MISSISSIPPI SURVEY OF DRINKING WATER SYSTEM

Characteristics and Rate Structures

MISSISSIPPI STATE UNIVERSITY™

EXTENSION

TABLE OF CONTENTS

INTRODUCTION 5

SURVEY DESIGN 5

WATER 5
Figure 1. Percentage of responding organizations by population class 6
Figure 2. Number of organizations offering additional services. 7
Table 1. Factors initiating capital improvements by population class, organization type, and water treatment class 8

RATE STRUCTURES 8
Figure 3. Number of organizations by type of water rate structure 9
Table 2. Number of organizations utilizing water rate structures by population class, organization type, and water treatment class. 10

TOTAL CHARGES FOR WATER USAGE 11
Mean Total Charges for Residential Water Usage 11
Table 3. Residential water: mean charge for 3,000 gallons of water by population class and treatment class. 11
Table 4. Residential water: mean charge for 3,000 gallons of water by population class and organization type 12
Figure 4. Geographic regions. 12
Table 5. Residential water: mean charge for 3,000 gallons of water by population class and geographic region. 13
Table 6. Residential water: mean charge for 5,000 gallons of water by population class and water treatment class. 13
Table 7. Residential water: mean charge for 5,000 gallons of water by population class and organization type. 14
Table 8. Residential water: mean charge for 5,000 gallons of water by population class and geographic region. 14
Table 9. Residential water: mean charge for 10,000 gallons of water by population class and water treatment class 15
Table 10. Residential water: mean charge for 5,000 gallons of water by population class and organization type 15
Table 11. Residential water: mean charge for 10,000 gallons of water by population class and geographic region. 16
Mean Total Charges for Commercial Water Usage 16
Table 12. Commercial water: mean charge for 3,000 gallons by population class and water treatment class. 17
Table 13. Commercial water: mean charge for 3,000 gallons by population class and organization type. 17
Table 14. Commercial water: mean charge for 3,000 gallons of water by population class and geographic region. 18
Table 15. Commercial water: total charge for 5,000 gallons by population class and water treatment class. 18
Table 16. Commercial water: mean charge for 5,000 gallons by population class and organization type. 19
Table 17. Commercial water: mean charge for 5,000 gallons of water by population class and geographic region. 19
Table 18. Commercial water: mean charge for 10,000 gallons by population class and water treatment class. 20
Table 19. Commercial water: total charge for 10,000 gallons by population class and organization type. 20
Table 20. Commercial water: mean charge for 10,000 gallons of water by population class and geographic region 21
Other Water Charges 21

TOTAL CHARGES FOR WASTEWATER USAGE 21
Mean Total Charges for Residential Wastewater Usage 21
Table 21. Residential wastewater: mean charge for 3,000 gallons by population class and wastewater treatment class. 22
Table 22. Residential wastewater: mean charge for 3,000 gallons by population class and organization type. 23
Table 23. Residential wastewater: mean charge for 3,000 gallons by population class and geographic region 23
Table 24. Residential wastewater: mean charge for 5,000 gallons by population class and wastewater treatment class. 24
Table 25. Residential wastewater: mean charge for 5,000 gallons by population class and organization type. 24
Table 26. Residential wastewater: mean charge for 5,000 gallons by population class and geographic region 25
Table 27. Residential wastewater: mean charge for 10,000 gallons by population class and wastewater treatment class. 25
Table 28. Residential wastewater: mean charge for 10,000 gallons by population class and organization type. 26
Table 29. Residential wastewater: mean charge for 10,000 gallons by population class and geographic region 26
Mean Total Charges for Commercial Wastewater Usage 27
Table 30. Commercial wastewater: charge for 3,000 gallons by population class and wastewater treatment class. 27
Table 31. Commercial wastewater: charge for 3,000 gallons by population class and organization type 28
Table 32. Commercial wastewater: mean charge for 3,000 gallons by population class and geographic region. 28
Table 33. Commercial wastewater: charge for 5,000 gallons by population class and wastewater treatment class. 29
Table 34. Commercial wastewater: charge for 5,000 gallons by population class and organization type 29
Table 35. Commercial wastewater: mean charge for 5,000 gallons by population class and geographic region. 30
Table 36. Commercial wastewater: charge for 10,000 gallons by population class and wastewater treatment class 30
Table 37. Commercial wastewater: charge for 10,000 gallons by population class and organization type 31
Table 38. Commercial wastewater: mean charge for 10,000 gallons by population class and geographic region. 31

RATE SETTING 32
Figure 5. Methods used to set rates 32

CONCLUSIONS 33
Table 39. Mean charges for residential water and wastewater usage. 33

APPENDIX I: RATE COMPONENTS FOR RESIDENTIAL WATER 34
Table A1-1. Number of organizations with base minimum gallon amounts by population class, organization type, and water treatment class. 34
Table A1-2. Residential water: mean base minimum rate (2,000 gallons) by population class and water treatment class. 35
Table A1-3. Residential water: mean base minimum rate (2,000 gallons) by population class and organization type 36
Table A1-4. Residential water: mean base minimum rate (2,000 gallons) by population class and geographic region. 37
Table A1-5. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and water treatment class. 38
Table A1-6. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type 39
Table A1-7. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region. 40
Table A1-8. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and water treatment class 41
Table A1-9. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type 42
Table A1-10. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region. 43
Table A1-11. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class. 44
Table A1-12. Residential water: mean, maximum, and minimum residential block flow rates by population class. 44
Table A1-13. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by water treatment class. 45
Table A1-14. Residential water: mean, maximum, and minimum residential block flow rates by water treatment class 45
Table A1-15. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type. 45
Table A1-16. Residential water: mean, maximum, and minimum residential block flow rates by organization type. 46
Table A1-17. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region 46
Table A1-18. Residential water: mean, maximum, and minimum residential block flow rates by geographic region. 46

