactions to the survey. Westat provided some guidelines to EPA to help determine what issues to address in the debriefings and how to address them.

The pretest supported the view that the general objectives and design of the data collection instrument were feasible. The pretest found no systematic problems in the respondents' ability to provide answers to the questions. Principal outcomes of the pretest included the addition of some response categories to certain questions to cover likely responses and changes in terminology to simplify wording or reflect actual technical usage within the water industry. The ordering and grouping of the questions was also improved.

5.1.2 Pilot Test

A full pilot test was conducted in August and September, 1994, to test all three versions of the questionnaires and the major operational components of the survey design. The goal was to produce findings to improve the design and procedures for the full study. A full report on the pilot test was delivered to EPA on September 30, 1994 (Community Water System Survey Pilot Test Report). The following sections highlight some of the quality assurance measures represented by the pilot test and its findings.

Sampling. The pilot test incorporated the procedures and specifications developed for processing, cleaning, and extracting needed data elements from the Federal Reporting Data Systems (FRDS) database and for drawing the sample from the extracted records and variables. These procedures performed as expected and achieved their intended goals. The principal goals included identifying and eliminating duplicate records on the frame, improving missing or ambiguous ownership data, checking for valid telephone numbers, stratifying the resulting frame according to the sample design, and drawing a systematic random sample. Eighty-two water systems were selected for the pilot study. One of these, which had participated in the pretest, was excluded at EPA's request, to avoid further burden on the system.

Based on lessons learned during the pilot, adjustments were made to the frame preparation and sampling plan. These changes were implemented to improve location rate, eligibility rate, and sample yields, either across the entire sample or within specific strata. For example, analysis of ineligible systems identified through the pilot test telephone screener supported the hypothesis that most FRDS records coded as "historical" records should be excluded from the frame, since those were found to be ineligible or out of business. In the interest of frame validity and coverage, it was necessary to test this situation empirically and not rely exclusively on the general FRDS documentation, since adherence to FRDS protocols can vary state by state.

Telephone Survey. The pilot-tested CATI questionnaire was programmed according to the document entitled Community Water Systems 1994 Survey, CATI Screening Questionnaire, CATI Specs #3 (7/25/94). The CATI software programs functioned in full conformity with these specifications throughout the pilot test. In general, the design of the questions and the questionnaire structure also accomplished their objective of screening the Phase I sample for eligible water systems, collecting the data needed to place the system in the correct sample stratum, and collecting the name and address of the appropriate respondent for the mail survey. Sixty-seven systems completed the CATI screener questionnaire; 62 were eligible systems.

Based on monitoring and observing the pilot interviews by CWSS project managers and feedback received from the telephone center managers and pilot test interviewers, changes were made to the CATI questionnaire. These included question rewording to clarify technical distinctions for the respondent, converting complex single questions into two simpler questions, and eliminating a few less important questions and response categories.

Another pilot test finding in the area of data collection also contributed significantly to the validity and coverage of the sample. Because of the sparseness or ambiguity of some of the system information on the FRDS record, it was determined that the CWSS interviewer training should incorporate additional instruction and practice in interpreting the FRDS sample and contact information, in order to ensure successfully locating and accurately identifying sampled systems in the full study.

Mail Survey. For Phase II of the pilot test, questionnaires were mailed out to the 62 eligible systems. Westat maintained a toll-free support line for sampled system respondents to call if they had technical or administrative questions. Seven of the 62 systems used the line. Calls were a mix of technical and administrative questions.

Twenty-one systems, about 39 percent, completed the mail questionnaire. The short pilot test data collection period did not permit testing any of the response-rate enhancement measures carried out in the full survey, such as reminder calls to non-respondents. Therefore a 39 percent response rate based on a single mailing was satisfactory enough to confirm the basic designs of the questionnaires and data collection plan.

The returned questionnaires were completely reviewed and coded by the Westat CWSS data preparation manager. The data were double-key entered with 100 percent verification. Review of the actual completed questionnaires and of frequency distributions of the keyed data led to some revisions in the design, layout, wording, content, and structure of the mail questionnaires. Incorporating these changes for the full study led to a clearer instrument with consistent response categories, particularly for items related to financial data. For example, improvements were made to make recording units of volume, length, and distance as simple and unambiguous as possible for the systems. Instructions were clarified about how to record financial data. Some explicit instructions alerted respondents when items in different questions should add up to the same totals.

Conclusion. The pilot tested many important study assumptions, designs, procedures, and systems. A range of resulting adjustments and improvements were implemented prior to fielding the full survey. The pilot also provided the opportunity to fully develop, try out, and gain hands-on experience with many of the operational designs, procedures, systems, and tools before committing the resources of the full study.

5.2 Sampling Quality Assurance

Quality assurance of the sampling process for the CWSS involved four principal areas:

- Review and cleaning of the FRDS file,
- Sampling specifications,
- Use of software designed specifically to draw complex stratified samples, and
- Review of sample tabulations.

FRDS File Review and Cleaning. For purposes of designing the sample and of preparing the frame for drawing the sample, extensive qualitative and quantitative review was performed on the records in the FRDS file. This FRDS review and cleaning addressed such issues as:

- The presence of necessary variables and appropriate values within those variables to support a sample design that would meet the analytical objectives of the survey;
- The accuracy of the data on the file, for both sampling and data collection purposes; and
- The rate of missing data within each variable.

Based on the findings of this review process, a viable sample design was created and a set of automated and manual data processing procedures were designed, documented, and carried out to improve the quality of the frame data. This improvement was designed for both sampling purposes and also for using the information on the frame to correctly locate and verify, during the CATI screening phase, the exact water system represented by a sampled record. This process was described above, in Section 2.1.

Sampling Specifications. In order to carry out the two-phase sampling processes, the survey statisticians prepared detailed specifications that served as directions for performing the sampling and as permanent documentation of the process. In addition to clearly specifying the process of drawing the sample, these specifications addressed the organization of the frame prior to sampling to ensure both proper stratification and also normal distributions of other attributes of interest, such as geography. These specifications ensured that the sample was drawn in conformity with the sample design and in a statistically

valid manner. Prior to being implemented, each set of specifications was reviewed by a senior statistician and by a senior systems analyst.

Sampling Software. The CWSS samples were drawn using WESSAMP, a set of macros for the SAS data analysis software package. WESSAMP was developed to standardize and automate the drawing of survey samples; it has been extensively tested and proven over hundreds of surveys. It minimizes the chance for human error and eliminates the need to write extensive custom programs to draw a sample. It specifically supports and simplifies the process of drawing a complex stratified sample as required for the CWSS.

Review of Sample Tabulations. WESSAMP automatically produces appropriate tabulations of sample statistics to be used by the sampling statistician to verify that the sample as drawn actually conforms to the sample design and sampling specifications. The review of these tabulations confirmed that the sample counts matched the design within each size/ownership/water source stratum, and also that the selected systems conformed within stratum to other meaningful normal distributions that had been identified on the frame.

5.3 Telephone Survey Quality Assurance

Several quality assurance measures were in place for the CWS telephone survey. These measures, listed under the appropriate telephone survey component, are discussed below.

CATI Questionnaire Design and Programming

- The final version of the CATI questionnaire incorporated improvements made as a result of the pilot test.
- Complete and detailed question-by-question specifications were prepared for every questionnaire item, to unambiguously document for interviewers and analysts the meaning, purpose, and context of all questions and responses.
- The CATI questionnaire was programmed according to detailed specifications. The programmed CATI questionnaire was tested extensively prior to the start of data collection to ensure that it was performing according to specification.

Telephone Interviewer Training and Performance

- CWSS interviewers had previously received 8 hours of general training in interviewing techniques and CATI operation, and then received another 8 hours on specific CWSS topics, such as procedures for contacting and verifying the water systems, administering the CWSS CATI questionnaires, and sensitivity in presenting the survey to the sampled water systems. The training followed a carefully prepared agenda. Exercises and role plays were scripted in advance, to ensure consistency and comprehensive coverage of important issues.

- Supervisory staff monitored the interviewers throughout the telephone data collection period. Silent monitoring equipment ensured that interviewers could not determine when an individual monitoring session was occurring. As needed, general adjustments or specific instructions for the interviewing process or individual interviewers were made as a result of the monitoring findings.

Telephone Data Collection

- Special data collection operations, such as tracing, improved response rates, sample coverage, and locating the correct sampled CWS.

- Where it was possible to identify them in advance, water systems owned or managed by a single entity were grouped together ahead of time, to make the telephone contact more efficient and less intrusive for the respondent.

Telephone Data Quality Assurance

There were a number of automated measures implemented for the telephone data collection to address specific data quality items:

- Use of the CATI questionnaire assured consistent and accurate administration of the questionnaire, with correct skip patterns, question choice, question wording, and response categories, as appropriate to each system's response patterns.

- On-line range checks for every variable produced immediate interviewer prompts and respondent probes whenever an entered value was outside of the expected or allowed range.

- Water systems that could not provide an answer to several critical screening questions could not be included in the final sample, since their eligibility would be unknown. A series of special prompts and interviewer probes were designed and automatically called up by the CATI system when a respondent initially failed to provide an answer to a critical question. Those probes helped the interview work cooperatively with respondents to attempt to work through an answer to the question.

- On a periodic basis during data collection and on a cumulative basis at its conclusion, data preparation staff performed a series of range checks, skip pattern checks, and problem resolution to monitor the collected data and correct it, if necessary. These measures checked the operation of the CATI instrument, writing of data to the database variables, use of response categories by interviewers, assignment of result codes, and qualitative notes recorded in the CATI system and on paper by telephone staff. This data review did not detect any errors in the automated data collection.

- After completion of the telephone screening, systems classified as ineligible or out of business were back-checked against FRDS data, using a series of strict criteria applied to FRDS data elements that were independent of the original sample frame dimensions. This provided an independent and parallel test of the reasonableness of the screener outcomes. As a result, 97 systems were reclassified, leading to improvements in the sample weights and final analytical tabulations of the weighted survey data.

5.4 Mail Survey Quality Assurance

Each component of the CWS mail survey was implemented pursuant to detailed written specifications that clearly stipulated how each design was to be implemented.

Questionnaire Design

- The various drafts of the three mail questionnaires were the product of several rounds of close review and comments by EPA, Westat, and independent peer review. Additionally, improvements were made based on the pretest and pilot test (see Section 5.1).

- Peer review of the questionnaire was provided by The National Drinking Water Advisory Council, John E. Peterson of the Government Finance Group; and Don Fraser, an independent consultant with expertise in the operational characteristics of drinking water systems.

- Questionnaire version control was maintained through the various drafts by hand-writing all edits onto the hard copy master of the current version. Once the edits were made in the master word processing file, the previous hard copy version was placed in a notebook and the new version became the master. Each new version was dated and serially numbered.

- Design of the questionnaire form paid particular attention to the presentation and layout of questions, response categories, response recording blocks, and instructions to clarify and simplify for respondents the provision of the highly detailed and complex data required for this survey. Graphic devices were used to make the forms clearer, simpler to use, and attractive. These devices included choice and consistency in type fonts, sizes, weights, and styles; question borders, text boxes, and shading.

Mail Data Collection

- The production of the physical components of the mailing package was designed to minimize the chance of human error in assembling each water system's package.

- Workers preparing the questionnaires for mailing were provided with detailed written specifications for the job. They were supervised by the mail operations manager, who had assisted in the design of the specifications.

- While preparing the questionnaires for mailing, workers checked the print quality of every 50th questionnaire to ensure that there were no batch printing problems.

- The mail operations manager conducted spot checks of the questionnaires before they were sealed to ensure that: a) the respondent was receiving the appropriate type of questionnaire (Public, Private, or Ancillary) for his system as determined by the type of system code on the address label; and b) Mail control ID numbers on the Address Label and CWS Information Label matched.

- Counts of the prepared questionnaires were done prior to mailing to verify that the correct number of questionnaires were mailed. Spot checks were also done on individual states, comparing the number of questionnaires processed to the sample frequency counts for those states.

- Instances where one respondent was responsible for multiple systems were given special handling. This was done to ensure that the respondent was provided with all of his questionnaires in one envelope, rather than inundated with multiple packages. Before the envelopes were sealed, cross checks were made against a listing of multi-system respondents to ensure that each respondent was being sent the correct questionnaires.

- Special data collection operations, such as the toll-free support line and reminder calls, were instituted with the goal of improving the response rate and sample coverage. They also improved the quality of reported data because respondents had resources available for resolving technical questions about the meaning of questionnaire items and about how to report their own special circumstances in terms of the generic questionnaire.

- The receipt control system ensured proper tracking and control of all questionnaires from the point of sampling until data were entered and cleaned. In addition to supporting the overall management of the project, the periodic reports of case statuses enabled The Cadmus Group to identify particular response rate problem areas and take appropriate telephone follow-up measures.

5.5 Expert Review of Critical Questions and Data Retrieval

Cadmus reviewed the completeness and accuracy of responses to eight questions designated as "critical" by EPA staff because the information provided in response to the questions was essential for conducting subsequent analyses in support of regulatory development and implementation efforts. Table 5-1 lists the critical questions. These questions can be found in the CWSS mail questionnaires, which appear as Appendices to this report. The remainder of this section provides an overview of the review effort.

Table 5-1 Critical Questions

Question	Description
4	Sources of Water
11	Population Served and Number of Connections
18	Treatment Facility Information
20	Information on Intakes with No Treatment
29	Water Sales by Customer Type
30	Other Water Related Revenue Sources
33	Routine Operating Expenses
34	Assets, Liabilities, and Debt

Categorization

To expedite the review process, each questionnaire was categorized according to the level of difficulty required to review it. Specifically, Cadmus reviewers placed each questionnaire into one of the following three categories:

Category 1: Complete responses to all critical questions and requiring the least amount of time to review and correct.

Category 2: Incomplete responses or apparent errors in response to less than three of the critical questions. These questionnaires required additional time to correct or contact the respondent for clarification.

Category 3: Incomplete or erroneous responses to more than three critical questions. Because these questionnaires would require a time-consuming effort to remedy them, Cadmus omitted most of them from further review.

In order to maximize the number of questionnaires reviewed, Cadmus staff reviewed questionnaires in Category 1 first and Category 2 second. To the extent that the budget and project schedule allowed, Cadmus staff reviewed the Category 3 systems.

Within each category, Cadmus reviewers gave priority to systems with apparent errors in responses over systems with missing data. Cadmus staff reasoned that a system's filling out a question indicated both the availability of data and a willingness to provide it.

General Approach

Where a system provided information in response to a survey question, Cadmus' review focused on determining whether the response was consistent with responses to other questions. To ensure consistency in the reviews, Cadmus developed a table for each critical question listing the steps to be followed in checking the question. In these tables, typical errors associated with the responses to the critical questions were listed, along with appropriate actions to take. In general, the strategy for solving problems was as follows:

- *First*, wherever possible, the reviewer attempted to derive an answer using information provided in response to other questions.
- *Second*, the reviewer contacted a Cadmus senior advisor to estimate an answer using best professional judgment.
- *Third*, the reviewer attempted to contact the respondent directly for clarification.

Cadmus reviewers did not estimate responses if adequate information was not provided by the respondent or contained in responses to other questions. If the respondent provided income statements, balance sheets, rate schedules, or other supporting documentation, Cadmus reviewers and/or senior staff used the documentation to derive missing answers.

In order to ensure a complete record of the review, Cadmus reviewers filled out a Questionnaire Review Sheet (QRS) during the review and attached it to the survey instrument. The QRS

required reviewers to list problems encountered during the review, actions taken to resolve the problems, and any unresolved issues at the conclusion of the review. Cadmus senior staff used the QRS forms to perform Quality Assurance checks of the reviews and to identify any problems or bottlenecks in the review process. The QRS and any attachments included by the respondents became permanent parts of the questionnaire form for future processing and archiving purposes.

Cadmus reviewers were successful in obtaining missing data for the majority of Category 1 surveys and a significant proportion of Category 2 surveys. In many cases, reviewers utilized answers to other questions in the survey to derive missing data, especially for the operational questions. Similarly, reviewers corrected numerous erroneous responses. Some of the most common problems were resolved quickly and with minimal effort. For example, surveys with incorrect units and/or mathematical errors typically were corrected without contacting the respondent. More complex problems typically required a call to the respondent. If a problematic answer could not be corrected, reviewers crossed it out on the survey instrument, and the item was handled as missing data in future processing steps.

5.6 Manual Editing, Coding, and Data Entry

Following the expert review and data retrieval process for critical items, the questionnaires were subjected to a 100 percent editing review in preparation for entering the data. This editing process examined every response field on every form, to check skip patterns, clarify handwriting that would be difficult for the data entry staff to read, standardize the recording of quantitative data, and identify any potential problems, such as marginal notes or potential order-of-magnitude reporting errors in the volumetric non-critical questions. General protocols were developed to guide the data preparation staff in reviewing the forms and in handling generic problems. When the editing process resulted in a change to a form other than routine coding actions like deleting penny amounts from responses in financial data fields, each change was individually recorded by ID number in a permanent coding-decision log. Problems that were too idiosyncratic or too significant to be handled generically were recorded in the log, then reviewed by a supervisor or manager who had the appropriate knowledge to resolve the issue. Any changes resulting from this level of review were also recorded in the log.

After the initial edit, the questionnaires moved to the data entry process. Each form was entered with 100 percent verification, that is, using independent double key entry. The automated data entry program was customized to each of the three questionnaire forms.

As the data were entered, the batches of entered records passed through a data cleaning process, consisting of standard computer edit that examined each variable for conformity to appropriate values or data ranges and also checked the small number of skip patterns that existed in the survey instruments. A report identified each variable for each case that failed any of these tests. A data preparation supervisor then examined the original questionnaire forms to determine whether the anomaly occurred in the original data and, if so, whether to confirm it as correct or to record it in the problem log for resolution as described in the preceding paragraph. The standard computerized edits were repeated for all the data until no cases failed the edits, except for any that had been specifically confirmed as valid outliers during a previous review.

After all questions had been edited, entered, and cleaned to the degree permitted by these processes, the resulting keyed database passed to a process of detailed automated logical edits that enabled expert staff to conduct a highly focused review of data values and relationships.