APPENDIX II: RATE COMPONENTS FOR COMMERCIAL WATER 47
Table A2-1. Commercial water: mean base minimum rate (2,000 gallons) by population class and water treatment class 47
Table A2-2. Commercial water: mean base minimum rate (2,000 gallons) by population class and organization type 48
Table A2-3. Commercial water: mean base minimum rate (2,000 gallons) by population class and geographic region. 48
Table A2-4. Commercial water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and water treatment class. 49
Table A2-5. Commercial water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type 50
Table A2-6. Commercial water: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region. 51
Table A2-7. Commercial water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and water treatment class. 52
Table A2-8. Commercial water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type. 52
Table A2-9. Commercial water: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region 53
Table A2-10. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class. 54
Table A2-11. Commercial water: mean, maximum, and minimum residential block flow rates by population class. 54
Table A2-12. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by water treatment class. 54
Table A2-13. Commercial water: mean, maximum, and minimum residential block flow rates by water treatment class. 55
Table A2-14. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type. 55
Table A2-15. Commercial water: mean, maximum, and minimum residential block flow rates by organization type. 55
Table A2-16. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region. 56
Table A2-17. Commercial water: mean, maximum, and minimum residential block flow rates by geographic region 56

APPENDIX III: RATE COMPONENTS FOR RESIDENTIAL WASTEWATER 57
Table A3-1. Number of organizations with base minimum gallon amounts by population class, organization type, and treatment class. 57
Table A3-2. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and wastewater treatment class 58
Table A3-3. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and organization type 59
Table A3-4. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and geographic region. 60
Table A3-5. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and wastewater treatment class 61
Table A3-6. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type 62
Table A3-7. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region. 63
Table A3-8. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and wastewater treatment class. 64
Table A3-9. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type. 65
Table A3-10. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region 66
A3-11. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class. 67
Table A3-12. Residential wastewater: mean, maximum, and minimum block flow rates by population class. 67
Table A3-13. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by wastewater treatment class. 67
Table A3-14. Residential wastewater: mean, maximum, and minimum block flow rates by wastewater treatment class. 68
Table A3-15. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type. 68
Table A3-16. Residential wastewater: mean, maximum, and minimum block flow rates by organization type. 68
Table A3-17. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region 69
Table A3-18. Residential wastewater: mean, maximum, and minimum block flow rates by geographic region 69

APPENDIX IV – RATE COMPONENTS FOR COMMERCIAL WASTEWATER 70
Table A4-1. Commercial wastewater: base minimum rate (2,000 gallons) by population class and wastewater treatment class. 70
Table A4-2. Commercial wastewater: base minimum rate (2,000 gallons) by population class and organization type. 71
Table A4-3. Commercial wastewater: mean base minimum rate (2,000 gallons) by population class and geographic region. 71
Table A4-4. Commercial wastewater: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and wastewater treatment class 72
Table A4-5. Commercial wastewater: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type. 73
Table A4-6. Commercial wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region. 73
Table A4-7. Commercial wastewater: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and wastewater treatment class. 74
Table A4-8. Commercial wastewater: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type. 74
Table A4-9. Commercial wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region 75
Table A4-10. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class 76
Table A4-11. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by population class. 76
Table A4-12. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by wastewater treatment class 76
Table A4-13. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by wastewater treatment class 77
Table A4-14. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type 77
Table A4-15. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by organization type. 77
Table A4-16. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region. 78
Table A4-17. Commercial wastewater: mean, maximum, and minimum block flow rates by geographic region. 78

INTRODUCTION

Eighty-eight percent of the approximately 1,200 public water systems in Mississippi are considered community water systems. These systems supply water to at least 15 service connections or 25 residents on an annual basis. Many of these systems were created in the 1960s to provide safe drinking water to rural areas through a program developed and implemented by the Farmers Home Administration (currently USDA Rural Development). Today, public water systems face substantial challenges including aging infrastructure, increased legal mandates and regulations, and subpar management practices. These challenges stress the need for governing bodies of public water systems to continually monitor rate structures and realize that an appropriate rate structure will greatly contribute to effort to remain or become financially viable.

As a result of these substantial challenges, Mississippi State University Extension Service faculty surveyed the state's public water systems in 2004, 2012, and 2018 to acquire information about the structure and level of water rate charges for Mississippi's community water systems. The goal was to obtain information about how rates were set and general information regarding water system characteristics. To continue providing current information to community water systems, an updated survey was conducted in March 2021 and findings from this effort are provided in this study. Study findings are designed to be used by water system officials throughout Mississippi to learn more about the distribution of various rate levels and structures among fellow water systems in the state.