5.7 Automated Data Validation Checks

In preparing the final database, EPA, The Cadmus Group, and Westat designed, produced, and analyzed a series of computer validation checks. These validation checks were run on the full survey database after the data had been 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, plus continuous character variables (e.g., OTHER (SPECIFY) fields);
- 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 data;
- Item-specific cross-univariates of continuous data; and
- Item-specific advanced logic edits.

All the validation checks were programmed and run using the SAS data analysis software package. Univariates are a standard SAS procedure producing various descriptive statistics for quantitative data (e.g., mean, median, and percentiles). A cross-tabulation or cross-univariate further breaks out the values or descriptive statistics for a given variable into subsets defined by the values of a second variable. For example, many of the crossed-univariates produced statistics for key survey variables such as number of gallons produced or water sales revenues, and further broke them down into the eight population-served size categories used to define the sample strata. This permitted a more precise review of the reasonableness of the responses in such variables, since the magnitude of their response value is closely related to the size of the system.

Output for the automated series was produced on a flow basis, allowing project staff to examine and modify the database on a continual basis. In general, frequency output was produced first, then univariates of continuous data, followed by item-specific crosses (tabulations and univariates) and the advanced logic checks. This hierarchical approach allowed for the efficient building of the validated database by examining simple output, such as frequencies, before proceeding to running more complex validation checks.

The advanced logic edits provided the most focused view into the data. The objective of the advanced logic edits was either to test the relationship between two or more variables or to identify extreme values as determined by expert opinion. In some cases, multiple logic checks were developed to achieve both objectives. An example of a logic edit is to check that respondents reported data consistently between Questions 29 and 31: a series of checks determines that if responses are reported in a line-item in Question 29 (water sales customer categories) then responses should also be reported in the parallel line-item in Question 31 (billing structure for each customer category).

Often, the logic checks created composite variables from a related set of survey variables, and tested the composite against other survey data or against external measures of reasonableness. For example, the three variables containing water production data (Question 4) were summed and compared to the sum of the eight variables containing water storage data (Question 8). A logic test then determined if systems reported more than ten days production worth of storage. The parameters for any absolute range tests or tolerances between variables were refined during the review process. The final edits were run using the revised tolerances.

The logic edits were designed so that if the expected logic condition was not met (say, for example, data fell out of the acceptable range) than the survey record would be flagged as containing a

possible error. The logic edits were numbered sequentially and a report was generated for each edit that listed the ID number of each system failing the edit, followed by all of its relevant survey variables and composite variables involved in the error check. Exhibit 5-1 is an example of a report page from an advanced logic edit.

It is important to note that the logic checks were diagnostic tools. None of the logic tests or other automated edits were ever used to make computerized global changes to the database based solely on failure of the logical check. Rather, they were used to guide expert review of individual cases. Review of the edit reports often confirmed the reasonableness of the data. In other cases, the error conditions were extreme enough that it was decided to review the original questionnaires to determine whether the data appeared to be truly invalid. When expert review determined that an individual data value was highly unreliable, it was corrected whenever possible, or removed from the record in relatively few extreme cases.

The advanced logic edits confirmed the effectiveness of the initial expert review of the critical questions. The number of items identified for the critical questions was considerably smaller than those flagged for the non-critical questions.

Altogether, 44 different advanced logic edits were developed. Overall, these edits examined, in one or more ways, approximately 500 out of the 600 survey variables, including all variables in the questions identified as critical questions by EPA.

Many of the data points that were changed as a result of the various data reviews and automated checks were found to be associated with order-of-magnitude confusion on the part of the respondents; for example, reporting in gallons when the question specified millions of gallons.

Finally, the various reviews and checks resulted in corrections to clear any extreme data outliers whose inclusion in the survey database as originally reported would have markedly skewed subsequent analyses, especially at sub group levels. However, while the effect of these corrections on the overall data quality is considerable, they represent a trivial number of changes to the total number of items reported. For example, the survey database contains approximately 1.2 million data points. The changes resulting from review of the advanced logic edits affected about 3,000 items. This represents about 0.25 percent of the data points. In terms of a possible trade-off between data quality and data integrity, there is a very small exposure to reduced data integrity and a very large yield in survey data quality.

8.1 - Storage Capacity

Q11ACURR <= 10,000 and ΣQ8_YB > (ΣQ4XA/365) * 10

OBS	ID Number	FPOPSERV	Q11ACURR	ΣQ8_YB (Y=1-8)	ΣQ4XA (X=A-C)	(ΣQ4XA/365) * 10
1	10000933	3	1,000	1.00	22.40	0.61
2	10002137	3	600	0.40	12.00	0.33
3	10006070	3	985	2.35	36.00	0.99
4	10006088	3	560	1.00	33.00	0.90
5	10007722	1	60	0.32	7.30	0.20
6	10008225	4	1,610	17.52	36.00	0.99
7	10009173	1	75	0.12	2.40	0.07
8	10009280	2	500	2.07	38.60	1.06
9	10010411	3	800	75.00	70.44	1.93
10	10010882	2	250	1.10	10.00	0.27
11	10013423	5	4,500	135.40	205.00	5.62
12	10013597	3	700	1.55	20.20	0.55
13	10014058	3	525	100.00	21.00	0.58
14	10014330	2	200	12.00	2.50	0.07
15	10015725	3	615	1.50	29.63	0.81
16	10015907	2	110	0.65	3.90	0.11
17	10016186	4	1,190	100.00	42.00	1.15
18	10017499	2	466	0.50	17.00	0.47
19	10017879	2	199	50.00	6.07	0.17
20	10018133	2	500	2.50	34.40	0.94
21	10019875	1	80	35.00	3.60	0.10
22	10020279	3	810	210.00	33.42	0.92
23	10022804	3	560	0.75	20.00	0.55
24	10023711	2	250	0.16	2.00	0.05
25	10024768	2	150	0.10	3.50	0.10
26	10027944	2	330	0.64	6.70	0.18
27	10028249	1	38	0.10	0.60	0.02
28	10029866	2	190	365.00	2.50	0.07
29	10030351	1	99	0.08	2.30	0.06
30	10031151	5	6,000	26.00	219.50	6.01
31	10032134	1	80	0.04	0.90	0.02
32	10034155	2	210	0.25	7.85	0.22
33	10037794	2	105	0.68	18.37	0.50
34	10037810	4	2,500	7.20	54.24	1.49
35	10038008	3	610	5.00	117.00	3.21
36	10038073	2	119	1.20	2.00	0.05
37	10038347	1	50	0.13	1.48	0.04
38	10038974	3	800	0.70	20.60	0.56
39	10041549	1	100	0.08	0.93	0.03
40	10041739	1	100	0.05	1.60	0.04
41	10043131	2	450	0.40	9.10	0.25
42	10043339	4	2,498	826.00	203.37	5.57
43	10046084	1	100	40.00	5.84	0.16
44	10046936	2	250	0.30	5.60	0.15
45	10050045	1	30	3.00	1.00	0.03
46	10050151	2	145	0.24	2.89	0.08
47	10050904	2	163	0.23	0.84	0.02
48	10051118	3	800	6.00	41.00	1.12
49	10051506	1	51	0.11	1.40	0.04
50	10051787	3	1,000	120.00	30.00	0.82

Exhibit 5-1 Report from an Advanced Logic Check

5.8 Quality Assurance for Financial Ratio Analysis in Volume I

Publicly owned and privately owned water systems record and report financial data in various ways. Comparing these data necessarily involves making assumptions about, and adjustments to, data that were reported in the questionnaires. In the following paragraphs, we describe how we developed the financial ratios contained in Volume I. We also describe how we made adjustments for the different accounting practices of publicly owned and privately owned systems.

Background

It is difficult to obtain comparable financial measurements between privately owned and publicly owned water systems, and even between water systems in each sector. This problem is created in part by the wide variations in size, objectives, and complexity of systems. Small ancillary systems, for example, provide potable water as an ancillary service; they may keep no records of the costs or revenues associated with water production and sale. (Indeed, the financial characteristics of ancillary systems are so unique that they were excluded from much of the financial discussion in Volume I.) The private and public sectors also may have fundamentally different objectives. For example, in an investor-owned company, provision of drinking water may be a means of creating returns on invested capital. In publicly owned systems, provision of drinking water may be part of an array of public services that may be supported by general revenues. Alternatively, in publicly owned systems that use an enterprise fund approach, consumers generally pay the costs of their water through water (or water and sewer) charges.

Differences in system complexity, size, and purpose are reflected in the methods by which these entities keep their books and report financial results. In the private sector, accounting systems and principles are governed by tax and regulatory requirements, and in the case of large companies with publicly held securities, by disclosures that may be required under federal securities laws. If several water systems are owned by a single company, or if water supply is only part of a larger package of services provided by the firm, it may be difficult to assemble and compare the precise costs and revenues associated with water supply. For example, some large water systems have ancillary businesses such as laboratories, or they provide contract operations and maintenance (O&M) services for other systems. The equity ownership and various classes of stock outstanding in investor-owned systems also inhibit direct comparisons with government-owned systems, whose equity interest is undivided, undistributed, and effectively held in the aggregate by the public.

There can be significant differences in how publicly owned systems account for and report their financial condition. The major difference (alluded to above) is between systems that account on an enterprise or full accrual basis (much as an investor owned system would) and those that use governmental fund or modified accrual accounting precepts. While there are several distinctions between the two broad categories of accounting concepts, the major difference is in the treatment of depreciation expense and debt service expenditures. Enterprise accounting systems generally calculate accrued depreciation and interest as a current expense, while governmental funds do not. (In some cases, even enterprise accounting systems may vary in their treatment of depreciation expense due to a lack of historical records or alternative methods of calculation.) Governmental fund accounting systems, in contrast, do not record depreciation as an expenditure; and to the extent that information related to the water system's debt is reported, the focus is on debt service payments (principal and interest). Moreover, a water system is treated for accounting purposes as a governmental unit, and its accounts are incorporated into the general fund structure, it is very likely that there will not be separate and identifiable debt service charge exclusively related to water supply. In such a case, although the water system may be self-supporting in terms of meeting its current costs of operation, the debt service (in effect) will be paid from general tax revenues, and the capital investment will be carried in the general asset accounts of the government.

These barriers to consistent financial information and uniform analysis have been somewhat overcome in public sector debt analysis by various adjustments to financial data that seek to make them comparable across the different accounting systems. The focus of these efforts has been to isolate revenues and cash expenses that are seen as most relevant to credit analysis, and to determining a water system's ability to repay bonded debt where water-related revenues such as user charges and dedicated taxes are pledged to bond repayment.

Given the different accounting techniques used in the public sector, it is common practice for bond market credit analysts to adjust cashflows to make water system finances as comparable as possible when revenues are used as a source of security for bond repayment. One of the more prominent adjustments is to disregard depreciation as a charge and not to deduct interest expense as an operating expense (even though it would be counted as an expense under commercial accounting practices). The objective is to derive "net available revenue," which focuses on the cash available to pay debt service after current O&M expenses have been paid. Another adjustment is to distinguish between recurrent operating revenues derived from the sale of water and those other revenues such as connection fees, inspection fees,

and developer fees, that are more episodic in nature.[1] If revenues are pledged to the repayment of bonds, the bond contract will typically require the water utility to set rates at levels that generate sufficient revenues to provide certain levels of "coverage."

To the extent permitted by the structure of our data on system finance, we attempted to use the adjustments outlined in the paragraph above to create comparable data in Volume I across all system types.

5.9 Data Processing Quality Assurance

The final, clean survey database represented the product of the various review, editing, data entry, and data validation steps described in Sections 5.5 through 5.7. Once this database was prepared, there were a number of subsequent data processing steps required to create a variety of files suitable for analyses and tabulations and for final delivery of a permanent database to EPA. The principal processing steps included:

- Appending needed variables from external files, including sample and contact information from the FRDS and Phase I CATI screener databases.
- Analyzing the hard copy questionnaires and the frequency distribution of continuous and categorical variables to devise rules for handling missing data.
- Zero-filling blank responses. Because of the large number of blanks appearing in quantitative data fields in the returned questionnaires, it was determined that respondents tended to leave blanks where zero was the actual response. Therefore, a detailed series of rules was developed for assessing such blank responses and determining whether to regard these as zeroes 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 then designed to implement these rules, then computer processes created pursuant to the specifications. These processes were run on the database to convert blank fields either to zeroes or to explicit missing values, as determined by the rules.

[1] Analysts attempted to exclude connection fees and inspection fees from operating revenues, but they faced a practical problem. If one excludes these fees from revenues, proper accounting methods require that one should also exclude any associated expenses (e.g., connection expenses and inspection expenses) from total operating expenses. Given the limitations of our survey data, we could not disaggregate expenses in this manner. Therefore, connection fees and inspection fees were not excluded from operating revenue when calculating the operating ratio.

- 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 FRDS data and first-phase screening 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 production of the analytical tables in Volume II of this report.

Each of these steps was carefully planned in advance. Detailed specifications were written to guide the programming and data processing needed to perform each step. In addition to these specifications, the processing of files and flow of data throughout these various steps were planned, controlled, and documented through data flow diagrams. The data flow diagrams are schematic representations of how files, data records, data elements, and individual data point values are handled, combined, extracted, and moved from one stage to the next. These diagrams are crucial quality assurance tools to help ensure that programmers and systems analysts have a clear and common understanding of the entire process of data management, that the processing stages fit together in logical order and accomplish the intended objectives, and that there is an unambiguous audit trail of the condition of the data at each processing 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 was the current version and it was always clear of sequential changes that had been made from one version to the next. If earlier versions of data files were needed because it was desirable to revert to values or restore data items that had been updated or modified as a result of the various review and processing steps, 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, data flow diagrams, 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.

5.10 Tabulation Quality Assurance

The tabulations of survey results presented in the 1994 Community Water System Survey report are varied, detailed, and complex. Rather than being a simple presentation of individual survey variables, each table usually presents the results of multiple calculations involving a variety of survey variables. Many tables present several such results within a single table. There were often 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 analytical 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;
- Conduct an independent review of the resulting programs against the data processing specifications;
- Review the initial tabular output for:
  - Consistency with the design of the table 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 finances;
- Review definitions, specifications, programs, and underlying data for tabulations exhibiting data anomalies or outliers;

- Revise 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 or outliers are found.

In addition to the above steps, the CWSS tabulation process employed one other measure to help assure the accuracy the tabulated results. 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. Equally importantly, it also expedited the process of successive iterations of the tabulations during the quality review process, since 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.

5.11 Examination of Potential Nonresponse Bias

The mail survey response rate was approximately 50 percent. If the nonrespondents have different characteristics from the respondents, this could result in a significant nonresponse bias in the survey estimates. There are a variety of characteristics that may be useful to explore in this regard. For this report, EPA was particularly interested to investigate whether patterns of compliance and non-compliance with EPA regulations were associated with systems' propensity to respond to the survey.

For the 3,681 water systems included in the mail survey sample, noncompliance data from FRDS were reviewed for the three-year period from January 1, 1993 to December 31, 1995. Systems with violations of the Maximum Contaminant Level (MCL) were flagged as having at least one MCL violation. Systems with monitoring and/or reporting (M/R) violations were classified as having at least one M/R violation.

If the percentage of systems with at least one violation were significantly different between respondents and nonrespondents, it would indicate that the estimates from the survey may be subject to significant nonresponse biases, in addition to their sampling error. It is important to look for differences that are both statistically significant (not likely to be due to random chance) and practically significant

(differences that might be large enough to impact the estimates to a noticeable degree). Differences were examined for all systems; by size, water source, and ownership type; and by combinations of these three variables. Differences were also examined for MCL violations, M/R violations, either type of violation, and both violations. Given the many breakdowns examined, a statistical significance level of .01 was used for each test of statistical significance. A difference of more than 15 percent was used to determine practical significance. For purposes of this analysis, we will use the term "significantly" different to mean differences that are both statistically and practically different.

When systems were examined that had **both types of violations** during the three year period, no significant differences were found for any breakdowns.

When systems were examined that had **MCL violations** during the three year period, the only significant difference was for privately owned surface-water systems, with 17 percent of responding systems having at least one violation and 33 percent of nonresponding systems.

When systems were examined that had **M/R violations** during the three year period, a number of differences were detected. Among responding systems, four out of 11 (36 percent) of privately owned ground-water systems serving over 100,000 people had a violation, while none of the five nonresponding systems had violations.

Systems serving between 500 and 1,000 people had more M/R violations among nonrespondents (57% compared to 40%), with similar results found for subsets of these systems. Publicly owned systems serving 3,300 to 10,000 people had 32 percent violations for respondents and 50 percent for nonrespondents. Similar results were found for publicly owned ground-water systems and privately owned surface-water systems of this size and publicly owned surface-water systems serving 10,000 to 50,000 people. Among ancillary ground-water systems, 48 percent of completed systems had a violation, compared to 65 percent of nonrespondents.

Results for systems that had **either type of violations** during the three year period were similar to those with M/R violations. Systems serving 50,000 to 100,000 people tended to have more violations among respondents than did nonrespondents (46% to 14% for privately owned ground-water systems and 50% to 29% for publicly owned surface-water systems).

Surface-water systems serving between 500 and 1,000 and between 3,300 and 10,000 showed a higher percentage with violation among nonrespondents, as did ancillary ground-water systems and a few other categories.

Given these results there appears to be no obvious systematic bias from nonresponse, at least for variables correlated with the presence of a violation. There are obviously many other types of differences that might exist between responding systems and nonresponding systems. However, there are no easily accessible data sources that contain indicators of these differences.

5.12 Quality Assurance During Report Preparation

As noted in the introduction to this chapter, EPA's Center for Environmental Statistics provided peer review of the data presented on this report to ensure that the findings have been appropriately described and presented. Additional peer review for this purpose was obtained from Mr. John Peterson, The Government Finance Group (GFG), expert in the field of public finance; Mr. Dan Fraser, an engineer and expert in the operational characteristics of water systems; Dr. Janice Beecher, Senior Research Scientist and Director of Regulatory Studies at Indiana University's Center for Urban Policy and the Environment; and Mr. Barry Liner, Water Research Center, an expert in benchmarking applied to water and waste water utilities.

APPENDIX A

CWSS CATI Screener Questionnaire

OMB No.: 2040-0173
Expires: 07/31/97

Community Water Systems 1994 Survey

CATI SCREENING Questionnaire

This telephone survey is estimated to require approximately 4 minutes to complete. This includes time for listening to the question and instructions, and reporting the requested data. Send comments regarding the burden estimate or any other aspect of this survey, indicating suggestions for reducing this burden to: Chief, Information Policy Branch, 2136 ▪ U.S. Environmental Protection Agency ▪ 401 M Street, S.W. ▪ Washington, D.C. 20460, and Desk Officer for EPA ▪ Office of Information and Regulatory Affairs ▪ Office of Management and Budget ▪ Washington, D.C. 20503

1994 COMMUNITY WATER SYSTEM SURVEY
Telephone (CATI) Questionnaire
SCREENING SURVEY

SECTION A. CONTACT PROCEDURES

VERIFYING THE CWS

C1. Hello, my name is {INTERVIEWER'S NAME} from Westat, Inc. Have I reached the {CWS NAME}. [I'm calling for a study being conducted for the U.S. Environmental Protection Agency.]

YES..... 1 → [READ THE CWS NAME AND ADDRESS PRINTED IN BOX 1 TO VERIFY THAT IT IS CORRECT AND GO TO C2]

YES, BUT NAME/ADDRESS HAS CHANGED..... 2 → [RECORD CLARIFICATION INFORMATION IN BOX 4 AND GO TO C2]

NO..... 3 → [GO TO SUGGESTIONS FOR C1 ON BLUE TIP SHEET]

COMMENTS: _____

_____

_____

IDENTIFYING THE RESPONDENT FOR SCREENER

C2. The U.S. Environmental Protection Agency is conducting a survey to collect information to help develop regulations and guidelines for community water systems.

C3. I would like to speak with someone knowledgeable about the water system who can answer a few questions about the system size, ownership, and water sources. Would that be you or someone else?

May I have your/his/her first name (LAST NAME/TITLE/PHONE NUMBER) please?

CONTACT NAME: _____
(First) (Last)

CONTACT TITLE: _____

CONTACT TELEPHONE NUMBER: ( ) _____ Ext._____

CONTACT IS THE SPEAKER ..... 1 → [GO TO C5]

CONTACT IS NOT THE SPEAKER 2

C3a. Would you please transfer me to {CONTACT GIVEN IN C3}?

AVAILABLE..... 1 → [GO TO C4]

NOT AVAILABLE..... 2 → [END CALL. SELECT THE APPROPRIATE RESULT CODE AND RECORD THE INFORMATION ON THE CALL RECORD]

CONTACT IS REACHABLE AT DIFFERENT NUMBER ..... 3 → [END CALL, RECORD THE INFORMATION ON CALL RECORD. REDIAL ON CATI SCREEN. ENTER THE NEW TELEPHONE NUMBER AND BEGIN AT C4]

FOR OTHER OUTCOMES, GO TO SUGGESTIONS FOR C3/C3a ON THE GREEN TIP SHEET OR SELECT APPROPRIATE RESULT CODE AND RECORD THE INFORMATION ON THE CALL RECORD.

C4. Hello, my name is {INTERVIEWER'S NAME} from Westat, Inc. I am calling for a study being conducted for the U.S. Environmental Protection Agency. When we spoke to someone else at {CWS NAME}, you were identified as being knowledgeable about your system's size, ownership, and water sources. EPA is conducting a survey to collect information to help develop regulations and guidelines for community water systems. [CONTINUE WITH C5]

C5. For this study, the Environmental Protection Agency will select a sample of water systems from across the country. Yours may be selected. While your participation is voluntary, it is crucial to the success of this project. I would like to ask you a few questions now to verify our records.

CONTINUE WITH CATI PORTION OF SCREENER..... 1

RESPONDENT SAYS HE/SHE IS NOT KNOWLEDGEABLE..... 2 → [ATTACH ADDITIONAL CONTACT QUESTIONNAIRE AND BEGIN AT C3 WITH CURRENT RESPONDENT]

SECTION B. CWS CATI SCREENER

Part III. Screening Questions

S1. Does {CWS NAME} supply drinking water to its customers?
STRA

YES	1		
NO	2	→	[(THANK 01) Thank you very much, but we are only interviewing suppliers of piped drinking water. Thank you for your cooperation. AUTOCODE RESULT AS 'I' AND DISPLAY RESULT MESSAGE]
REFUSED	-7	→	[GO TO REFUSAL PROBE1]
DON'T KNOW	-8	→	[GO TO DK PROBE1]

[QUESTION S1A IS NEW]

S1A. Does {CWS NAME} deliver that drinking water through a system of pipes [that is, water pipes, water
STRA lines, or water mains]?

YES	1		
NO	2	→	[(THANK01)] Thank you very much, but we are only interviewing suppliers of piped drinking water. Thank you for your cooperation. AUTOCODE RESULT AS 'I' AND DISPLAY RESULT MESSAGE]
REFUSED	-7	→	[GO TO REFUSAL PROBE1]
DON'T KNOW	-8	→	[GO TO DK PROBE1]

S2. Does {CWS NAME} have at least 15 service connections used by year-round residents?
STRA

YES	1	→	[SKIP TO S3A]
NO	2		
REFUSED	-7	→	[GO TO REFUSAL PROBE1]
DON'T KNOW	-8		

S3. Does {CWS NAME} serve at least 25 year-round residents with piped drinking water?
STRA

YES	1		
NO	2	→	[(THANK 02) Thank you very much, but we are only interviewing providers with 25 or more residents. Thank you for your cooperation. AUTOCODE RESULT AS 'I' AND DISPLAY RESULT MESSAGE]
REFUSED	-7	→	[GO TO REFUSAL PROBE1]
DON'T KNOW	-8	→	[GO TO DK PROBE1]

[QUESTION S3A IS NEW]

S3A. Does {CWS NAME}, or any parent company or agency, own or operate any other water systems
STRA besides {CWS NAME} in {CWS CITY [C137]}, {CWS STATE [C139]}

YES	1
NO	2
REFUSED	-7
DON'T KNOW	-8

[BOX 5 IS NEW]

BOX 5

NOTE TO PROGRAMMER:

IF S3A = 1, -7, -8, DISPLAY THE FOLLOWING PROMPT:

When you answer the following questions, please refer in your answers only to {CWS NAME} in {CWS CITY [C137]}, {CWS STATE [C139]}. If this presents a difficulty for you at any point, please explain the problem to me so that I can make a note of it.

CONTINUE WITH BOX 10.

ELSE CONTINUE WITH BOX 10.

Part IV. Stratification Questions

BOX 10

NOTE TO PROGRAMMER:

USE THE FOLLOWING TABLE TO DETERMINE THE HANDLING OF S4, S4A, S5, S6, S7, AND S8 WHEN ANY COMBINATION OF REFUSAL PROBE1, DK PROBE1, AND S7 VERIFICATION PROBE IS TRIGGERED.

INITIAL RESPONSE TO S4 - S8	DISPLAY PROBE	SECOND RESPONSE TO S4 - S8 (FROM PROBE)	FINAL VALUE IN S4-S8	OUTCOME		
				S4 - S6	S7	S8
DK	DK PROBE2	DK	DK	GO TO S7	GO TO S8	GO TO S13
		R	R			
R	REF PROBE2	R	R			
		DK	DK			
THE FOLLOWING COMBINATIONS CAN OCCUR FOR S7 ONLY:						
DK	DK PROBE2	ANY VALUE OUTSIDE S7 VERIFICATION RANGE	OUTLIER VALUE	NA	GO TO S8	NA
R	REF PROBE2					
ANY VALUE OUTSIDE S7 VERIFICATION RANGE	S7 VERIFICATION PROBE	ANY VALUE OUTSIDE S7 VERIFICATION RANGE	OUTLIER VALUE			
		DK	DK			
		R	R			

FOR ALL OTHER RESPONSES (REGULAR CATEGORICAL VALUES), FOLLOW THE MAIN PATH INDICATED FOR EACH CATEGORICAL VALUE IN THE RESPECTIVE QUESTION. FOR S7, THIS APPLIES ONLY IF THE CATEGORICAL VALUE IS ALSO WITHIN VERIFICATION RANGE LIMITS.

THESE SPECIFICATIONS PREVENT REPEATED PROBING OF THE SAME QUESTION, IF ALTERNATING SEQUENCES OF RESPONSES LEADING TO DIFFERENT PROBES WERE TO OCCUR. SPECIFICALLY, NO RANGE VERIFICATION PROBE IS ATTEMPTED ON AN OUTLIER RESPONSE TO S7 WHEN THE RESPONSE FOLLOWS A DK OR REFUSED PROBE, ON THE PREMISE THAT THIS SEQUENCE ALREADY INDICATES QUESTIONABLE RESPONSES THAT ARE NOT LIKELY TO BE FURTHER CLARIFIED AT THIS TIME WITH THE CURRENT RESPONDENT.

S4. Does {CWS NAME} purchase any of the water it distributes?
STRA

YES	1		
NO	2	→	[SKIP TO S6]
REFUSED	-7	→	[GO TO REFUSAL PROBE2 AND SKIP TO S7 IF CONFIRMED]
DON'T KNOW	-8	→	[GO TO DK PROBE2 AND SKIP TO S7 IF CONFIRMED]

[QUESTION S4A IS NEW]

S4A. Does {CWS NAME} purchase 100 percent of the water it distributes?
STRA

YES	1		
NO	2	→	[SKIP TO S6]
REFUSED	-7	→	[GO TO REFUSAL PROBE2 AND SKIP TO S7 IF CONFIRMED]
DON'T KNOW	-8	→	[GO TO DK PROBE2 AND SKIP TO S7 IF CONFIRMED]

S5. Is {CWS NAME}'s primary source of purchased water from ground water or surface water?
STRA

GROUND WATER	1	→	[SKIP TO S7]
SURFACE WATER	2	→	[SKIP TO S7]
REFUSED	-7	→	[GO TO REFUSAL PROBE2 AND SKIP TO S7 IF CONFIRMED]
DON'T KNOW	-8	→	[GO TO DK PROBE2 AND SKIP TO S7 IF CONFIRMED]

[Ground water: wells, springs, aquifers, etc.]
[Surface water: lakes, reservoirs, ponds, rivers, streams, etc.]

S6. Is {CWS NAME}'s primary source of non-purchased water from ground water or surface water?
STRA

GROUND WATER	1		
SURFACE WATER	2		
REFUSED	-7	→	[GO TO REFUSAL PROBE2 AND CONTINUE WITH S7 IF CONFIRMED]
DON'T KNOW	-8	→	[GO TO DK PROBE2 AND CONTINUE WITH S7 IF CONFIRMED]

[Ground water: wells, springs, aquifers, etc.]
[Surface water: lakes, reservoirs, ponds, rivers, streams, etc.]

S7. What is the total year-round residential population served directly by {CWS NAME}? Would you
STRA say . . .

[ENTER ONE ONLY]

100 or less,	1		
101-500,	2		
501-1,000,	3		
1,001-3,300,	4		
3,301-10,000	5		
10,001-50,000	6		
50,001-100,000, or	7		
Over 100,000?	8		
REFUSED	-7	→	[GO TO REFUSAL PROBE2 AND CONTINUE WITH S8 IF CONFIRMED]
DON'T KNOW	-8	→	[GO TO DK PROBE2 AND CONTINUE WITH S8 IF CONFIRMED]

BOX 15

NOTE TO PROGRAMMER:

THE FOLLOWING RANGE VERIFICATION WILL BE APPLIED TO QUESTION S7.

IF THE RETAIL POPULATION COUNT FOR THE WATER SYSTEM (LOADED FROM FRDS FILE DATA ELEMENT C117) EXCEEDS THE UPPER BOUND OF THE SELECTED RESPONSE CATEGORY BY AN AMOUNT GREATER THAN 25% OF THE VALUE OF C117, OR

IF C117 IS BELOW THE LOWER BOUND OF THE SELECTED RESPONSE CATEGORY BY AN AMOUNT GREATER THAN 25% OF THE VALUE OF C117,

DISPLAY THE FOLLOWING PROBE AND REQUIRE RE-ENTRY OF THE RESPONSE:

That amount is significantly different from the information in our records. I would like to confirm that I recorded your answer correctly. It may help to mention that the question concerns the year-round residential population served by {CWS NAME}. This may be different from the total census population of the area, the total number of year-round and transient people served, the number of residential water connections, or the total residential population served by any other systems you might also operate.

REDISPLAY S7.

ACCEPT SECOND ENTRY WITHOUT FURTHER VERIFICATION.

NOTE: FORMULA LOGIC IS AS FOLLOWS:

IF S7 IS NOT MISSING AND C117 IS NOT MISSING
IF C117 ≥ 25
IF (C117 - UPPER BOUND) > 0.25 * C117 OR
IF (LOWER BOUND - C117) > 0.25 * C117

S8.
STRA Is the {CWS NAME}'s water system ...

Owned or operated by a government or public agency, ... 1	→	[SKIP TO S12]
Owned privately and operated primarily as a water business, or 2	→	[CONTINUE WITH S10]
Owned privately and operated as a necessary part of another business? 3	→	[SKIP TO S11]
REFUSED ..... -7	→	[GO TO REFUSAL PROBE2 AND SKIP TO S13 IF CONFIRMED]
DON'T KNOW ..... -8	→	[GO TO DK PROBE2 AND SKIP TO S13 IF CONFIRMED]

[Government includes: city, town, township, village, or any municipal government; county, borough, parish; special district or authority; state or Federal government; or any other publicly owned or operated system.]

S9. **S9 DELETED**

S10. Is the water business...
STRA

Investor owned; operating separately but financially dependent on a parent company, ...	1	[SKIP TO S13]
Investor owned; operating separately and <u>not</u> financially dependent on a parent company, ...	2	
Owned and operated by a homeowners' association or subdivision, or	3	
Something else?	4	
REFUSED	-7	
DON'T KNOW	-8	

S11. Is the other business a...
STRA

Mobile home park, ...	1	[SKIP TO S13]
Hospital, ...	2	
School, ...	3	
Some other institution, ...	4	
Restaurant, ...	5	
Campground, ...	6	
Resort, ...	7	
Apartments, ...	8	
Condominiums, or	9	
Something else?	10	
REFUSED	-7	
DON'T KNOW	-8	

S12. Is that government a . . .
STRA

Town, township, village or municipal government,	1
County, borough, or parish government,	2
State government,	3
Special district government	4
An authority,	5
The Federal government, or	6
Some other government?	7
REFUSED	-7
DON'T KNOW	-8

[BOX 20 IS NEW]

BOX 20

NOTE TO PROGRAMMER:

FEDERAL AND STATE CWSs WERE EXCLUDED FROM THE SAMPLE FRAME PRIOR TO SAMPLING. IF ANY WERE INCORRECTLY CODED IN FRDS, THEY WILL BE ELIMINATED HERE.

IF S12 = 3 OR 6, TERMINATE INTERVIEW AND AUTOCODE FINAL RESULT CODE AS 'I2.' DISPLAY THANK YOU:

Those are all the questions I have. Thank you for your participation.

DISPLAY RESULT MESSAGE SCREEN.

S13. Is {CWS NAME} located on Native American or American Indian land, such as a reservation or
STRA other tribal land?

YES	1
NO	2
REFUSED	-7
DON'T KNOW	-8

S14. **S14 DELETED**

S15. **S15 DELETED**

S16. **S16 DELETED**

Part V. Mailing and Contact Information

S17. STRA Your water system qualifies as the type of system we might be interested in for the Survey of Community Water Systems. Please give me the name, title, mailing address, and telephone number of the person who would be best qualified to answer some more detailed questions about the operations and finances of {CWS NAME} if it is selected for the survey.

CONTACT NAME: MAILFNAM (20 COLS) (FIRST) MAILLNAM (25 COLS) (LAST)

TITLE: MAILTITL (40 COLS)

ORGANIZATION NAME: MAILCWS (40 COLS)

ADDRESS: MAILADDR (40 COLS)

CITY: MAILCITY (30 COLS) STATE: MAILSTAT (2 COLS) ZIP CODE: MAILZIP |__|__|__|__|__|

TELEPHONE: (MAILAREA |__|__|__|) MAILEXCH |__|__|__| - MAILLOCL |__|__|__|__| EXT. MAILEXT |__|__|__|__|

[NOTE TO PROGRAMMER: REQUIRE ENTRY IN ALL FIELDS OF S17 EXCEPT TITLE AND EXT. ALLOW ENTRY OF REFUSED OR DON'T KNOW IN ALL FIELDS.]

Thank you very much for your participation. [NOTE TO PROGRAMMER: AUTOCODE RESULT AS 'C' AND DISPLAY RESULT MESSAGE SCREEN]

REFUSAL PROBE1

This information is very important for the EPA water systems survey. Your answers will be kept confidential. I would be happy to discuss your concerns, so that you might reconsider answering this question.

[ENTER RESPONDENT'S ANSWER IN THE ENTRY FIELD. IF RESPONDENT STILL REFUSES, RE-ENTER "REFUSED," (SHIFT/7).]

NOTE TO PROGRAMMER:

USE THE FOLLOWING TABLE TO DETERMINE THE HANDLING OF S1, S1A, S2, AND S3 WHEN REFUSAL PROBE1 IS TRIGGERED BY INITIAL ITEM REFUSAL:

2nd Response to S1, S1A S2, S3	Final Value in S1, S1A S2, S3	Outcome
R	R	Terminate Interview and Treat as Refusal
DK	DK	S1, S1A S3: Terminate Interview and Treat as Refusal S2: Go To S3
1, 2	1, 2	Follow Main Path Instructions

REFUSAL TREATMENT NOTE: REFUSALS RESULTING AUTOMATICALLY FROM REFUSAL PROBE1 WILL PRODUCE A RESULT MESSAGE TO INTERVIEWERS TO RECORD RESULT CODE '12' ON CALL RECORD. OTHER REFUSALS WILL BE CODED BY INTERVIEWERS AS STANDARD INTERIM REFUSAL CODE '2'. THIS WILL PERMIT SEPARATE HANDLING OF REFUSALS DUE TO ITEM-REFUSAL IN ELIGIBILITY QUESTIONS S1, S1A, S2, OR S3.

CATI WILL NOT ASSIGN INDIVIDUAL INTERIM RESULT CODES. ALL INTERIMS WILL BE CODED BY CATI AS RESULT CODE '9'.