SURVEY DESIGN

To gain insight regarding the environment of water rates levels and structures in the state, we sent surveys to all public water systems in the state of Mississippi. Each Mississippi public water system has a Public Water System Identification Number assigned by the Mississippi State Department of Health – Bureau of Public Water Supply (MSDH–BPWS). For the purposes of this study, multiple individual public water systems that have the same responsible individual and mailing address were assumed to belong to a single organizational body and to be governed in the same manner. These organizational bodies (whether municipal, rural, county district, utility authority, or privately owned) will be referred to hereafter as organizations unless otherwise specified.

We asked the organizations to complete one survey per organization since one organization can consist of multiple systems with separate Public Water System Identification Numbers. We asked the organizations to respond to survey questions regarding population, connections, rate structures, and other factors that reflect the organization as a whole. Aggregated data was verified using a master list of system information and characteristics provided by MSDH–BPWS.

We sent surveys to 808 community organizations across the state that charge customers for water service. These organizations control 931 individual community water systems. Systems serving institutions such as schools, hospitals, factories, and prisons (non-community systems) were not included in this publication. One hundred twenty-seven organizations returned the surveys for a response rate of 15.7 percent.

The 128 organizations responding to the survey represented 157 water systems as defined by the MSDH–BPWS. One hundred twelve organizations were comprised of one system, eight organizations were comprised of two systems, one organization was comprised of three systems, two organizations were comprised of four systems, four organizations were comprised of five systems and one organization was comprised of eight systems.

WATER

Ninety-three (72.7 percent) of the usable survey responses from community water organizations in Mississippi were organized as water association organizations, while 27 (21.1 percent) were municipal water utilities. This compares favorably to the overall distribution of water organizations in the state, with 55 percent organized as associations and 32 percent operating as organizations governed by a municipality. The remaining eight responses (6.2 percent) were classified as utility districts or privately owned community systems.

A key factor in classifying water organizations focuses on the size of population served[1]. The smallest responding organization reported serving a population of 42 persons, while the largest responding organization served a population of 49,339. Nineteen of the responses (14.8 percent) were from organizations considered to be very small, while 73 of the responding organizations (57 percent) were classified as small. Twenty-five of the responding organizations (19.5 percent) were classified as medium, and the remaining 11 organizations (8.6 percent) were considered large. While applying these size definitions to organizations rather than individual systems is not a common practice, it was determined that

[1] United States Environmental Protection Agency (EPA) guidelines suggest that the average residential public water system connection serves 2.6 persons. The EPA classifies water systems serving a population of 500 or less as "very small," systems serving a population of 501 through 3,300 persons as being "small," systems serving a population of 3,301 through 10,000 persons as "medium," systems serving a population of 10,001 through 100,000 persons as "large," and systems that serve a population over 100,000 persons as "large" (https://echo.epa.gov/help/drinking-water-dashboard-help).

utilizing these definitions for the purpose of this study was acceptable since it provided a commonly understood delineation.

Since a major component of water production and delivery cost includes the cost of treating raw water, it is also beneficial to classify the organizations by treatment category. Since one organization may contain multiple systems that fall into multiple treatment categories, the decision was made to classify the organization by the most intensive treatment category used by the organization's systems.[2] For example, an organization that consists of one Class B system and two Class C Systems would be classified as a Class B organization.

Eighty-three of the responding organizations (64.8 percent) were classified as Class D treatment organizations, while 25 organizations (19.5 percent) utilized Class C treatment techniques, 13 organizations (10.2 percent) were Class B, and seven organizations (5.5 percent) were classified as Class E systems. No Class A systems responded to the survey. Ten organizations (7 percent) indicated that they purchase between 1 percent and 100 percent of the water sold. Of these nine responses, seven organizations (4.7 percent) were the Class E systems that purchased 100 percent of their water. The remaining three organizations purchased finished water from other organizations in addition to treating groundwater. **Figure 1** shows the percentage of organizations in each population class and treatment class.

Along with providing drinking water, some responding organizations provide additional utility services to the public, such as sewer/wastewater, electricity, natural gas, and/or garbage/refuse collection. Ninety-three of the responding organizations (72.7 percent) only provided drinking water services to customers. Twenty-three organizations (18 percent) provided wastewater services in addition to drinking water, six organizations (4.7 percent) provided both wastewater and garbage/refuse pickup services, and three organizations (2.3 percent) provided wastewater, garbage/refuse pickup, and natural gas services. In addition to the drinking water services provided by all organizations, 35 organizations (27.3 percent) provided wastewater services (26 of these organizations were municipalities), 10 organizations provided garbage/refuse pickup services, four organizations provided natural gas services, and two organizations provided electrical services. All organizations that provided