TELEPHONE SUPERVISORS WILL REVIEW CALL RECORDS AND UPDATE ALL CASES AS FINAL REFUSALS, 'RB,' WHEN ANY COMBINATION OF RESULT CODES '2' OR '12' REACHES A TOTAL COUNT OF TWO.

REFUSAL PROBE2

Your answer to this question will provide information needed to correctly categorize your water system. It would be very helpful if you would reconsider answering it, so that we can be sure of asking you the appropriate questions.

[ENTER RESPONDENT'S ANSWER IN THE ENTRY FIELD. IF RESPONDENT STILL REFUSES, RE-ENTER "REFUSED," (SHIFT/7).]

NOTE TO PROGRAMMER:

UPON SECOND ENTRY IN DATA ENTRY FIELD (AFTER FIRST ENTRY INVOKED REFUSAL PROBE 2), FOLLOW THE PATH INDICATED IN THE QUESTIONNAIRE FOR THE ENTERED VALUE, EXCEPT FOR A SECOND REFUSED (= -7). IF -7 IS ENTERED FOR A SECOND TIME, CONTINUE WITH NEXT QUESTION OR SKIP TO THE INDICATED QUESTION, AS INDICATED IN THE QUESTIONNAIRE FOR A CONFIRMED REFUSAL.

DK PROBE1

This information is very important for the EPA water systems survey. If you don't feel certain enough to answer this question, I would be glad to speak with someone else who could provide this information. If you feel you can give a reasonably certain answer, I can accept that, or would you rather give me the name of someone else to contact?

STRA.DK PRB1 ( )

RESPONDENT CAN ANSWER QUESTION..... 1	→	[REDISPLAY QUESTION]
RESPONDENT CAN PROVIDE NAME OF SOMEONE ELSE..... 2	→	[DISPLAY COLLECT NAME SCREEN]
RESPONDENT CANNOT ANSWER QUESTION AND CANNOT PROVIDE NAME OF SOMEONE ELSE..... 3	→	[TERMINATE INTERVIEW AND TREAT AS REFUSAL]

NOTE TO PROGRAMMER:

USE THE FOLLOWING TABLE TO DETERMINE THE HANDLING OF S1, S1A AND S3 WHEN DKPROBE1 IS TRIGGERED BY INITIAL DON'T KNOW RESPONSE:

Response to DK PROBE1	2nd Response to S1,S1A, S3	Final Value in S1, S1A, S3	Outcome
1	1, 2	1, 2	Follow Main Path Instructions
1	DK	DK	Terminate Interview and Treat as Refusal
1	R	R	Terminate Interview and Treat as Refusal
2	—	DK	Collect Name
3	—	DK	Terminate Interview and Treat as Refusal

REFUSAL TREATMENT NOTE: REFUSALS RESULTING AUTOMATICALLY FROM DK PROBE1 WILL PRODUCE A RESULT MESSAGE TO INTERVIEWERS TO RECORD RESULT CODE '12' ON CALL RECORD. OTHER REFUSALS WILL BE CODED BY INTERVIEWERS AS STANDARD INTERIM REFUSAL CODE '2'. THIS WILL PERMIT SEPARATE HANDLING OF REFUSAL DUE TO DON'T KNOW RESPONSES AND UNWILLINGNESS TO PROVIDE BETTER RESPONDENT FOR ELIGIBILITY QUESTIONS S1 - S3.

CATI WILL NOT ASSIGN INDIVIDUAL INTERIM RESULT CODES. ALL INTERIMS WILL BE CODED BY CATI AS RESULT CODE '9'.

TELEPHONE SUPERVISORS WILL REVIEW CALL RECORDS AND UPDATE ALL CASES AS FINAL REFUSALS, 'RB,' WHEN ANY COMBINATION OF RESULT CODES '2' OR '12' REACHES A TOTAL COUNT OF TWO.

COLLECT NAME SCREEN (NEWCONT)

RECORD NEW CONTACT PERSON'S NAME, TITLE, AND PHONE NUMBER IN CONTACT UPDATE SECTION OF RESPONDENT INFORMATION SHEET [RIS].

IF NEW CONTACT PERSON IS AT CURRENT PHONE NUMBER, ASK IF PERSON IS AVAILABLE. IF NOT, SCHEDULE CALLBACK ON CALL RECORD.

STRA.NEWCONT ( )

NEW CONTACT AVAILABLE	1	→	[RESTART INTERVIEW AT VERIFICATION SCREEN, VERF02]
NEW CONTACT NOT AVAILABLE	2	→	[DISPLAY RESULT SCREEN RESULT 01]

DK PROBE2

Your answer to this question will provide information needed to correctly categorize your water system. If you feel you can give a reasonably certain answer, I can accept that.

[ENTER RESPONDENT'S ANSWER IN THE ENTRY FIELD. IF RESPONDENT STILL ANSWERS "DON'T KNOW," RE-ENTER "DON'T KNOW," (SHIFT/8).]

NOTE TO PROGRAMMER:

UPON SECOND ENTRY IN DATA ENTRY FIELD (AFTER FIRST ENTRY INVOKED DK PROBE2), FOLLOW THE PATH INDICATED IN THE QUESTIONNAIRE FOR THE ENTERED VALUE, EXCEPT FOR A SECOND DON'T KNOW (= -8). IF -8 IS ENTERED FOR A SECOND TIME, CONTINUE WITH NEXT QUESTION OR SKIP TO THE INDICATED QUESTION, AS INDICATED IN THE QUESTIONNAIRE FOR A CONFIRMED DON'T KNOW.

There will be four front-end screens:

1. Case ID entry screen

2. Information Verification Screen for selected case, to enable interviewer to confirm correct entry of ID by matching screen information against RIS information:

   CWS Name
   CWS Address
   CWS City, State, ZIP
   CWS FRDS Number

3. Telephone number entry screen, to enable interviewer to enter current target number from RIS into CATI, which will pass it to the autodialer. This will reduce dialing error, since dialed number will be visible on screen for interviewer to verify before sending it to the autodialer.

4. Information Verification Screen for selected case, to enable interviewer to a) re-confirm correct entry of ID after dialing (by matching screen information against RIS information or information provided by contact), before proceeding into CATI instrument, or b) redial/exit case if not confirmed by contact.

There will be two back-end screens.

1. Thank you screen, with reminder to interviewer to code result on paper Call Record.

2. Thank you and result message screen, displayed to interviewer after autocoding of result by CATI; will display the assigned code and prompt the interviewer to record that code on the paper Call Record.

   In addition to the standard CATI displays at the top of each screen, the following items should also be displayed: CWS Name, City, State, FRDS number.

APPENDIX B

CWSS Telephone Contact Questionnaire

Westat ID _____

CONTACT QUESTIONNAIRE # _____

VERIFYING THE CWS

C1. Hello, my name is {INTERVIEWER'S NAME} from Westat, Inc. Have I reached the {CWS NAME}. [I'm calling for a study being conducted for the U.S. Environmental Protection Agency.]

YES..... 1 → [READ THE CWS NAME AND ADDRESS PRINTED IN BOX 1 TO VERIFY THAT IT IS CORRECT AND GO TO C2]

YES, BUT NAME/ADDRESS HAS CHANGED..... 2 → [RECORD CLARIFICATION INFORMATION IN BOX 4 AND GO TO C2]

NO..... 3 → [GO TO SUGGESTIONS FOR C1 ON BLUE TIP SHEET]

COMMENTS: _____

_____

_____

IDENTIFYING THE RESPONDENT FOR SCREENER

C2. The U.S. Environmental Protection Agency is conducting a survey to collect information to help develop regulations and guidelines for community water systems.

C3. I would like to speak with someone knowledgeable about the water system who can answer a few questions about the system size, ownership, and water sources. Would that be you or someone else?

May I have your/his/her first name (LAST NAME/TITLE/PHONE NUMBER) please?

CONTACT NAME: _____
(First) (Last)

CONTACT TITLE: _____

CONTACT TELEPHONE NUMBER: ( )_____ Ext._____

CONTACT IS THE SPEAKER ..... 1 → [GO TO C5]

CONTACT IS NOT THE SPEAKER 2

Westat ID _____

CONTACT QUESTIONNAIRE # _____

C3a. Would you please transfer me to {CONTACT GIVEN IN C3}?

AVAILABLE	1	→	[GO TO C4]
NOT AVAILABLE	2	→	[END CALL. SELECT THE APPROPRIATE RESULT CODE AND RECORD THE INFORMATION ON THE CALL RECORD]
CONTACT IS REACHABLE AT DIFFERENT NUMBER	3	→	[END CALL, RECORD THE INFORMATION ON CALL RECORD. REDIAL ON CATI SCREEN. ENTER THE NEW TELEPHONE NUMBER AND BEGIN AT C4]

FOR OTHER OUTCOMES, GO TO SUGGESTIONS FOR C3/C3a ON THE GREEN TIP SHEET OR SELECT APPROPRIATE RESULT CODE AND RECORD THE INFORMATION ON THE CALL RECORD.

C4. Hello, my name is {INTERVIEWER'S NAME} from Westat, Inc. I am calling for a study being conducted for the U.S. Environmental Protection Agency. When we spoke to someone else at {CWS NAME}, you were identified as being knowledgeable about your system's size, ownership, and water sources. EPA is conducting a survey to collect information to help develop regulations and guidelines for community water systems. [CONTINUE WITH C5]

C5. For this study, the Environmental Protection Agency will select a sample of water systems from across the country. Yours may be selected. While your participation is voluntary, it is crucial to the success of this project. I would like to ask you a few questions now to verify our records.

CONTINUE WITH CATI PORTION OF SCREENER	1		
RESPONDENT SAYS HE/SHE IS NOT KNOWLEDGEABLE	2	→	[ATTACH ADDITIONAL CONTACT QUESTIONNAIRE AND BEGIN AT C3 WITH CURRENT RESPONDENT]

APPENDIX C

Public CWSS Mail Questionnaire

OMB No.: 2040-0173
Expires: 7/31/97

United States
Environmental Protection Agency

SURVEY OF PUBLIC

COMMUNITY WATER SYSTEMS

12/28/94

Please return this questionnaire in the enclosed postage-paid envelope

or mail to:

EPA Community Water Systems Survey
1650 Research Boulevard
Room GA 45
Rockville, MD 20850-9973

The following questionnaire is estimated to require 45 minutes to an hour to complete.
This includes time for reviewing instructions, gathering and reporting the requested data, and reviewing the questionnaire.
Send comments regarding the burden estimate or any other aspect of this survey, indicating suggestions for reducing this burden, to:
Chief, Information Policy Branch, 2136 • U.S. Environmental Protection Agency • 401 M Street, S.W. • Washington, DC 20460, and
Desk Officer for EPA • Office of Information and Regulatory Affairs •· Office of Management and Budget • Washington, DC 20503.

Please respond about:

If you have any questions about the survey or how to complete the questionnaire, please call:

Please return your completed questionnaire in the enclosed postage-paid envelope by March 10, 1995.

1994 Community Water Systems Survey: Public Systems Questionnaire

GENERAL INSTRUCTIONS

This questionnaire asks three preliminary questions and then is divided into two major parts:

PART I - OPERATING CHARACTERISTICS (Questions 4-27); and
PART II - FINANCIAL CHARACTERISTICS (Questions 28-40).

Please complete the questionnaire as follows:

- In Question 1, provide the best contact person for each part (I and II);
- In Question 2, indicate the latest full-year reporting periods for which your operating information, and financial information are available;
- In Part I of the questionnaire, use the period indicated in Question 2(A) to report "last year's" operating data; and in Part II, use the period indicated in Question 2(B) to report "last year's" financial data;
- In Part II of the questionnaire, record dollar amounts as whole dollars;
- **Please record your answers for the questionnaire by filling in the blank(s) or circling the appropriate number(s) for each item; and**
- Make a copy of the completed questionnaire for your records before sealing it in the enclosed envelope.

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

▼

(A) PART I - OPERATING CHARACTERISTICS:

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

▼

(B) PART II - FINANCIAL CHARACTERISTICS
(Write "SAME" if same as above)

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

2. Please specify the end date of the most recent 12-month reporting period for which your drinking water system can provide operating and financial information.

	▼ Can be reported for the 12 months ending
(A) Operating information	_____/_____/_____
(B) Financial information	_____/_____/_____

3. Please indicate, by circling the appropriate numbers in columns A, B, and C, whether the organizations or people listed below provide your drinking water system with:

(A) Information on drinking water requirements and guidance;
(B) Operator training; and
(C) Technical assistance.
(Circle all numbers that apply for each information source)

	INFORMATION SOURCE	▼ (A) Source providing information on drinking water requirements and guidance	▼ (B) Source providing operator training	▼ (C) Source providing technical assistance
1.	State Department of Natural Resources, state Health Department, or state EPA	1	2	3
2.	Other state government departments or extension services	1	2	3
3.	U.S. Environmental Protection Agency	1	2	3
4.	Other federal agencies or extension services (e.g., FmHA, Rural Development Administration)	1	2	3
5.	County government	1	2	3
6.	Local government	1	2	3
7.	State rural water associations	1	2	3
8.	Other associations	1	2	3
9.	Rural community assistance program	1	2	3
10.	Contracted engineering services	1	2	3
11.	Citizen volunteers	1	2	3
12.	Electronic bulletin boards	1	2	3
13.	Technical publications	1	2	3
14.	Radio or television	1	2	3
15.	Local newspapers	1	2	3
16.	Federal register	1	2	3
17.	Other *(Please specify)*_____	1	2	3
18.	_____	1	2	3

PART I - OPERATING CHARACTERISTICS

PRODUCTION AND STORAGE

4. For each type of water source listed below, please indicate which ones you use and:

   (A) the number of gallons (in millions of gallons) produced in the last year (i.e., the amount of water going into the distribution system); and
   (B) the number of water intake points with disinfection.

WATER SOURCE	Do you obtain water from this source? YES	NO	If YES, enter the number of: (A) Gallons produced in the last year (in millions)	(B) Number of intake points with disinfection
Ground water	1	2	_____	_____
Surface water	1	2	_____	_____
Water purchased from other systems	1	2	_____	_____

5. What was your system's peak daily production of non-purchased drinking water during the past year, and what is the system's maximum daily treatment design capacity?

	Gallons per day
(A) Peak daily production	_____
(B) Maximum daily treatment design capacity	_____

6. You reported your system's maximum daily treatment design capacity in Part B of Question 5. There are several possible factors that may have resulted in a maximum capacity of this size. Some possibilities are listed below. Please circle the number to the right of each factor that indicates how important that factor was in determining your system's maximum design capacity.

Factor Determining Maximum Design Capacity	How important was this factor? Very Important →	→			Not important at all
1. Current peak needs (beyond average daily flow)	1	2	3	4	5
2. Seasonal demand (e.g., irrigation)	1	2	3	4	5
3. Emergency flows (e.g., fire, drought)	1	2	3	4	5
4. Expected growth.	1	2	3	4	5
5. Limited choice in package plant sizes.	1	2	3	4	5
6. Other *(Please specify)*_____	1	2	3	4	5

7. Do you have treated water storage?

▼

1 Yes

2 No → Go to Question 9

8. Please indicate whether you have the following types of treated water storage listed below; and if so, for each type of storage:

(A) how many tanks do you have;
(B) what is their storage capacity (in millions of gallons); and
(C) do you disinfect water in these tanks after storage?

TYPE OF TREATED WATER STORAGE	Does your water system have this type of treated water storage? YES	NO	If YES, complete the following: (A) Number of tanks	(B) Total storage capacity (in millions of gallons)	(C) Disinfect after storage? YES	NO
GROUND LEVEL OR SUB-SURFACE STORAGE						
Natural materials (e.g., wood, earth):						
1. Uncovered	1	2	_____	_____	1	2
2. Covered	1	2	_____	_____	1	2
Synthetic materials (e.g., steel, concrete):						
3. Uncovered	1	2	_____	_____	1	2
4. Covered	1	2	_____	_____	1	2
ELEVATED STORAGE						
Natural materials (e.g., wood):						
5. Uncovered	1	2	_____	_____	1	2
6. Covered	1	2	_____	_____	1	2
Synthetic materials (e.g., steel):						
7. Uncovered	1	2	_____	_____	1	2
8. Covered	1	2	_____	_____	1	2

DISTRIBUTION

9. Please indicate the types of pipe used in your distribution system. For each type of pipe, what is the number of:

(A) miles (or feet) of existing pipe;
(B) miles (or feet) of pipe replaced in the last year;
(C) water main repairs in the last year; and
(D) months between flushes for that type of pipe.

TYPE OF PIPE	Does your distribution system have this type of pipe? YES	NO	If YES, enter the number of: (A) Miles or feet (specify which) of existing pipe	Miles or feet? (Circle M or F)	(B) Miles or feet (specify which) of pipe replaced in the last year	Miles or feet? (Circle M or F)	(C) Water main repairs in the last year for type of pipe	(D) Months between flushes for type of pipe
IRON:								
1. w/ Cement Lining.	1	2	_____	M F	_____	M F	_____	_____
2. w/o Cement Lining	1	2	_____	M F	_____	M F	_____	_____
ASBESTOS CEMENT:								
3. w/ Vinyl	1	2	_____	M F	_____	M F	_____	_____
4. w/o Vinyl	1	2	_____	M F	_____	M F	_____	_____
5. PVC	1	2	_____	M F	_____	M F	_____	_____
6. Other plastic	1	2	_____	M F	_____	M F	_____	_____
7. Other *(Please specify)* _____	1	2	_____	M F	_____	M F	_____	_____

10. How many miles (or feet) of new pipe (for expansion purposes) have you installed in the last 5 years? Enter response for either miles <u>or</u> feet, but not both.
(If zero, enter "0")

_____ MILES OF NEW PIPE **<u>OR</u>** _____ FEET OF NEW PIPE

11. How many people and connections does your system currently serve with piped drinking water, and how many did it serve 5 years ago?
(Please estimate if you don't know the exact number.)

> **NOTE:**
>
> If your system serves a population that changes on a seasonal basis (for example, a winter or summer resort area), please indicate the highest seasonal number of people served or active connections.

		▼ Currently	▼ 5 years ago
(A)	PEOPLE SERVED WITH PIPED DRINKING WATER	_____	_____
(B)	ACTIVE CONNECTIONS WITH PIPED DRINKING WATER	_____	_____

12. What are the ZIP codes of your service area? *(If your system's service area covers more than 10 ZIP codes, record only the first 3 digits of the ZIP code(s), i.e., all ZIP codes covered by the same 3 starting digits can be summarized as one ZIP code by recording the first 3 digits.)*

▼

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

OR

FIRST 3 DIGITS OF ZIP CODES *(For systems whose service area covers more than 10 ZIP codes)*

___XX ___XX ___XX ___XX ___XX

OPERATOR TRAINING

13. Do you have any drinking water treatment plant operators currently employed by your system?

▼
1 Yes
2 No → Go to Question 15

14. Please indicate whether the treatment plant operators you employ have attained any of the training level categories listed below. Provide the number of operators and average operator work week (in hours) for each applicable training level category:

TRAINING LEVEL CATEGORY	Do you employ drinking water treatment operators who have attained this training level category? YES	NO	If "YES" How many operators do you have? (Number)	Average hours per week per operator: Treatment Duties (Hrs)	Other Drinking Water Duties (Hrs)
STATE CERTIFIED (i.e., with state-approved certified training for drinking water)					
- Full time operator(s) [Definition: Works at least 35 hours a week]	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, state certified operators	1	2	_____	_____	_____
TRAINED THROUGH A NATIONAL OR STATE PROGRAM, BUT NOT STATE CERTIFIED					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, trained operators	1	2	_____	_____	_____
OTHER TRAINING LEVEL (e.g., on-the-job training)					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time operators not classified above	1	2	_____	_____	_____

WATER SOURCES AND TREATMENT

15. Is your water system interconnected to another system that you can use for emergency purposes (e.g., hot summers)?

1 Yes
2 No

16. If your primary source of drinking water became permanently unusable due to contamination, please indicate whether or not you would adopt any of the solutions listed below:

SOLUTION	If primary water sources became unusable, would you adopt this solution? YES	NO
1. Draw more heavily upon other sources on the present system	1	2
2. Draw upon another system to which you are now connected	1	2
3. Draw upon alternative sources (e.g., hook up to another system)	1	2
4. Implement a water management plan (e.g., rationing)	1	2
5. Drill new well(s)	1	2
6. Curtail service	1	2
7. Other *(Please specify)*_____	1	2

17. If you are currently interconnected to your long term alternate water source, check the box indicated and go to Question 18.

☐ Currently interconnected → Go to Question 18

If you have no long term alternate water source(s), check the box indicated and go to Question 18.

☐ No long term alternate water source(s) → Go to Question 18

What is the name of your long term alternate water source(s) and how many miles is it from the nearest connection point on your current system?

Name of long term alternate water source(s)	Distance from system *(to nearest mile)*	If distance is **under one mile,** please estimate distance **in feet**
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

18. Please supply the following information for each treatment facility. The term "treatment facility" refers to any place where water is treated prior to delivery to customers. *(If you have more than five facilities, please check here ❑. Record the information about the additional facilities on a photocopy of this page or use a blank sheet of your own.)*

▼ FACILITY NAME	LOCATION OF FACILITY: (Enter latitude and longitude from local plat map or permit) Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Ground Water Sources: Number of wells treated	Range of well depths (in feet)	Combined average daily flow (gal/day)	Combined potential daily flow (gal/day)	Surface Water Sources: Combined surface water intakes (gal/day)	Combined average daily flow (gal/day)	Treatments provided (Enter code(s) from Box 1)
1. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
2. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
3. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
4. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
5. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__

BOX 1 - WATER TREATMENT CODES

CODE	Treatment
01	Raw water storage
02	Presedimentation
03	Aeration
	PRE-DISINFECTION/OXIDATION:
04	Chlorine
05	Chlorine dioxide
06	Chloramines
07	Ozone
08	$KMnO_4$
09	Pre-disinfection/oxidation combinations
10	Lime/Soda ash softening
11	Recarbonation with CO_2
	IRON AND MANGANESE REMOVAL:
12	Green sand filtration
13	Chemical oxidation filtration
14	Aeration filtration
	FLOCCULATION/COAGULATION:
15	Aluminum salt
16	Iron salts
17	pH adjustment
18	Activated silica
19	Clays
20	Polymers
21	Other flocculation/coagulation
22	Flocculation/coagulation combinations
	FILTRATION:
23	Slow sand
24	Rapid sand
25	Dual/Multi-media
26	Diatomaceous earth
27	Reverse osmosis
28	Pressure filtration
29	Other filtration
30	Filtration combinations
	ORGANICS REMOVAL:
31	GAC adsorption post contactors
32	GAC adsorption filter adsorbers
33	PAC addition
34	Ion exchange
35	Air stripping
36	Organics removal combinations
	POST-DISINFECTION:
37	Chlorine
38	Chlorine dioxide
39	Chloramines
40	Post-disinfection combinations
41	Fluoridation
42	Hypochlorination
	CORROSION CONTROL:
43	pH adjustment
44	Alkalinity adjustment
45	Corrosion inhibitors
46	Corrosion control combinations
	OTHER TREATMENTS NOT ELSEWHERE CLASSIFIED:
47	(Please specify) _____

19. Are there places in your distribution system other than those reported in your answer to question 8C (storage) or question 18 (treatment facilities) where you boost disinfectant residuals?

▼

1 Yes
2 No

20. Please supply the following information for each well or surface water intake not receiving treatment (include only sources that were active in 1994). If you have more than five wells and intakes, please check here ☐. *(Record the information about the additional wells and intakes on a photocopy of this page or use a blank sheet of your own.)*

▼ AQUIFER OR SURFACE WATER SOURCE NAME *(e.g. Ogalala Aquifer or Ohio River)*	SOURCE TYPE *(enter G for Ground or S for Surface)*	LOCATION OF WELL OR INTAKE: *(Enter latitude and longitude from local plat map or permit)* Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Average flow *(Gal/day)*	If well, please list: Potential flow *(Gal/day)*	Well depth *(feet)*
1. _____	_____	__ __ __	___ __ __	_____	_____	_____
2. _____	_____	__ __ __	___ __ __	_____	_____	_____
3. _____	_____	__ __ __	___ __ __	_____	_____	_____
4. _____	_____	__ __ __	___ __ __	_____	_____	_____
5. _____	_____	__ __ __	___ __ __	_____	_____	_____

SOURCE WATER PROTECTION

21. Does your drinking water system participate in a source-water or wellhead protection program?

▼

1 Yes
2 No → Go to Question 25

22. Please indicate whether or not the following measures are being adopted in your source-water or wellhead protection program:

MEASURE	▼ Is this measure adopted in your source-water or wellhead protection program? YES	NO
1. Education on land use impacts	1	2
2. Ownership of a watershed	1	2
3. Zoning or land use controls	1	2
4. Best Management Practices (such as run-off controls, fertilizer scheduling, less toxic road maintenance materials)	1	2
5. Other *(Please specify)*_____	1	2

23. Who leads or manages this program?
(Circle only one number)

▼

1 Local government

2 Regional authority (e.g., Section 208 Agency)

3 State agency

4 Other *(Please specify)*_____

24. How is the management area delineated?
(Circle all numbers that apply and fill in the blanks if 3, 4 or 5 is circled)

▼

1 By watershed boundaries

2 By aquifer boundaries

3 By a fixed radius around well of _____ feet

4 By a fixed distance from a surface water body of _____ feet

5 Other *(Please specify)* _____

25. Please indicate if any of the potential sources of contamination listed below exist within 2 miles of your water supply intakes:

▼

	POTENTIAL SOURCE OF CONTAMINATION	Does this potential source of contamination exist within 2 miles of your water supply? YES	NO
1.	Industrial or manufacturing facilities	1	2
2.	Agricultural runoff	1	2
3.	Animal feed lots	1	2
4.	Urban runoff	1	2
5.	Sewage discharge	1	2
6.	Hazardous waste site	1	2
7.	Solid waste disposal	1	2
8.	Nitrates	1	2
9.	Pesticides, rodenticides, fungicides (e.g., mixing or storage facilities)	1	2
10.	Mining, oil, or gas activities	1	2
11.	Petroleum products (e.g., auto repair shops)	1	2
12.	Solvents (e.g., dry cleaners)	1	2
13.	Septic systems or other sewage discharges	1	2
14.	Other *(Please specify)*_____	1	2

26. Who performs laboratory analysis on your drinking water?

LAB ANALYSIS PROVIDER	Does this provider perform your lab analysis for ... Metals/ Inorganics? YES	NO	Microbials? YES	NO	VOCs*? YES	NO	Other Organics? YES	NO
The state.	1	2	1	2	1	2	1	2
A private firm.	1	2	1	2	1	2	1	2
In-house employees	1	2	1	2	1	2	1	2
Other *(Specify)*_____	1	2	1	2	1	2	1	2

**VOCs=Volatile organic compounds (e.g., carbon tetrachloride, benzine, THMs, etc.)*

27. How do you pay for your laboratory analysis?

PAYMENT METHOD	Do you use this payment method? YES	NO
Direct payment for tests to state or private lab.	1	2
Included as part of state permit	1	2
Don't pay.	1	2
Other *(Please specify)*_____	1	2

PART II - FINANCIAL INFORMATION

REVENUES AND EXPENSES

28. Are your financial reports or income and expense statements for your drinking water system completed in accordance to Generally Accepted Accounting Principles (GAAP)? *(Circle one number)*

1 Yes

2 No

3 Don't have separate income and expense statements for our drinking water system

4 Don't know

To simplify your task of providing financial information, please follow the guidelines below when filling out the remainder of the questionnaire.

PROVIDING ESTIMATES:

The following questions ask for information on drinking water supply operations, **exclusive of other activities** with other types of operations. Where possible, please provide exact information from your system's records. Otherwise **provide your best estimate** of financial information that is applicable to your drinking water system only.

ROUNDING:

Please record your dollar amounts <u>to the nearest dollar</u>. DO NOT record fractional dollars (i.e., dollars and cents).

29. During the last year [as defined in your response to Question 2(B)] what were your drinking water system's revenues from water sales for each of the following customer categories: *(If zero, enter "0")*

	WATER SALES CUSTOMER CATEGORIES	Water Sales Revenues	Gallons delivered (in millions)
1.	Residential customers	$_____	_____
2.	Commercial customers	$_____	_____
3.	Industrial customers	$_____	_____
4.	Wholesale customers (i.e., those who redistribute your water to other users)	$_____	_____
5.	Local municipal government	$_____	_____
6.	Other government customers	$_____	_____
7.	Agricultural customers	$_____	_____
8.	Other (*Specify*)_____	$_____	_____
9.	TOTAL	$_____	_____

30. Please indicate your drinking water system's revenues during the last year from the other water-related revenue sources listed below. *(If zero, enter "0")*

	WATER RELATED REVENUE SOURCE (EXCLUDING WATER SALES)	Revenues
1.	Connection fees	$_____
2.	Inspection fees	$_____
3.	Developer fees	$_____
4.	Other fees	$_____
5.	General fund revenues (operating transfers in)	$_____
6.	Interest earnings (on water fund, etc.)	$_____
7.	Fines/penalties	$_____
	Please specify other water system revenues (not elsewhere reported)	
8.	_____	$_____
9.	_____	$_____

31. For each customer category listed below, please identify your drinking water system's billing structure, indicate the year and percent of the two most recent rate increases, and provide the number of metered and unmetered active connections.
(If zero, enter "0")

CUSTOMER CATEGORY	Billing structure *(Circle all code(s) from Box 2 that apply)*	Year and percent of two most recent rate increases YR.	%	YR.	%	Number of active connections Metered/Unmetered
1. Residential customers	1 2 3 4 5 6 7	___	___	___	___	_____/_____
2. Commercial customers	1 2 3 4 5 6 7	___	___	___	___	_____/_____
3. Industrial customers	1 2 3 4 5 6 7	___	___	___	___	_____/_____
4. Wholesale customers (i.e., those who redistribute your water to other users)	1 2 3 4 5 6 7	___	___	___	___	_____/_____
5. Local municipal government	1 2 3 4 5 6 7	___	___	___	___	_____/_____
6. Other government customers	1 2 3 4 5 6 7	___	___	___	___	_____/_____
7. Agricultural customers	1 2 3 4 5 6 7	___	___	___	___	_____/_____
8. Other (*Specify*) _____	1 2 3 4 5 6 7	___	___	___	___	_____/_____

Note: The total of all metered and unmetered connections should be the same as the current active connections reported in question 11(B).

BOX 2 - BILLING STRUCTURE

Metered Charges

CODE	Billing Structure
1	Uniform rate
2	Declining block rate
3	Increasing block rate
4	Peak period rate (e.g., seasonal)

Unmetered Charges

CODE	Billing Structure
5	Separate flat rate for water
6	Combined flat rate for water and other services (e.g., rental fees, association fees, pad fees)

Other Type of Charges

CODE	Billing structure
7	Other *(Specify)*_____

32. How many gallons (or dollar equivalents) of uncompensated usage did your water system have in the last year for each of the usage categories listed below:

UNCOMPENSATED USAGE CATEGORY	Uncompensated usage (Enter either millions of gallons or dollar equivalent, if gallons unknown)
1. Free service to municipal buildings and parks	_____million gals. *or* $_____
2. Fire protection, street cleaning, hydrant flushing	_____million gals. *or* $_____
3. Leaks, breaks, failed meters	_____million gals. *or* $_____
4. Uncollected bills	_____million gals. *or* $_____
5. Other *(Specify)*_____	_____million gals. *or* $_____

The next question is intended to account for all of your drinking water expenses. Please list your:

- ⇛ Routine operating expenses in Part A;
- ⇛ Capital-related expenses (including interest or principal repayment) in Part B; and
- ⇛ Other expenses in Part C.

33A. Please enter the routine operating expenses of your drinking water system in the last year, according to the operating expense categories listed below:

PART A
OPERATING EXPENSES

		Last year's expenses
	DIRECT COMPENSATION (wages, salaries, bonuses, etc.):	
1.	Managers	$_____
2.	Operators	$_____
3.	Others	$_____
4.	Benefits (health & insurance premiums, FICA, FUTA, and pension contributions)	$_____
	ENERGY COSTS:	
5.	Electricity	$_____
6.	Other energy (gas, oil, etc.)	$_____
	CHEMICALS:	
7.	Disinfectants	$_____
8.	Precipitant chemicals	$_____
9.	Other chemicals	$_____
10.	Materials and supplies	$_____
11.	Outside analytical lab services	$_____
12.	Other outside contractor services	$_____
13.	Depreciation expenses	$_____
14.	Water purchase expense ❑ raw water ❑ treated water	$_____
15.	Payments in lieu of taxes or other cash transfers out	$_____
16.	Other operating expenses (general and administrative expenses not reported elsewhere)	$_____
17.	TOTAL ALL OPERATING EXPENSES	$_____

B. Please enter the amount of debt service expenditures for your drinking water system in the last year.

PART B
DEBT SERVICE EXPENDITURES

18.	Interest payments	$_____
19.	Principal payments	$_____
20.	Other debt service expenditures (Specify) _____	$_____
21.	TOTAL ALL DEBT SERVICE EXPENDITURES	$_____

C. Please enter the amount of other expenses (excluding operating and debt service expenses reported in Parts A and B) for your drinking water system in the last year.

PART C
OTHER EXPENSES

22.	Capital improvements (e.g., expansion, new treatment)	$_____
23.	Advance contributions to sinking funds	$_____
24.	Other (Specify) _____	$_____
25.	TOTAL OTHER EXPENSES	$_____
26.	TOTAL ALL EXPENSES (FROM PARTS A - C)	$_____

ASSETS, LIABILITIES, DEBT

34. Please provide the following information on your drinking water system's total assets and liabilities, outstanding debt, and total capital reserve fund.

		Amount at end of last year
1.	TOTAL ASSETS	$
2.	TOTAL LIABILITIES	$
	TOTAL DEBT OUTSTANDING:	
	DIRECT NET DEBT (*see definition below*):	
3.	Due within 5 years	$
4.	Longer than 5 years	$
5.	Revenue Bond Debt	$
6.	All Other Debt	$
7.	TOTAL CAPITAL RESERVE FUND	$

DEFINITION:
Direct Net Debt - Gross direct debt (owed directly by a jurisdiction) less debt that is self-supporting (revenue bonds) and double-barreled bonds (general obligation bonds secured by earmarked revenues which flow outside the general fund).

CAPITAL INVESTMENT

35. Have you paid for major capital improvements, repairs or expansion since January 1, 1987?

1 Yes
2 No → Go to Question 37

36. What sources of funds did you use to pay for these major capital improvements, repairs, or expansion?

SOURCE OF FUNDS FOR CAPITAL INVESTMENT	Was this source of funds used since 1/1/87? YES	NO	If YES, how much was secured or provided for each of the following? Water quality improvement	Replacement or major repairs	System expansion
Debt Financing					
1. Revenue or industrial development bond	1	2	$_____	$_____	$_____
2. General obligation bond	1	2	$_____	$_____	$_____
3. Bank loan	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED LOAN:					
4. Rural Development Administration (RDA)	1	2	$_____	$_____	$_____
5. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
6. State Agencies (*Specify*) _____	1	2	$_____	$_____	$_____
Other Sources of Funds					
7. Payment from capital reserve fund . . .	1	2	$_____	$_____	$_____
8. Special assessment	1	2	$_____	$_____	$_____
9. Cash flow from current revenues. . . .	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED GRANT:					
10. Rural Development Administration (RDA)	1	2	$_____	$_____	$_____
11. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
12. Other (*Specify*) _____	1	2	$_____	$_____	$_____

37. Have you ever had to reduce or cancel plans for major capital improvements, repairs, or expansion of your drinking water system because you were unable to secure an adequate loan from any source; and if so, what was the amount of the loan sought?

	Amount of Loan	Reason for Loan Denial (if known)
1 Yes →	$_____	_____
2 No		

IF YOU HAVE **NOT** USED BONDS FOR FINANCING, GO TO QUESTION 40.

38. Have your bonds ever been rated by a rating service?

▼

1 Yes

2 No → Go to Question 39C

39A. What was your system's latest bond rating?

RATING SERVICE	▼ Rating
Moody's	/__/__/__/__/__/ (e.g., Baa1)
Standard and Poor's	/__/__/__/__/__/ (e.g., BBB+)
Other (*Specify*) _____	_____

39B. What was the year of your system's latest bond rating?