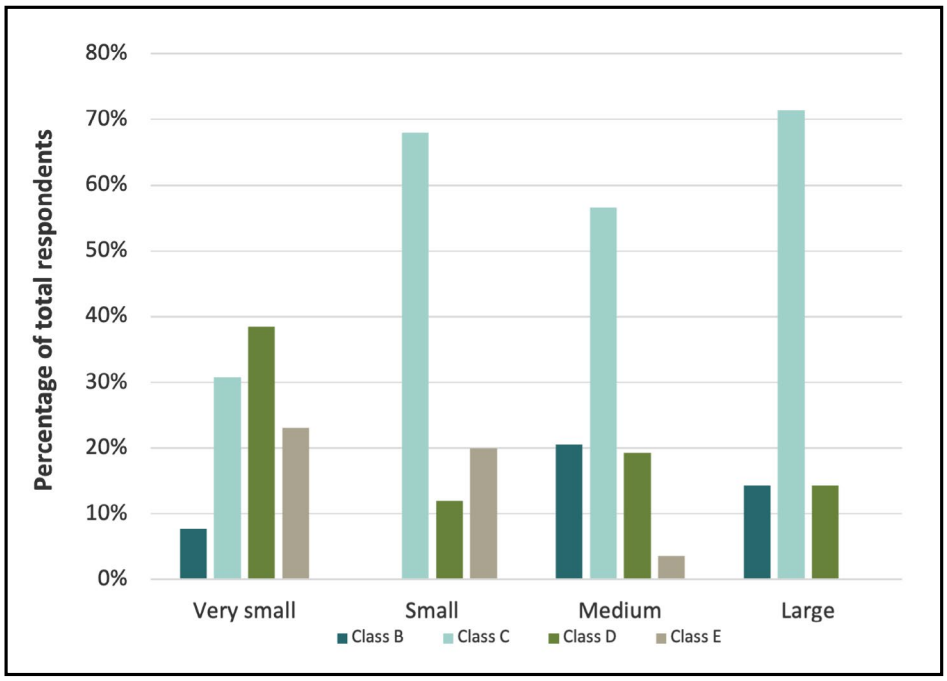

Figure 1. Percentage of responding organizations by population class.

[2] Class A organizations have surface water treatment, lime softening, or coagulation and filtration for the removal of constituents other than iron or manganese. Class B organizations have two or more Class C treatment facilities, with iron or manganese removal facilities breaking pressure or requiring flocculation and/or sedimentation, a system utilizing membrane filtration, or ion exchange treatment. Class C organizations have aeration, pH adjustment, corrosion control, or closed pressure type facilities. Class D organizations provide no treatment to the water other than chlorination, fluoridation, or direct chemical feed. Class E organizations purchase all finished water from other systems. (Source: *Recommended Minimum Performance Guidelines for Certified Waterworks Operators in the State of Mississippi*, Mississippi Department of Health)

additional services other than wastewater services were municipalities. **Figure 2** depicts the number of organizations providing additional utilities.

We also asked the responding organizations if they imposed a tap/connection fee and a late fee for water services. One hundred nineteen (93 percent) of the responding organizations indicated that a residential tap/connection fee is charged, and 47 of these organizations indicated that the tap/connection fee is based on connection line size. Reported residential connection fees ranged from a low of $15 to a high of $875. Eighty-seven organizations (68 percent) indicated that a flat fee is charged for a new connection and did not specify if connection size affected the fee. These tap/connection fees ranged from a low of $15 to a high of $875 with a mean (average) of $355. Ten organizations (7.8 percent) reported variable fees based on the size of the line being installed or actual cost. These residential tap/connection fees, as reported by these organizations, ranged from $500 to $1,655; the mean fee collected by organizations charging a tap/connection fee by line size is $817 (this mean was calculated by using the lowest fee reported by the organization).

Twenty-seven of the responding organizations (21.1 percent) reported charging an agricultural connection fee between $25 and $700 with an average of $377.

Seventy-seven of the responding organizations (60.2 percent) reported charging a commercial connection fee that ranged between $15 and $2,000 with a mean charge of $400. Nineteen organizations (14.8 percent) reported an industrial connection fee between $25 and $700 with a mean of $320. It is important to note that a number of the organizations that responded regarding the industrial tap/connection fee question are in areas where major industry does not exist.

One hundred twenty of the responding organizations (93.8 percent) reported charging a late fee. The two organizations organized as water districts charged a late fee; one municipality and one privately owned system did not charge a late fee, and six of the 93 organizations organized as water associations did not charge a late fee. Thirty-five of the responding organizations (29.2 percent) indicated a fixed dollar amount late fee, while 83 organizations indicated that they charged a late fee based on a percentage of the water bill or a combination of a percentage amount and a fixed amount. The fixed late fees ranged from a low of $2 to a high of $50, with a mean of $11.94. The late fees assessed as a percentage of the total bill ranged from 3 percent to 30 percent, with a mean of 11.3 percent. Two organizations indicated that they had both fixed and percentage components in their late fee charges.