▼

19 _____

39C. What was the type of bond that was last issued by your system?
(Circle one number)

▼

1 Revenue or industrial development bond

2 General obligation bond

3 Other (Specify) _____

40. Please enter any additional comments (optional):

_____

_____

_____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE. YOUR TIME AND EFFORT ARE GREATLY APPRECIATED. MAILING INSTRUCTIONS ARE INSIDE THE FRONT COVER.

APPENDIX D

Private CWSS Mail Questionnaire

OMB No.: 2040-0173

Expires: 7/31/97

United States
Environmental Protection Agency

SURVEY OF PRIVATE

COMMUNITY WATER SYSTEMS

12/28/94

Please return this questionnaire in the enclosed postage-paid envelope

or mail to:

EPA Community Water Systems Survey
1650 Research Boulevard
Room GA 45
Rockville, MD 20850-9973

The following questionnaire is estimated to require 45 minutes to an hour to complete.
This includes time for reviewing instructions, gathering and reporting the requested data, and reviewing the questionnaire.
Send comments regarding the burden estimate or any other aspect of this survey, indicating suggestions for reducing this burden, to:
Chief, Information Policy Branch, 2136 • U.S. Environmental Protection Agency • 401 M Street, S.W. • Washington, DC 20460, and
Desk Officer for EPA • Office of Information and Regulatory Affairs • Office of Management and Budget • Washington, DC 20503.

Please respond about:

If you have any questions about the survey or how to complete the questionnaire, please call:

Please return your completed questionnaire in the enclosed postage-paid envelope by March 10, 1995.

1994 Community Water Systems Survey: Private Systems Questionnaire

GENERAL INSTRUCTIONS

This questionnaire asks three preliminary questions and then is divided into two major parts:

PART I - OPERATING CHARACTERISTICS (Questions 4-27); and
PART II - FINANCIAL CHARACTERISTICS (Questions 28-40).

Please complete the questionnaire as follows:

- In Question 1, provide the best contact person for each part (I and II);
- In Question 2, indicate the latest full-year reporting periods for which your operating information, and financial information are available;
- In Part I of the questionnaire, use the period indicated in Question 2(A) to report "last year's" operating data; and in Part II, use the period indicated in Question 2(B) to report "last year's" financial data;
- In Part II of the questionnaire, record dollar amounts as whole dollars;
- **Please record your answers for the questionnaire by filling in the blank(s) or circling the appropriate number(s) for each item; and**
- Make a copy of the completed questionnaire for your records before sealing it in the enclosed envelope.

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

▼

(A) PART I - OPERATING CHARACTERISTICS:

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

▼

(B) PART II - FINANCIAL CHARACTERISTICS
(Write "SAME" if same as above)

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

2. Please specify the end date of the most recent 12-month reporting period for which your drinking water system can provide operating and financial information.

	▼ Can be reported for the 12 months ending
(A) Operating information	_____/_____/_____
(B) Financial information	_____/_____/_____

3. Please indicate, by circling the appropriate numbers in columns A, B, and C, whether the organizations or people listed below provide your drinking water system with:

(A) Information on drinking water requirements and guidance;
(B) Operator training; and
(C) Technical assistance.
(Circle all numbers that apply for each information source)

	INFORMATION SOURCE	▼ (A) Source providing information on drinking water requirements and guidance	▼ (B) Source providing operator training	▼ (C) Source providing technical assistance
1.	State Department of Natural Resources, state Health Department, or state EPA	1	2	3
2.	Other state government departments or extension services	1	2	3
3.	U.S. Environmental Protection Agency	1	2	3
4.	Other federal agencies or extension services (e.g., FmHA, Rural Development Administration)	1	2	3
5.	County government	1	2	3
6.	Local government	1	2	3
7.	State rural water associations	1	2	3
8.	Other associations	1	2	3
9.	Rural community assistance program	1	2	3
10.	Contracted engineering services	1	2	3
11.	Citizen volunteers	1	2	3
12.	Electronic bulletin boards	1	2	3
13.	Technical publications	1	2	3
14.	Radio or television	1	2	3
15.	Local newspapers	1	2	3
16.	Federal register	1	2	3
17.	Other *(Please specify)*_____	1	2	3
18.	_____	1	2	3

PART I - OPERATING CHARACTERISTICS

PRODUCTION AND STORAGE

4. For each type of water source listed below, please indicate which ones you use and:

   (A) the number of gallons (in millions of gallons) produced in the last year (i.e., the amount of water going into the distribution system); and
   (B) the number of water intake points with disinfection.

WATER SOURCE	Do you obtain water from this source? YES	NO	If YES, enter the number of: (A) Gallons produced in the last year (in millions)	(B) Number of intake points with disinfection
Ground water	1	2	_____	_____
Surface water	1	2	_____	_____
Water purchased from other systems	1	2	_____	_____

5. What was your system's peak daily production of non-purchased drinking water during the past year, and what is the system's maximum daily treatment design capacity?

	Gallons per day
(A) Peak daily production	_____
(B) Maximum daily treatment design capacity	_____

6. You reported your system's maximum daily treatment design capacity in Part B of Question 5. There are several possible factors that may have resulted in a maximum capacity of this size. Some possibilities are listed below. Please circle the number to the right of each factor that indicates how important that factor was in determining your system's maximum design capacity.

Factor Determining Maximum Design Capacity	How important was this factor? Very Important →	→			Not important at all
1. Current peak needs (beyond average daily flow)	1	2	3	4	5
2. Seasonal demand (e.g., irrigation)	1	2	3	4	5
3. Emergency flows (e.g., fire, drought)	1	2	3	4	5
4. Expected growth.	1	2	3	4	5
5. Limited choice in package plant sizes.	1	2	3	4	5
6. Other *(Please specify)*_____	1	2	3	4	5

7. Do you have treated water storage?

▼

1 Yes

2 No → Go to Question 9

8. Please indicate whether you have the following types of treated water storage listed below; and if so, for each type of storage:

(A) how many tanks do you have;
(B) what is their storage capacity (in millions of gallons); and
(C) do you disinfect water in these tanks after storage?

TYPE OF TREATED WATER STORAGE	Does your water system have this type of treated water storage? YES	NO	If YES, complete the following: (A) Number of tanks	(B) Total storage capacity (in millions of gallons)	(C) Disinfect after storage? YES	NO
GROUND LEVEL OR SUB-SURFACE STORAGE						
Natural materials (e.g., wood, earth):						
1. Uncovered	1	2	_____	_____	1	2
2. Covered	1	2	_____	_____	1	2
Synthetic materials (e.g., steel, concrete):						
3. Uncovered	1	2	_____	_____	1	2
4. Covered	1	2	_____	_____	1	2
ELEVATED STORAGE						
Natural materials (e.g., wood):						
5. Uncovered	1	2	_____	_____	1	2
6. Covered	1	2	_____	_____	1	2
Synthetic materials (e.g., steel):						
7. Uncovered	1	2	_____	_____	1	2
8. Covered	1	2	_____	_____	1	2

DISTRIBUTION

9. Please indicate the types of pipe used in your distribution system. For each type of pipe, what is the number of:

(A) miles (or feet) of existing pipe;
(B) miles (or feet) of pipe replaced in the last year;
(C) water main repairs in the last year; and
(D) months between flushes for that type of pipe.

TYPE OF PIPE	Does your distribution system have this type of pipe? YES	NO	If YES, enter the number of: (A) Miles or feet (specify which) of existing pipe	Miles or feet? (Circle M or F)	(B) Miles or feet (specify which) of pipe replaced in the last year	Miles or feet? (Circle M or F)	(C) Water main repairs in the last year for type of pipe	(D) Months between flushes for type of pipe
IRON:								
1. w/ Cement Lining.	1	2	_____	M F	_____	M F	_____	_____
2. w/o Cement Lining	1	2	_____	M F	_____	M F	_____	_____
ASBESTOS CEMENT:								
3. w/ Vinyl.	1	2	_____	M F	_____	M F	_____	_____
4. w/o Vinyl.	1	2	_____	M F	_____	M F	_____	_____
5. PVC	1	2	_____	M F	_____	M F	_____	_____
6. Other plastic	1	2	_____	M F	_____	M F	_____	_____
7. Other *(Please specify)* _____.	1	2	_____	M F	_____	M F	_____	_____

10. How many miles (or feet) of new pipe (for expansion purposes) have you installed in the last 5 years? Enter response for either miles <u>or</u> feet, but not both.
(If zero, enter "0")

_____ MILES OF NEW PIPE **<u>OR</u>** _____ FEET OF NEW PIPE

11. How many people and connections does your system currently serve with piped drinking water, and how many did it serve 5 years ago?
(Please estimate if you don't know the exact number.)

> **NOTE:**
>
> If your system serves a population that changes on a seasonal basis (for example, a winter or summer resort area), please indicate the highest seasonal number of people served or active connections.

		▼ Currently	▼ 5 years ago
(A)	PEOPLE SERVED WITH PIPED DRINKING WATER	_____	_____
(B)	ACTIVE CONNECTIONS WITH PIPED DRINKING WATER	_____	_____

12. What are the ZIP codes of your service area? *(If your system's service area covers more than 10 ZIP codes, record only the first 3 digits of the ZIP code(s), i.e., all ZIP codes covered by the same 3 starting digits can be summarized as one ZIP code by recording the first 3 digits.)*

▼

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

OR

FIRST 3 DIGITS OF ZIP CODES *(For systems whose service area covers more than 10 ZIP codes)*

___XX ___XX ___XX ___XX ___XX

OPERATOR TRAINING

13. Do you have any drinking water treatment plant operators currently employed by your system?

▼

1 Yes

2 No → Go to Question 15

14. Please indicate whether the treatment plant operators you employ have attained any of the training level categories listed below. Provide the number of operators and average operator work week (in hours) for each applicable training level category:

TRAINING LEVEL CATEGORY	Do you employ drinking water treatment operators who have attained this training level category? YES	NO	If "YES" How many operators do you have? (Number)	Average hours per week per operator: Treatment Duties (Hrs)	Other Drinking Water Duties (Hrs)
STATE CERTIFIED (i.e., with state-approved certified training for drinking water)					
- Full time operator(s) [Definition: Works at least 35 hours a week]	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, state certified operators	1	2	_____	_____	_____
TRAINED THROUGH A NATIONAL OR STATE PROGRAM, BUT NOT STATE CERTIFIED					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, trained operators	1	2	_____	_____	_____
OTHER TRAINING LEVEL (e.g., on-the-job training)					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time operators not classified above	1	2	_____	_____	_____

WATER SOURCES AND TREATMENT

15. Is your water system interconnected to another system that you can use for emergency purposes (e.g., hot summers)?

1 Yes
2 No

16. If your primary source of drinking water became permanently unusable due to contamination, please indicate whether or not you would adopt any of the solutions listed below:

SOLUTION	If primary water sources became unusable, would you adopt this solution? YES	NO
1. Draw more heavily upon other sources on the present system	1	2
2. Draw upon another system to which you are now connected	1	2
3. Draw upon alternative sources (e.g., hook up to another system)	1	2
4. Implement a water management plan (e.g., rationing)	1	2
5. Drill new well(s)	1	2
6. Curtail service	1	2
7. Other *(Please specify)*_____	1	2

17. If you are currently interconnected to your long term alternate water source, check the box indicated and go to Question 18.

☐ Currently interconnected → Go to Question 18

If you have no long term alternate water source(s), check the box indicated and go to Question 18.

☐ No long term alternate water source(s) → Go to Question 18

What is the name of your long term alternate water source(s) and how many miles is it from the nearest connection point on your current system?

Name of long term alternate water source(s)	Distance from system *(to nearest mile)*	If distance is **under one mile,** please estimate distance **in feet**
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

18. Please supply the following information for each treatment facility. The term "treatment facility" refers to any place where water is treated prior to delivery to customers. *(If you have more than five facilities, please check here ❑. Record the information about the additional facilities on a photocopy of this page or use a blank sheet of your own.)*

▼ FACILITY NAME	LOCATION OF FACILITY: (Enter latitude and longitude from local plat map or permit) Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Ground Water Sources: Number of wells treated	Range of well depths (in feet)	Combined average daily flow (gal/day)	Combined potential daily flow (gal/day)	Surface Water Sources: Combined surface water intakes (gal/day)	Combined average daily flow (gal/day)	Treatments provided (Enter code(s) from Box 1)
1. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
2. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
3. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
4. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__
5. _____	__ __ __	__ __ __	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|__

BOX 1 - WATER TREATMENT CODES

CODE	Treatment
01	Raw water storage
02	Presedimentation
03	Aeration
	PRE-DISINFECTION/OXIDATION:
04	Chlorine
05	Chlorine dioxide
06	Chloramines
07	Ozone
08	$KMnO_4$
09	Pre-disinfection/oxidation combinations
10	Lime/Soda ash softening
11	Recarbonation with CO_2
	IRON AND MANGANESE REMOVAL:
12	Green sand filtration
13	Chemical oxidation filtration
14	Aeration filtration
	FLOCCULATION/COAGULATION:
15	Aluminum salt
16	Iron salts
17	pH adjustment
18	Activated silica
19	Clays
20	Polymers
21	Other flocculation/coagulation
22	Flocculation/coagulation combinations
	FILTRATION:
23	Slow sand
24	Rapid sand
25	Dual/Multi-media
26	Diatomaceous earth
27	Reverse osmosis
28	Pressure filtration
29	Other filtration
30	Filtration combinations
	ORGANICS REMOVAL:
31	GAC adsorption post contactors
32	GAC adsorption filter adsorbers
33	PAC addition
34	Ion exchange
35	Air stripping
36	Organics removal combinations
	POST-DISINFECTION:
37	Chlorine
38	Chlorine dioxide
39	Chloramines
40	Post-disinfection combinations
41	Fluoridation
42	Hypochlorination
	CORROSION CONTROL:
43	pH adjustment
44	Alkalinity adjustment
45	Corrosion inhibitors
46	Corrosion control combinations
	OTHER TREATMENTS NOT ELSEWHERE CLASSIFIED:
47	(Please specify) _____

19. Are there places in your distribution system other than those reported in your answer to question 8C (storage) or question 18 (treatment facilities) where you boost disinfectant residuals?

▼

1 Yes
2 No

20. Please supply the following information for each well or surface water intake not receiving treatment (include only sources that were active in 1994). If you have more than five wells and intakes, please check here ❑. *(Record the information about the additional wells and intakes on a photocopy of this page or use a blank sheet of your own.)*

▼

AQUIFER OR SURFACE WATER SOURCE NAME *(e.g, Ogalala Aquifer or Ohio River)*	SOURCE TYPE *(enter G for Ground or S for Surface)*	LOCATION OF WELL OR INTAKE: *(Enter latitude and longitude from local plat map or permit)* Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Average flow *(Gal/day)*	If well, please list: Potential flow *(Gal/day)*	Well depth *(feet)*
1._____	____	__ __ __	___ __ __	_____	_____	____
2._____	____	__ __ __	___ __ __	_____	_____	____
3._____	____	__ __ __	___ __ __	_____	_____	____
4._____	____	__ __ __	___ __ __	_____	_____	____
5._____	____	__ __ __	___ __ __	_____	_____	____

SOURCE WATER PROTECTION

21. Does your drinking water system participate in a source-water or wellhead protection program?

▼

1 Yes
2 No → Go to Question 25

22. Please indicate whether or not the following measures are being adopted in your source-water or wellhead protection program:

▼

MEASURE	Is this measure adopted in your source-water or wellhead protection program? YES	NO
1. Education on land use impacts	1	2
2. Ownership of a watershed	1	2
3. Zoning or land use controls	1	2
4. Best Management Practices (such as run-off controls, fertilizer scheduling, less toxic road maintenance materials)	1	2
5. Other *(Please specify)*_____	1	2

23. Who leads or manages this program?
(Circle only one number)

▼

1 Local government

2 Regional authority (e.g., Section 208 Agency)

3 State agency

4 Other *(Please specify)*_____

24. How is the management area delineated?
(Circle all numbers that apply and fill in the blanks if 3, 4 or 5 is circled)

▼

1 By watershed boundaries

2 By aquifer boundaries

3 By a fixed radius around well of _____ feet

4 By a fixed distance from a surface water body of _____ feet

5 Other *(Please specify)* _____

25. Please indicate if any of the potential sources of contamination listed below exist within 2 miles of your water supply intakes:

▼

	POTENTIAL SOURCE OF CONTAMINATION	Does this potential source of contamination exist within 2 miles of your water supply? YES	NO
1.	Industrial or manufacturing facilities	1	2
2.	Agricultural runoff	1	2
3.	Animal feed lots	1	2
4.	Urban runoff	1	2
5.	Sewage discharge	1	2
6.	Hazardous waste site	1	2
7.	Solid waste disposal	1	2
8.	Nitrates	1	2
9.	Pesticides, rodenticides, fungicides (e.g., mixing or storage facilities)	1	2
10.	Mining, oil, or gas activities	1	2
11.	Petroleum products (e.g., auto repair shops)	1	2
12.	Solvents (e.g., dry cleaners)	1	2
13.	Septic systems or other sewage discharges	1	2
14.	Other *(Please specify)*_____	1	2

26. Who performs laboratory analysis on your drinking water?

LAB ANALYSIS PROVIDER	Does this provider perform your lab analysis for ... Metals/ Inorganics? YES	NO	Microbials? YES	NO	VOCs*? YES	NO	Other Organics? YES	NO
The state.	1	2	1	2	1	2	1	2
A private firm.	1	2	1	2	1	2	1	2
In-house employees	1	2	1	2	1	2	1	2
Other *(Specify)*_____	1	2	1	2	1	2	1	2

**VOCs=Volatile organic compounds (e.g., carbon tetrachloride, benzine, THMs, etc.)*

27. How do you pay for your laboratory analysis?

PAYMENT METHOD	Do you use this payment method? YES	NO
Direct payment for tests to state or private lab.	1	2
Included as part of state permit	1	2
Don't pay.	1	2
Other *(Please specify)*_____	1	2

PART II - FINANCIAL INFORMATION

REVENUES AND EXPENSES

28. Are your financial reports or income and expense statements for your drinking water system completed in accordance to Generally Accepted Accounting Principles (GAAP)? *(Circle one number)*

1 Yes

2 No

3 Don't have separate income and expense statements for our drinking water system

4 Don't know

To simplify your task of providing financial information, please follow the guidelines below when filling out the remainder of the questionnaire.

PROVIDING ESTIMATES:

The following questions ask for information on drinking water supply operations, **exclusive of other activities** with other types of operations. Where possible, please provide exact information from your system's records. Otherwise **provide your best estimate** of financial information that is applicable to your drinking water system only.

ROUNDING:

Please record your dollar amounts <u>to the nearest dollar</u>. DO NOT record fractional dollars (i.e., dollars and cents).

29. During the last year [as defined in your response to Question 2(B)] what were your drinking water system's revenues from water sales for each of the following customer categories:
(If zero, enter "0")

WATER SALES CUSTOMER CATEGORIES	Water Sales Revenues	Gallons delivered (in millions)
1. Residential customers	$_____	_____
2. Commercial customers	$_____	_____
3. Industrial customers	$_____	_____
4. Wholesale customers (i.e., those who redistribute your water to other users)	$_____	_____
5. Local municipal government	$_____	_____
6. Other government customers	$_____	_____
7. Agricultural customers	$_____	_____
8. Other (*Specify*)_____	$_____	_____
9. TOTAL	$_____	_____

30. Please indicate your drinking water system's revenues during the last year from the other water-related revenue sources listed below.
(If zero, enter "0")

WATER RELATED REVENUE SOURCE (EXCLUDING WATER SALES)	Revenues
1. Connection fees	$_____
2. Inspection fees	$_____
3. Developer fees	$_____
4. Other fees	$_____
5. Interest earnings (on water fund, etc.)	$_____
Please specify other water system revenues (not elsewhere reported)	
6. _____	$_____
7. _____	$_____

31. For each customer category listed below, please identify your drinking water system's billing structure, indicate the year and percent of the two most recent rate increases, and provide the number of metered and unmetered active connections.
(If zero, enter "0")

	CUSTOMER CATEGORY	Billing structure *(Circle all code(s) from Box 2 that apply)*	Year and percent of two most recent rate increases YR.	%	YR.	%	Number of active connections Metered/Unmetered
1.	Residential customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
2.	Commercial customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
3.	Industrial customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
4.	Wholesale customers (i.e., those who redistribute your water to other users)	1 2 3 4 5 6 7	____	____	____	____	_____/_____
5.	Local municipal government	1 2 3 4 5 6 7	____	____	____	____	_____/_____
6.	Other government customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
7.	Agricultural customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
8.	Other (*Specify*) _____	1 2 3 4 5 6 7	____	____	____	____	_____/_____

Note: The total of all metered and unmetered connections should be the same as the current active connections reported in question 11(B).

BOX 2 - BILLING STRUCTURE

Metered Charges

CODE	Billing Structure
1	Uniform rate
2	Declining block rate
3	Increasing block rate
4	Peak period rate (e.g., seasonal)

Unmetered Charges

CODE	Billing Structure
5	Separate flat rate for water
6	Combined flat rate for water and other services (e.g., rental fees, association fees, pad fees)

Other Type of Charges

CODE	Billing structure
7	Other *(Specify)*_____

32. How many gallons (or dollar equivalents) of uncompensated usage did your water system have in the last year for each of the usage categories listed below:

UNCOMPENSATED USAGE CATEGORY	Uncompensated usage (Enter either millions of gallons or dollar equivalent, if gallons unknown)
1. Free service to municipal buildings and parks	_____million gals. *or* $_____
2. Fire protection, street cleaning, hydrant flushing	_____million gals. *or* $_____
3. Leaks, breaks, failed meters	_____million gals. *or* $_____
4. Uncollected bills	_____million gals. *or* $_____
5. Other *(Specify)*_____	_____million gals. *or* $_____

The next question is intended to account for all of your drinking water system expenses. Please list your:

- Routine operating expenses in Part A;
- Capital-related expenses (including interest or principal repayment) in Part B; and
- Other expenses in Part C.

33A. *Please enter the routine operating expenses* of your drinking water system in the last year, according to the operating expense categories listed below:

PART A
OPERATING EXPENSES

		Last year's expenses
	DIRECT COMPENSATION (wages, salaries, bonuses, etc.):	
1.	Managers	$
2.	Operators	$
3.	Others	$
4.	Benefits (health & insurance premiums, FICA, FUTA, and pension contributions)	$
	ENERGY COSTS:	
5.	Electricity	$
6.	Other energy (gas, oil, etc.)	$
	CHEMICALS:	
7.	Disinfectants	$
8.	Precipitant chemicals	$
9.	Other chemicals	$
10.	Materials and supplies	$
11.	Outside analytical lab services	$
12.	Other outside contractor services	$
13.	Depreciation expenses	$
14.	Water purchase expense ☐ raw water ☐ treated water	$
15.	Other operating expenses (general and administrative expenses not reported elsewhere)	$
	ALL TAXES: (income, property, etc.)	
16.	Federal taxes	$
17.	State taxes	$
18.	Local taxes	$
19.	TOTAL ALL OPERATING EXPENSES	$

B. Please enter the amount of debt service expenditures for your drinking water system in the last year.

PART B
DEBT SERVICE EXPENDITURES

20.	Interest payments	$
21.	Principal payments	$
22.	Other debt service expenditures (Specify) _____	$
23.	TOTAL ALL DEBT SERVICE EXPENDITURES	$

C. Please enter the amount of other expenses (excluding operating and debt service expenses reported in Parts A and B) for your drinking water system in the last year.

PART C
OTHER EXPENSES

24.	Capital improvements (e.g., expansion, new treatment)	$
25.	Advance contributions to sinking funds	$
26.	Other (Specify) _____	$
27.	TOTAL OTHER EXPENSES	$
28.	TOTAL ALL EXPENSES (FROM PARTS A - C)	$

ASSETS, LIABILITIES, DEBT

34. Please provide the following information on your drinking water system's total assets and liabilities, outstanding debt, and total capital reserve fund.

		Amount at end of last year
1.	TOTAL ASSETS	$
2.	TOTAL LIABILITIES	$
	TOTAL DEBT OUTSTANDING:	
3.	Due within 5 years	$
4.	Longer than 5 years	$
5.	TOTAL CAPITAL RESERVE FUND	$

CAPITAL INVESTMENT

35. Have you paid for major capital improvements, repairs or expansion since January 1, 1987?

1 Yes

2 No → Go to Question 37

36. What sources of funds did you use to pay for these major capital improvements, repairs, or expansion?

SOURCE OF FUNDS FOR CAPITAL INVESTMENT	Was this source of funds used since 1/1/87? YES	NO	If YES, how much was secured or provided for each of the following? Water quality improvement	Replacement or major repairs	System expansion
Debt Financing					
1. Revenue or industrial development bond	1	2	$_____	$_____	$_____
2. Company bond	1	2	$_____	$_____	$_____
3. Bank loan	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED LOAN:					
4. Small Business Administration . . .	1	2	$_____	$_____	$_____
5. Rural Development Administration (RDA).	1	2	$_____	$_____	$_____
6. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
7. State Agencies (*Specify*) _____	1	2	$_____	$_____	$_____
Other Sources of Funds					
8. Payment from capital reserve fund . . .	1	2	$_____	$_____	$_____
9. Special assessment	1	2	$_____	$_____	$_____
10. Stock issue	1	2	$_____	$_____	$_____
11. Cash flow from current revenues. . . .	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED GRANT:					
12. Rural Development Administration (RDA)	1	2	$_____	$_____	$_____
13. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
14. Other (*Please specify*) _____	1	2	$_____	$_____	$_____

37. Have you ever had to reduce or cancel plans for major capital improvements, repairs, or expansion of your drinking water system because you were unable to secure an adequate loan from any source; and if so, what was the amount of the loan sought?

▼	Amount of Loan	Reason for Loan Denial (if known)
1 Yes →	$_____	_____
2 No		

IF YOU HAVE **NOT** USED BONDS FOR FINANCING, GO TO QUESTION 40.

38. Have your bonds ever been rated by a rating service?

▼

1 Yes

2 No → Go to Question 39C

39A. What was your system's latest bond rating?

RATING SERVICE	▼ Rating
Moody's	/___/___/___/___/ (e.g., Baa1)
Standard and Poor's	/___/___/___/___/ (e.g., BBB+)
Other (*Specify*) _____	_____

39B. What was the year of your system's latest bond rating?

▼

19 _____

39C. What was the type of bond that was last issued by your system?
(Circle one number)

▼

1 Revenue or industrial development bond

3 Company bond

4 Other (Specify) _____

40. Please enter any additional comments (optional):

_____

_____

_____

_____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE. YOUR TIME AND EFFORT ARE GREATLY APPRECIATED. MAILING INSTRUCTIONS ARE INSIDE THE FRONT COVER.

APPENDIX E

Ancillary CWSS Mail Questionnaire

OMB No.: 2040-0173
Expires: 7/31/97

United States
Environmental Protection Agency

SURVEY OF COMMUNITY WATER SYSTEMS OPERATED IN CONJUNCTION WITH MOBILE HOME PARKS OR OTHER BUSINESSES

12/28/94

Please return this questionnaire in the enclosed postage-paid envelope

or mail to:

EPA Community Water Systems Survey
1650 Research Boulevard
Room GA 45
Rockville, MD 20850-9973

The following questionnaire is estimated to require 45 minutes to an hour to complete.
This includes time for reviewing instructions, gathering and reporting the requested data, and reviewing the questionnaire.
Send comments regarding the burden estimate or any other aspect of this survey, indicating suggestions for reducing this burden, to:
Chief, Information Policy Branch, 2136 • U.S. Environmental Protection Agency • 401 M Street, S.W. • Washington, DC 20460, and
Desk Officer for EPA • Office of Information and Regulatory Affairs • Office of Management and Budget • Washington, DC 20503.

Please respond about:

If you have any questions about the survey or how to complete the questionnaire, please call:

Please return your completed questionnaire in the enclosed postage-paid envelope by March 10, 1995.

1994 Community Water Systems Survey: Questionnaire for Systems Operated in Conjuction With Mobile Home Parks Or Other Businesses

GENERAL INSTRUCTIONS

This questionnaire asks three preliminary questions and then is divided into two major parts:

PART I - OPERATING CHARACTERISTICS (Questions 4-27); and
PART II - FINANCIAL CHARACTERISTICS (Questions 28-40).

Please complete the questionnaire as follows:

- In Question 1, provide the best contact person for each part (I and II);
- In Question 2, indicate the latest full-year reporting periods for which your operating information, and financial information are available;
- In Part I of the questionnaire, use the period indicated in Question 2(A) to report "last year's" operating data; and in Part II, use the period indicated in Question 2(B) to report "last year's" financial data;
- In Part II of the questionnaire, record dollar amounts as whole dollars;
- **Please record your answers for the questionnaire by filling in the blank(s) or circling the appropriate number(s) for each item; and**
- Make a copy of the completed questionnaire for your records before sealing it in the enclosed envelope.

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

▼

(A) PART I - OPERATING CHARACTERISTICS:

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

▼

(B) PART II - FINANCIAL CHARACTERISTICS
(Write "SAME" if same as above)

Name: _____ Title: _____

Tel. No. (_____)_____-_____ Fax No. _____-_____

2. Please specify the end date of the most recent 12-month reporting period for which your drinking water system can provide operating and financial information.

	▼ Can be reported for the 12 months ending
(A) Operating information	_____/_____/_____
(B) Financial information	_____/_____/_____

3. Please indicate, by circling the appropriate numbers in columns A, B, and C, whether the organizations or people listed below provide your drinking water system with:

(A) Information on drinking water requirements and guidance;
(B) Operator training; and
(C) Technical assistance.
(Circle all numbers that apply for each information source)

	INFORMATION SOURCE	▼ (A) Source providing information on drinking water requirements and guidance	▼ (B) Source providing operator training	▼ (C) Source providing technical assistance
1.	State Department of Natural Resources, state Health Department, or state EPA	1	2	3
2.	Other state government departments or extension services	1	2	3
3.	U.S. Environmental Protection Agency	1	2	3
4.	Other federal agencies or extension services (e.g., FmHA, Rural Development Administration)	1	2	3
5.	County government	1	2	3
6.	Local government	1	2	3
7.	State rural water associations	1	2	3
8.	Other associations	1	2	3
9.	Rural community assistance program	1	2	3
10.	Contracted engineering services	1	2	3
11.	Citizen volunteers	1	2	3
12.	Electronic bulletin boards	1	2	3
13.	Technical publications	1	2	3
14.	Radio or television	1	2	3
15.	Local newspapers	1	2	3
16.	Federal register	1	2	3
17.	Other *(Please specify)*_____	1	2	3
18.	_____	1	2	3

PART I - OPERATING CHARACTERISTICS

PRODUCTION AND STORAGE

4. For each type of water source listed below, please indicate which ones you use and:

   (A) the number of gallons (in millions of gallons) produced in the last year (i.e., the amount of water going into the distribution system); and
   (B) the number of water intake points with disinfection.

WATER SOURCE	Do you obtain water from this source? YES	NO	If YES, enter the number of: (A) Gallons produced in the last year (in millions)	(B) Number of intake points with disinfection
Ground water	1	2	_____	_____
Surface water	1	2	_____	_____
Water purchased from other systems	1	2	_____	_____

5. What was your system's peak daily production of non-purchased drinking water during the past year, and what is the system's maximum daily treatment design capacity?

	Gallons per day
(A) Peak daily production	_____
(B) Maximum daily treatment design capacity	_____

6. You reported your system's maximum daily treatment design capacity in Part B of Question 5. There are several possible factors that may have resulted in a maximum capacity of this size. Some possibilities are listed below. Please circle the number to the right of each factor that indicates how important that factor was in determining your system's maximum design capacity.

Factor Determining Maximum Design Capacity	How important was this factor? Very Important →	→			Not important at all
1. Current peak needs (beyond average daily flow)	1	2	3	4	5
2. Seasonal demand (e.g., irrigation)	1	2	3	4	5
3. Emergency flows (e.g., fire, drought)	1	2	3	4	5
4. Expected growth.	1	2	3	4	5
5. Limited choice in package plant sizes.	1	2	3	4	5
6. Other *(Please specify)*_____	1	2	3	4	5

7. Do you have treated water storage?

▼

1 Yes

2 No → Go to Question 9

8. Please indicate whether you have the following types of treated water storage listed below; and if so, for each type of storage:

(A) how many tanks do you have;
(B) what is their storage capacity (in millions of gallons); and
(C) do you disinfect water in these tanks after storage?

TYPE OF TREATED WATER STORAGE	Does your water system have this type of treated water storage?		If YES, complete the following:			
			(A) Number of tanks	(B) Total storage capacity (in millions of gallons)	(C) Disinfect after storage?	
	YES	NO			YES	NO
GROUND LEVEL OR SUB-SURFACE STORAGE						
Natural materials (e.g., wood, earth):						
1. Uncovered	1	2	____	_____	1	2
2. Covered	1	2	____	_____	1	2
Synthetic materials (e.g., steel, concrete):						
3. Uncovered	1	2	____	_____	1	2
4. Covered	1	2	____	_____	1	2
ELEVATED STORAGE						
Natural materials (e.g., wood):						
5. Uncovered	1	2	____	_____	1	2
6. Covered	1	2	____	_____	1	2
Synthetic materials (e.g., steel):						
7. Uncovered	1	2	____	_____	1	2
8. Covered	1	2	____	_____	1	2

DISTRIBUTION

9. Please indicate the types of pipe used in your distribution system. For each type of pipe, what is the number of:

(A) miles (or feet) of existing pipe;
(B) miles (or feet) of pipe replaced in the last year;
(C) water main repairs in the last year; and
(D) months between flushes for that type of pipe.

TYPE OF PIPE	Does your distribution system have this type of pipe? YES	NO	If YES, enter the number of: (A) Miles or feet (specify which) of existing pipe	Miles or feet? (Circle M or F)	(B) Miles or feet (specify which) of pipe replaced in the last year	Miles or feet? (Circle M or F)	(C) Water main repairs in the last year for type of pipe	(D) Months between flushes for type of pipe
IRON:								
1. w/ Cement Lining.	1	2	_____	M F	_____	M F	_____	_____
2. w/o Cement Lining	1	2	_____	M F	_____	M F	_____	_____
ASBESTOS CEMENT:								
3. w/ Vinyl	1	2	_____	M F	_____	M F	_____	_____
4. w/o Vinyl	1	2	_____	M F	_____	M F	_____	_____
5. PVC	1	2	_____	M F	_____	M F	_____	_____
6. Other plastic	1	2	_____	M F	_____	M F	_____	_____
7. Other *(Please specify)* _____.	1	2	_____	M F	_____	M F	_____	_____

10. How many miles (or feet) of new pipe (for expansion purposes) have you installed in the last 5 years? Enter response for either miles <u>or</u> feet, but not both.
(If zero, enter "0")

_____ MILES OF NEW PIPE **OR** _____ FEET OF NEW PIPE

11. How many people and connections does your system currently serve with piped drinking water, and how many did it serve 5 years ago?
(Please estimate if you don't know the exact number.)

> **NOTE:**
>
> If your system serves a population that changes on a seasonal basis (for example, a winter or summer resort area), please indicate the highest seasonal number of people served or active connections.