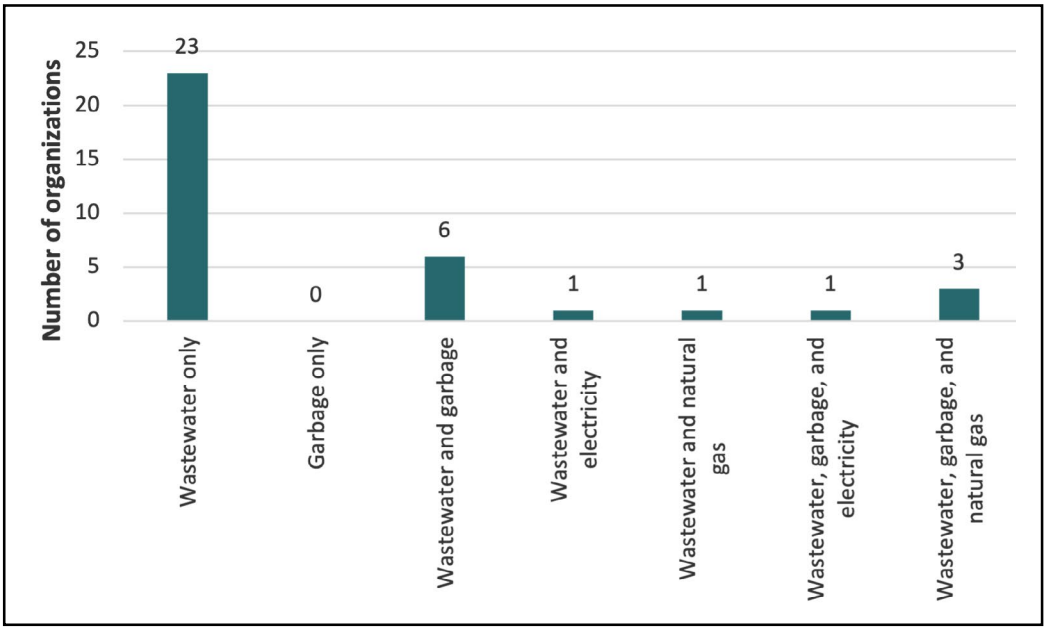

Figure 2. Number of organizations offering additional services.

Twenty-seven of the responding organizations (21.1 percent) planned to implement some sort of capital improvements in the relatively near future. Four organizations planned to expand their customer base by either adding a subdivision or expanding into an uncertificated area. Nineteen organizations had plans to improve their infrastructure by either construction new infrastructure (well, treatment plan, SCADA system, etc.) or upgrading distribution lines. Two organizations indicated that they were planning major upgrades to their meters. **Table 1** presents the number of organizations by various classifications that are planning to make specific capital improvements.

Seventeen organizations that planned to make capital improvements also expected to adjust water rates in the near future to generate additional revenue to fund those improvements.

RATE STRUCTURES

We asked organizations to report the type of rate structure utilized to generate revenue from the sale of water. Most of the responding organizations charged a minimum fee for a specified number of gallons plus a flow rate for the amount of water used in excess of the number of gallons covered by the minimum fee. The number of gallons covered in the flow rate is divided into units, or blocks, of customer usage called price blocks. For example, an organization may charge $25 (base minimum fee) for the first 2,000 gallons of water consumed and an additional charge or block flow rate of $4 for every 1,000 gallons (price block) consumed after the initial 2,000 gallons. As customer water usage increases, the dollar amounts charged for each additional price block can remain the same, increase, or decrease. These types of pricing structures are referred to as a uniform block rate, an increasing block rate, and a decreasing block rate, respectively.[3]

Table 1. Factors initiating capital improvements by population class, organization type, and water treatment class.

CAPITAL IMPROVEMENT CLASSIFICATION	POPULATION CLASS	ORGANIZATION TYPE	WATER TREATMENT CLASS
Increase in customer base	Very small – 0	Association – 4	Class B – 1
	Small – 5	District – 0	Class C – 1
	Medium – 1	Private – 2	Class D – 4
	Large – 0	Municipal – 0	Class E – 0
Upgrade infrastructure	Very small – 5	Association – 13	Class B – 5
	Small – 7	District – 0	Class C – 5
	Medium – 4	Private – 3	Class D – 9
	Large – 3	Municipal – 3	Class E – 0
Upgrade meters	Very small – 0	Association – 2	Class B – 0
	Small – 0	District – 0	Class C – 0
	Medium – 2	Private – 0	Class D – 2
	Large – 0	Municipal – 0	Class E – 0

[3] A uniform block rate structure consists of a base minimum charge for a specified base minimum number of gallons plus an additional flow rate charge for customer usage in excess of the base minimum gallons. The flow rate does not change (increase or decrease) as the usage increases. Example — A customer may be charged $25 for the first 2,000 gallons of usage and $4 for every 1,000 gallons consumed in addition to the base minimum (2,000) gallons.

An increasing block rate structure consists of a base minimum charge for a specified base minimum number of gallons plus an additional flow rate charge for customer usage in excess of the base minimum gallons. The flow rate increases as customer usage increases. Example — A customer may be charged $25 for the first 2,000 gallons of usage, $4 for the next 1,000 gallons consumed (gallons 2,001 through 3,000), $4.50 for the next 1,000 gallons consumed (gallons 3,001 through 4,000), etc.

A decreasing block rate structure consists of a base minimum charge for a specified base minimum number of gallons plus an additional flow rate charge for customer usage in excess of the base minimum gallons. The flow rate decreases as customer usage increases. Example — A customer may be charged $25 for the first 2,000 gallons of usage, $5 for the next 1,000 gallons consumed (gallons 2,001 through 3,000), $4.50 for the next 1,000 gallons consumed (gallons 3,001 through 4,000), etc.

Organizations often implement the same rate structure for all individual water systems governed by the organization's board or responsible party; therefore, the data reported in the survey is expected to reflect the organization as a whole. When we compared the type of rate structure response to the survey reported by the systems to the survey responses that were given by the systems for questions regarding the minimum fee, minimum gallons, charge per block, and block size, it was apparent that many of the organizations do not have a full understanding of the various types of rate structures. One of the more common mistakes made by organizations was reporting a flat rate or increasing block rate when the rate structure was actually a uniform block rate structure.

Figure 3 shows that no responding organization utilized a flat rate structure. This type of rate structure charges customers a fixed amount for an unlimited number of gallons of water consumed during the billing cycle. For example, an organization utilizing a flat rate structure may charge each customer $20 per billing cycle regardless of the amount of water consumed.