	▼ Currently	▼ 5 years ago
(A) PEOPLE SERVED WITH PIPED DRINKING WATER	_____	_____
(B) ACTIVE CONNECTIONS WITH PIPED DRINKING WATER	_____	_____

12. What are the ZIP codes of your service area? *(If your system's service area covers more than 10 ZIP codes, record only the first 3 digits of the ZIP code(s), i.e., all ZIP codes covered by the same 3 starting digits can be summarized as one ZIP code by recording the first 3 digits.)*

▼

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

OR

FIRST 3 DIGITS OF ZIP CODES *(For systems whose service area covers more than 10 ZIP codes)*

___XX ___XX ___XX ___XX ___XX

OPERATOR TRAINING

13. Do you have any drinking water treatment plant operators currently employed by your system?

▼
1 Yes
2 No → Go to Question 15

14. Please indicate whether the treatment plant operators you employ have attained any of the training level categories listed below. Provide the number of operators and average operator work week (in hours) for each applicable training level category:

TRAINING LEVEL CATEGORY	Do you employ drinking water treatment operators who have attained this training level category? YES	NO	If "YES" How many operators do you have? (Number)	Average hours per week per operator: Treatment Duties (Hrs)	Other Drinking Water Duties (Hrs)
STATE CERTIFIED (i.e., with state-approved certified training for drinking water)					
- Full time operator(s) [Definition: Works at least 35 hours a week]	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, state certified operators	1	2	_____	_____	_____
TRAINED THROUGH A NATIONAL OR STATE PROGRAM, BUT NOT STATE CERTIFIED					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time, trained operators	1	2	_____	_____	_____
OTHER TRAINING LEVEL (e.g., on-the-job training)					
- Full time operator(s) *(see definition above)*. .	1	2	_____	_____	_____
- Part time operator(s) who also operate other drinking water plants (e.g., "circuit riders") .	1	2	_____	_____	_____
- Other part time operators not classified above	1	2	_____	_____	_____

WATER SOURCES AND TREATMENT

15. Is your water system interconnected to another system that you can use for emergency purposes (e.g., hot summers)?

1 Yes
2 No

16. If your primary source of drinking water became permanently unusable due to contamination, please indicate whether or not you would adopt any of the solutions listed below:

SOLUTION	If primary water sources became unusable, would you adopt this solution? YES	NO
1. Draw more heavily upon other sources on the present system	1	2
2. Draw upon another system to which you are now connected	1	2
3. Draw upon alternative sources (e.g., hook up to another system)	1	2
4. Implement a water management plan (e.g., rationing)	1	2
5. Drill new well(s)	1	2
6. Curtail service	1	2
7. Other *(Please specify)*_____	1	2

17. If you are currently interconnected to your long term alternate water source, check the box indicated and go to Question 18.

☐ Currently interconnected → Go to Question 18

If you have no long term alternate water source(s), check the box indicated and go to Question 18.

☐ No long term alternate water source(s) → Go to Question 18

What is the name of your long term alternate water source(s) and how many miles is it from the nearest connection point on your current system?

Name of long term alternate water source(s)	Distance from system *(to nearest mile)*	If distance is **under one mile,** please estimate distance **in feet**
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

18. Please supply the following information for each treatment facility. The term "treatment facility" refers to any place where water is treated prior to delivery to customers. *(If you have more than five facilities, please check here ❑. Record the information about the additional facilities on a photocopy of this page or use a blank sheet of your own.)*

▼ FACILITY NAME	LOCATION OF FACILITY: (Enter latitude and longitude from local plat map or permit) Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Ground Water Sources: Number of wells treated	Range of well depths (in feet)	Combined average daily flow (gal/day)	Combined potential daily flow (gal/day)	Surface Water Sources: Combined surface water intakes (gal/day)	Combined average daily flow (gal/day)	Treatments provided (Enter code(s) from Box 1)
1. _____	__ __ __	___ ___ ___	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|
2. _____	__ __ __	___ ___ ___	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|
3. _____	__ __ __	___ ___ ___	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|
4. _____	__ __ __	___ ___ ___	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|
5. _____	__ __ __	___ ___ ___	____	____ to ____	_____	_____	_____	_____	__|__|__|__|__|

BOX 1 - WATER TREATMENT CODES

CODE	Treatment
01	Raw water storage
02	Presedimentation
03	Aeration
	PRE-DISINFECTION/OXIDATION:
04	Chlorine
05	Chlorine dioxide
06	Chloramines
07	Ozone
08	$KMnO_4$
09	Pre-disinfection/oxidation combinations
10	Lime/Soda ash softening
11	Recarbonation with CO_2
	IRON AND MANGANESE REMOVAL:
12	Green sand filtration
13	Chemical oxidation filtration
14	Aeration filtration
	FLOCCULATION/COAGULATION:
15	Aluminum salt
16	Iron salts
17	pH adjustment
18	Activated silica
19	Clays
20	Polymers
21	Other flocculation/coagulation
22	Flocculation/coagulation combinations
	FILTRATION:
23	Slow sand
24	Rapid sand
25	Dual/Multi-media
26	Diatomaceous earth
27	Reverse osmosis
28	Pressure filtration
29	Other filtration
30	Filtration combinations
	ORGANICS REMOVAL:
31	GAC adsorption post contactors
32	GAC adsorption filter adsorbers
33	PAC addition
34	Ion exchange
35	Air stripping
36	Organics removal combinations
	POST-DISINFECTION:
37	Chlorine
38	Chlorine dioxide
39	Chloramines
40	Post-disinfection combinations
41	Fluoridation
42	Hypochlorination
	CORROSION CONTROL:
43	pH adjustment
44	Alkalinity adjustment
45	Corrosion inhibitors
46	Corrosion control combinations
	OTHER TREATMENTS NOT ELSEWHERE CLASSIFIED:
47	(Please specify) _____

19. Are there places in your distribution system other than those reported in your answer to question 8C (storage) or question 18 (treatment facilities) where you boost disinfectant residuals?

▼

1 Yes
2 No

20. Please supply the following information for each well or surface water intake not receiving treatment (include only sources that were active in 1994). If you have more than five wells and intakes, please check here ❑. *(Record the information about the additional wells and intakes on a photocopy of this page or use a blank sheet of your own.)*

▼ AQUIFER OR SURFACE WATER SOURCE NAME *(e.g, Ogalala Aquifer or Ohio River)*	SOURCE TYPE *(enter G for Ground or S for Surface)*	LOCATION OF WELL OR INTAKE: *(Enter latitude and longitude from local plat map or permit)* Latitude (Degrees Min. Sec.)	Longitude (Degrees Min. Sec.)	Average flow *(Gal/day)*	If well, please list: Potential flow *(Gal/day)*	Well depth *(feet)*
1. _____	_____	__ __ __	___ __ __	_____	_____	_____
2. _____	_____	__ __ __	___ __ __	_____	_____	_____
3. _____	_____	__ __ __	___ __ __	_____	_____	_____
4. _____	_____	__ __ __	___ __ __	_____	_____	_____
5. _____	_____	__ __ __	___ __ __	_____	_____	_____

SOURCE WATER PROTECTION

21. Does your drinking water system participate in a source-water or wellhead protection program?

▼

1 Yes
2 No → Go to Question 25

22. Please indicate whether or not the following measures are being adopted in your source-water or wellhead protection program:

MEASURE	▼ Is this measure adopted in your source-water or wellhead protection program? YES	NO
1. Education on land use impacts	1	2
2. Ownership of a watershed	1	2
3. Zoning or land use controls	1	2
4. Best Management Practices (such as run-off controls, fertilizer scheduling, less toxic road maintenance materials)	1	2
5. Other *(Please specify)*_____	1	2

23. Who leads or manages this program?
(Circle only one number)

▼

1 Local government

2 Regional authority (e.g., Section 208 Agency)

3 State agency

4 Other *(Please specify)*_____

24. How is the management area delineated?
(Circle all numbers that apply and fill in the blanks if 3, 4 or 5 is circled)

▼

1 By watershed boundaries

2 By aquifer boundaries

3 By a fixed radius around well of _____ feet

4 By a fixed distance from a surface water body of _____ feet

5 Other *(Please specify)* _____

25. Please indicate if any of the potential sources of contamination listed below exist within 2 miles of your water supply intakes:

▼

	POTENTIAL SOURCE OF CONTAMINATION	Does this potential source of contamination exist within 2 miles of your water supply? YES	NO
1.	Industrial or manufacturing facilities	1	2
2.	Agricultural runoff	1	2
3.	Animal feed lots	1	2
4.	Urban runoff	1	2
5.	Sewage discharge	1	2
6.	Hazardous waste site	1	2
7.	Solid waste disposal	1	2
8.	Nitrates	1	2
9.	Pesticides, rodenticides, fungicides (e.g., mixing or storage facilities)	1	2
10.	Mining, oil, or gas activities	1	2
11.	Petroleum products (e.g., auto repair shops)	1	2
12.	Solvents (e.g., dry cleaners)	1	2
13.	Septic systems or other sewage discharges	1	2
14.	Other *(Please specify)*_____	1	2

26. Who performs laboratory analysis on your drinking water?

LAB ANALYSIS PROVIDER	Does this provider perform your lab analysis for ... Metals/ Inorganics? YES	NO	Microbials? YES	NO	VOCs*? YES	NO	Other Organics? YES	NO
The state.	1	2	1	2	1	2	1	2
A private firm.	1	2	1	2	1	2	1	2
In-house employees	1	2	1	2	1	2	1	2
Other *(Specify)*_____	1	2	1	2	1	2	1	2

**VOCs=Volatile organic compounds (e.g., carbon tetrachloride, benzine, THMs, etc.)*

27. How do you pay for your laboratory analysis?

PAYMENT METHOD	Do you use this payment method? YES	NO
Direct payment for tests to state or private lab.	1	2
Included as part of state permit	1	2
Don't pay.	1	2
Other *(Please specify)*_____	1	2

PART II - FINANCIAL INFORMATION

REVENUES AND EXPENSES

28. Are your financial reports or income and expense statements for your drinking water system completed in accordance to Generally Accepted Accounting Principles (GAAP)? *(Circle one number)*

1 Yes

2 No

3 Don't have separate income and expense statements for our drinking water system

4 Don't know

To simplify your task of providing financial information, please follow the guidelines below when filling out the remainder of the questionnaire.

PROVIDING ESTIMATES:

The following questions ask for information on drinking water supply operations, **exclusive of other activities** with other types of operations. Where possible, please provide exact information from your system's records. Otherwise **provide your best estimate** of financial information that is applicable to your drinking water system only.

Unless specifically requested, **exclude** financial information relating to your primary business.

ROUNDING:

Please record your dollar amounts <u>to the nearest dollar</u>. DO NOT record fractional dollars (i.e., dollars and cents).

29. If your business billed separately for water supplied, what were the water revenues during the last year [as defined in your response to Question 2(B)] for each of the following customer categories? (If your business did not bill separately for water, report only the gallons delivered (in millions) and please check here: ❑)

(If zero, enter "0")

	WATER SALES CUSTOMER CATEGORIES	▼ Water Sales Revenues	▼ Gallons delivered (in millions)
1.	Residential customers	$_____	_____
2.	Commercial customers	$_____	_____
3.	Industrial customers	$_____	_____
4.	Wholesale customers (i.e., those who redistribute your water to other users)	$_____	_____
5.	Local municipal government	$_____	_____
6.	Other government customers	$_____	_____
7.	Agricultural customers	$_____	_____
8.	Other (*Specify*)_____	$_____	_____
9.	TOTAL	$_____	_____

30. Please indicate your drinking water system's revenues during the last year from the other water-related revenue sources listed below; and what were the total revenues from your primary business, excluding water-related revenues?
(If zero, enter "0")

	WATER RELATED REVENUE SOURCE (EXCLUDING WATER SALES)	▼ Revenues
	WATER-RELATED REVENUES:	
1.	Connection fees	$_____
2.	Inspection fees	$_____
3.	Usage fees	$_____
	Please specify other water system revenues (not elsewhere reported)	
4.	_____	$_____
5.	_____	$_____
6.	PRIMARY BUSINESS REVENUES (excluding water-related revenues):	$_____

31. For each customer category listed below, please identify your drinking water system's billing structure, indicate the year and percent of the two most recent rate increases, and provide the number of metered and unmetered active connections.
(If zero, enter "0")

CUSTOMER CATEGORY	Billing structure *(Circle all code(s) from Box 2 that apply)*	Year and percent of two most recent rate increases YR.	%	YR.	%	Number of active connections Metered/Unmetered
1. Residential customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
2. Commercial customers	1 2 3 4 5 6 7	____	____	____	____	_____/_____
3. Other (*Specify*) _____	1 2 3 4 5 6 7	____	____	____	____	_____/_____

Note: The total of all metered and unmetered connections should be the same as the current active connections reported in question 11(B).

BOX 2 - BILLING STRUCTURE

Metered Charges

CODE	Billing Structure
1	Uniform rate
2	Declining block rate
3	Increasing block rate
4	Peak period rate (e.g., seasonal)

Unmetered Charges

CODE	Billing Structure
5	Separate flat rate for water
6	Combined flat rate for water and other services (e.g., rental fees, association fees, pad fees)

Other Type of Charges

CODE	Billing structure
7	Other *(Specify)*_____

32. How many gallons (or dollar equivalents) of uncompensated usage did your water system have in the last year for each of the usage categories listed below:

UNCOMPENSATED USAGE CATEGORY	Uncompensated usage (Enter either millions of gallons or dollar equivalent, if gallons unknown)
Leaks, breaks, failed meters	_____million gals. *or* $_____
Uncollected bills	_____million gals. *or* $_____
Other *(Specify)*_____	_____million gals. *or* $_____

The next question is intended to account for all of your drinking water system expenses. Please list your:

- Routine operating expenses in Part A;
- Capital-related expenses (including interest or principal repayment) in Part B; and
- Other expenses in Part C.

33A. Please enter the routine operating expenses of your drinking water system in the last year, according to the operating expense categories listed below:

PART A
OPERATING EXPENSES

Last year's expenses

WATER SYSTEM EXPENSES:

DIRECT COMPENSATION (wages, salaries, bonuses, etc.):

1. Managers . . . . . $_____
2. Operators . . . . . $_____
3. Others . . . . . $_____
4. Benefits (health & insurance premiums, FICA, FUTA, and pension contributions) . . . . . $_____

ENERGY COSTS:

5. Electricity . . . . . $_____
6. Other energy (gas, oil, etc.) . . . . . $_____

CHEMICALS:

7. Disinfectants . . . . . $_____
8. Precipitant chemicals . . . . . $_____
9. Other chemicals . . . . . $_____
10. Materials and supplies . . . . . $_____
11. Outside analytical lab services . . . . . $_____
12. Other outside contractor services . . . . . $_____
13. Depreciation expenses . . . . . $_____
14. Water purchase expense
    ❑ raw water ❑ treated water . . . . . $_____
15. Other water system operating expenses (general and administrative expenses not reported elsewhere) . . . $_____
16. **TOTAL ALL WATER SYSTEM OPERATING EXPENSES** . . . . . $_____
17. EXPENSES FOR **PRIMARY** BUSINESS (excluding taxes) . . . . . $_____

    ALL TAXES ON **PRIMARY** BUSINESS (income taxes, property taxes, etc.)

18. Federal taxes . . . . . $_____
19. State taxes . . . . . $_____
20. Local taxes . . . . . $_____

B. Please enter the amount of debt service expenditures for your drinking water system in the last year.

PART B
DEBT SERVICE EXPENDITURES

21. Interest payments . . . . . $_____
22. Principal payments . . . . . $_____
23. Other debt service expenditures (Specify) _____ $_____
24. **TOTAL ALL WATER SYSTEM DEBT SERVICE EXPENDITURES** . . . . . $_____

C. Please enter the amount of other expenses (excluding operating and debt service expenses reported in Parts A and B) for your drinking water system in the last year.

PART C OTHER EXPENSES	Last year's expenses
25. Capital improvements (e.g., expansion, new treatment)	$
26. Advance contributions to sinking funds	$
27. Other (Specify) _____	$
28. **TOTAL OTHER WATER SYSTEM EXPENSES**	$
29. **TOTAL ALL WATER SYSTEM EXPENSES (FROM PARTS A - C)**	$

ASSETS, LIABILITIES, DEBT

34. Please provide the following information on your drinking water system's total assets and liabilities, outstanding debt, and total capital reserve fund.

	Amount at end of last year
1. TOTAL ASSETS	$
2. TOTAL LIABILITIES	$
TOTAL DEBT OUTSTANDING:	
3. Due within 5 years	$
4. Longer than 5 years	$
5. TOTAL CAPITAL RESERVE FUND	$

CAPITAL INVESTMENT

35. Have you paid for major capital improvements, repairs or expansion since January 1, 1987?

1 Yes

2 No → Go to Question 37

36. What sources of funds did you use to pay for these major capital improvements, repairs, or expansion?

SOURCE OF FUNDS FOR CAPITAL INVESTMENT	Was this source of funds used since 1/1/87? YES	NO	If YES, how much was secured or provided for each of the following? Water quality improvement	Replacement or major repairs	System expansion
Debt Financing					
1. Revenue or industrial development bond	1	2	$_____	$_____	$_____
2. Company bond	1	2	$_____	$_____	$_____
3. Bank loan	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED LOAN:					
4. Small Business Administration . . .	1	2	$_____	$_____	$_____
5. Rural Development Administration (RDA)	1	2	$_____	$_____	$_____
6. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
7. State Agencies (*Specify*) _____	1	2	$_____	$_____	$_____
Other Sources of Funds					
8. Payment from capital reserve fund . . .	1	2	$_____	$_____	$_____
9. Special assessment	1	2	$_____	$_____	$_____
10. Stock issue	1	2	$_____	$_____	$_____
11. Cash flow from current revenues. . . .	1	2	$_____	$_____	$_____
STATE OR FEDERAL SUBSIDIZED GRANT:					
12. Rural Development Administration (RDA)	1	2	$_____	$_____	$_____
13. Farmers Home Administration (FmHA).	1	2	$_____	$_____	$_____
14. Other (*Specify*) _____	1	2	$_____	$_____	$_____

37. Have you ever had to reduce or cancel plans for major capital improvements, repairs, or expansion of your drinking water system because you were unable to secure an adequate loan from any source; and if so, what was the amount of the loan sought?

	Amount of Loan	Reason for Loan Denial (if known)
1 Yes →	$_____	_____
2 No		

IF YOU HAVE **NOT** USED BONDS FOR FINANCING, GO TO QUESTION 40.

38. Have your bonds ever been rated by a rating service?

▼

1 Yes

2 No → Go to Question 39C

39A. What was your system's latest bond rating?

RATING SERVICE	▼ Rating
Moody's	/___/___/___/___/ (e.g., Baa1)
Standard and Poor's	/___/___/___/___/ (e.g., BBB+)
Other (*Specify*) _____	_____

39B. What was the year of your system's latest bond rating?

▼

19 _____

39C. What was the type of bond that was last issued by your system?
(Circle one number)

▼

1 Revenue or industrial development bond

3 Company bond

4 Other (Specify) _____

40. Please enter any additional comments (optional):

_____

_____

_____

_____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE. YOUR TIME AND EFFORT ARE GREATLY APPRECIATED. MAILING INSTRUCTIONS ARE INSIDE THE FRONT COVER.

EPA

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