All 128 organizations responding to the survey charged for water based on the number of gallons consumed. The most common rate structure among survey respondents was the uniform rate structure that was used by 110 of the responding organizations (85.9 percent). This was followed by four organizations (3.1 percent) using the increasing block rate structure and 14 organizations (10.9 percent) using the decreasing block rate structure.

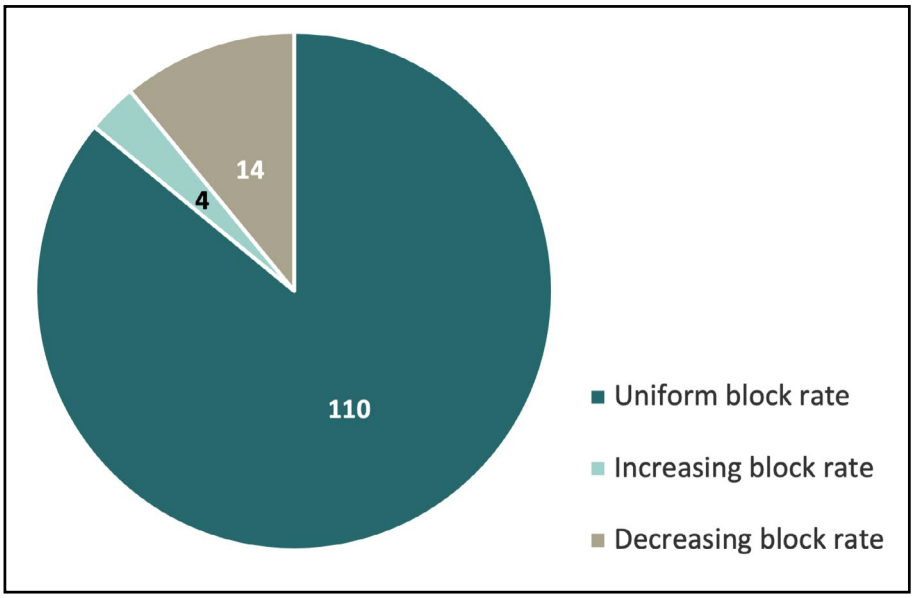

Figure 3. Number of organizations by type of water rate structure.

It is often assumed that the more complicated rate structures (the increasing block rate structure or the decreasing block rate structure) are implemented as the population of the organization increases or as the treatment process becomes more complicated. Analysis of the survey data belies this assumption. **Table 2** provides an enumeration of the number of systems that have specific block rate structures by population class, organization type, and treatment class. The majority of the organizations that utilize either an increasing or decreasing block rate structure are smaller associations and utilize Class D or E treatment procedures (less complicated treatment procedures). It is interesting to note that more organizations utilize a decreasing block rate structure rather than an increasing block rate structure and that more small organizations utilize a decreasing block rate structure than other population classes. The organizations that utilize a decreasing block rate structure are typically small associations that utilize Class D treatment methods.

Table 2. Number of organizations utilizing water rate structures by population class, organization type, and water treatment class.

RATE STRUCTURE	POPULATION CLASS	ORGANIZATION TYPE	WATER TREATMENT CLASS
Increase in customer base	Very small – 0	Association – 4	Class B – 1
	Small – 5	District – 0	Class C – 1
	Medium – 1	Private – 2	Class D – 4
	Large – 0	Municipal – 0	Class E – 0
Upgrade infrastructure	Very small – 5	Association – 13	Class B – 5
	Small – 7	District – 0	Class C – 5
	Medium – 4	Private – 3	Class D – 9
	Large – 3	Municipal – 3	Class E – 0
Upgrade meters	Very small – 0	Association – 2	Class B – 0
	Small – 0	District – 0	Class C – 0
	Medium – 2	Private – 0	Class D – 2
	Large – 0	Municipal – 0	Class E – 0

TOTAL CHARGES FOR WATER USAGE

Mean Total Charges for Residential Water Usage

The most telling indicator of the level of rates for an organization is the total amount charged for a specified amount of water. This exercise is more illuminating because the total charges represent the effect on the customer and the revenue flowing into the organization, more so than individual billing components such as the base minimum rate or block flow rates.

While the typical rate survey report provides the total charges for a customer using 10,000 gallons, the effects of various combination of the base minimum rate and block flow rates can result in large variations in total charges as consumption changes. To provide a more comprehensive comparison, we present the total charges for 3,000 gallons, 5,000 gallons, and 10,000 gallons (only organizations that provided complete rate structures were included in this analysis; this is the reason that the rates from a subset of 120 organizations of the 128 organizations responding to the survey are used in this part of the analysis). **Table 3** provides the mean (average) charge for 3,000 gallons of residential water reported by responding organizations organized by population class and treatment class, **Table 4** provides the same type of information by population class and type, and **Table 5** provides this information by population class and geographic region. **Tables 6**, **7**, and **8** provide the same information for 5,000 gallons of residential water usage while **Tables 9**, **10**, and **11** provide this information for 10,000 gallons of residential water usage.

There are a number of important conclusions that can be derived from these tables. The first conclusion concerns the level of charges across population classes. While the very small organizations have lower charges than the small organizations for the 5,000-gallon and 10,000-gallon scenarios, the charge for residential water typically falls as the population served by the organization increases in number, thus indicating that organizations have some recognition of economies of scale in providing water to residential customers.

Second, charges for the 3,000-gallon and 10,000-gallon scenarios dropped as treatment procedures became simpler until the Class E organizations were observed. The Class E charges were lower than the Class B charges for these quantities but were higher than the Class C and Class D charges. The exception concerned the 5,000-gallon charges; the Class D charges for this quantity category were slightly above those for Class C but still below the Class B charges.

Third, municipalities have a lesser total charge for water than do water associations for all scenarios. This is likely due to decreased distribution costs resulting from a geographically denser population for municipalities when compared with association populations. While districts reported the highest average charge of all the organization types, it is important to realize that there were only two districts that reported rate information and to be careful when utilizing these charges as a guide. Private systems had a higher average total charge for water than did municipalities for the 3,000-gallon scenario, but they had lower average charges for the 5,000-gallon and 10,000-gallon scenarios. This suggests that the private systems have relatively higher base minimum charges but lower flow rates.

Table 3. Residential water: mean charge for 3,000 gallons of water by population class and treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$30.64 13 orgs	10.8%	$16.62 1 org	$33.28 4 orgs	$35.42 5 orgs	$23.83 3 orgs
Class C	$21.74 24 orgs	20.0%	0 orgs	$24.04 16 orgs	$22.25 3 orgs	$14.05 5 orgs
Class D	$23.98 77 orgs	64.2%	$26.30 15 orgs	$25.06 45 orgs	$18.59 15 orgs	$22.75 2 orgs
Class E	$27.61 6 orgs	5.0%	0 orgs	$28.47 5 orgs	$23.30 1 org	0 orgs
All classes	**$24.44 120 orgs**	**100.0%**	**$25.70 16 orgs**	**$25.54 70 orgs**	**$22.75 24 orgs**	**$18.72 10 orgs**

Table 4. Residential water: mean charge for 3,000 gallons of water by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$34.63 2 orgs	1.7%	0 orgs	$52.00 1 org	$17.25 1 org	0 orgs
Municipality	$20.54 23 orgs	19.2%	$22.77 4 orgs	$22.10 11 orgs	$20.89 4 orgs	$13.65 4 orgs
Private	$21.35 6 orgs	5.0%	$40.00 1 org	$17.03 3 orgs	$21.38 1 org	$15.65 1 org
Association	$25.42 89 orgs	74.2%	$25.46 11 orgs	$28.47 5 orgs	$23.54 18 orgs	$23.40 5 orgs
All org types	**$24.44 120 orgs**	**100.0%**	**$25.70 16 orgs**	**$25.54 70 orgs**	**$22.75 24 orgs**	**$18.72 10 orgs**

While likely not a very useful metric for effectively setting rates, many organizations are cognizant of the rates of other water and wastewater utilities in the area. **Figure 4** presents the five geographic regions of the state that we used in delineating the location of the organizations.[4] The Capital/River Region reports the highest level of mean total charges, and the Coastal Region reports the lowest level of mean total charges for all quantity scenarios. The higher charges for the Capital/River Region are likely due to the fact that 10 of the organizations in that geographic region utilized Class B and Class C (more complex) treatment techniques. The lower charges in the Coastal Region are due to the majority (77.3 percent) of the organizations utilizing Class D treatment techniques. The Delta Region (all Class D treatment organizations) reported the second highest level for the 3,000-gallon scenario, while the Pines Region reported the second highest levels for the 5,000-gallon and 10,000-gallon scenarios. The Hills Region reported the fourth highest level of mean total charges for the 3,000-gallon and 5,000-gallon scenarios but the third highest level for the 10,000-gallon scenario.

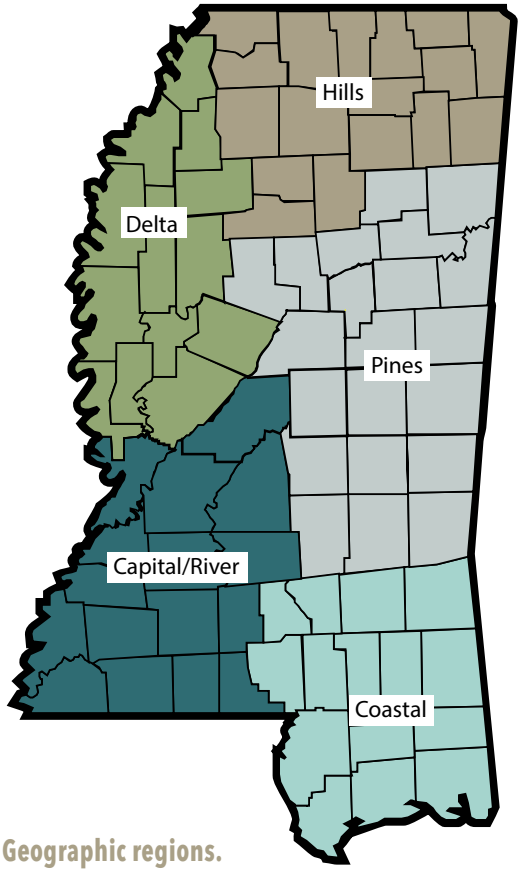

Figure 4. Geographic regions.

[4] The Capital/River Region consists of Adams, Amite, Claiborne, Copiah, Franklin, Hinds, Jefferson, Lawrence, Lincoln, Madison, Pike, Rankin, Simpson, Walthall, Warren, and Wilkinson Counties. The Coastal Region consists of Covington, Forrest, George, Greene, Hancock, Harrison, Jackson, Jefferson Davis, Jones, Lamar, Marion, Pearl River, Perry, Stone, and Wayne Counties. The Delta Region consists of Bolivar, Carroll, Coahoma, Holmes, Humphreys, Issaquena, Leflore, Quitman, Sharkey, Sunflower, Tallahatchie, Tunica, Washington, and Yazoo Counties. The Hills Region consists of Alcorn, Benton, Calhoun, DeSoto, Grenada, Itawamba, Lafayette, Lee, Marshall, Panola, Pontotoc, Prentiss, Tate, Tippah, Tishomingo, Union, and Yalobusha Counties. The Pines Region consists of Attala, Chickasaw, Choctaw, Clarke, Clay, Jasper, Kemper, Lauderdale, Leake, Lowndes, Monroe, Montgomery, Neshoba, Newton, Noxubee, Oktibbeha, Scott, Smith, Webster, and Winston Counties.

Table 5. Residential water: mean charge for 3,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$30.49 22 orgs	18.3%	$22.29 3 orgs	$31.75 13 orgs	$34.44 5 orgs	$19.13 1 org
Coastal	$19.78 22 orgs	18.3%	0 orgs	$22.03 14 orgs	$16.21 7 orgs	$13.21 1 org
Delta	$26.78 9 orgs	7.5%	$25.64 6 orgs	$29.70 2 orgs	0 orgs	$27.75 1 org
Hills	$21.12 36 orgs	30.0%	$25.00 4 orgs	$21.74 22 orgs	$21.07 6 orgs	$13.91 4 orgs
Pines	$26.61 31 orgs	25.8%	$30.15 3 orgs	$27.84 19 orgs	$22.31 6 orgs	$23.83 3 orgs
All regions	**$24.44 120 orgs**	**100.0%**	**$25.70 16 orgs**	**$25.54 70 orgs**	**$22.75 24 orgs**	**$18.72 10 orgs**

Table 6. Residential water: mean charge for 5,000 gallons of water by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$42.36 13 orgs	10.8%	$23.06 1 org	$45.07 4 orgs	$47.17 5 orgs	$37.17 3 orgs
Class C	$30.61 24 orgs	20.0%	0 orgs	$33.95 16 orgs	$31.08 3 orgs	$19.65 5 orgs
Class D	$32.20 77 orgs	64.2%	$34.31 15 orgs	$33.69 45 orgs	$25.45 16 orgs	$33.50 2 orgs
Class E	$40.05 6 orgs	5.0%	0 orgs	$41.08 5 orgs	$34.90 1 org	0 orgs
All classes	**$33.38 120 orgs**	**100.0%**	**$33.60 16 orgs**	**$34.93 70 orgs**	**$31.08 24 orgs**	**$27.67 10 orgs**

Table 7. Residential water: mean charge for 5,000 gallons of water by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$43.88 2 orgs	1.7%	0 orgs	$66.00 1 org	$21.75 1 org	0 orgs
Municipality	$27.57 23 orgs	19.2%	$28.59 4 orgs	$30.01 11 orgs	$28.36 4 orgs	$19.07 4 orgs
Private	$27.06 6 orgs	5.0%	$48.00 1 org	$22.09 3 orgs	$26.14 1 org	$21.95 1 org
Association	$35.07 89 orgs	74.2%	$34.12 11 org	$36.05 55 orgs	$32.47 18 orgs	$35.70 5 orgs
All org types	**$33.38 120 orgs**	**100.0%**	**$33.60 16 orgs**	**$34.93 70 orgs**	**$31.08 24 orgs**	**$27.67 10 orgs**

Table 8. Residential water: mean charge for 5,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$40.92 22 orgs	18.3%	$30.60 3 orgs	$43.16 13 orgs	$44.67 5 orgs	$23.95 1 org
Coastal	$27.78 22 orgs	18.3%	0 orgs	$30.75 14 orgs	$22.99 7 orgs	$19.85 1 org
Delta	$33.03 9 orgs	7.5%	$31.31 6 orgs	$35.56 2 orgs	0 orgs	$38.25 1 org
Hills	$29.09 36 orgs	30.0%	$34.18 4 orgs	$29.43 22 orgs	$29.99 6 orgs	$20.80 4 orgs
Pines	$37.07 31 orgs	25.8%	$40.42 3 orgs	$38.68 19 orgs	$30.26 6 orgs	$37.17 3 orgs
All regions	**$33.38 120 orgs**	**100.0%**	**$33.60 16 orgs**	**$34.93 70 orgs**	**$31.08 24 orgs**	**$27.67 10 orgs**

Table 9. Residential water: mean charge for 10,000 gallons of water by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$71.68 13 orgs	10.8%	$39.16 1 org	$74.58 4 orgs	$76.56 5 orgs	$70.50 3 orgs
Class C	$53.01 24 orgs	20.0%	0 orgs	$58.43 16 orgs	$53.17 3 orgs	$35.56 5 orgs
Class D	$52.67 77 orgs	64.2%	$53.88 15 orgs	$55.29 45 orgs	$42.58 16 orgs	$60.38 2 orgs
Class E	$71.49 6 orgs	5.0%	0 orgs	$73.01 5 orgs	$63.90 1 org	0 orgs
All classes	**$55.74 120 orgs**	**100.0%**	**$52.96 17 orgs**	**$58.38 70 orgs**	**$51.87 25 orgs**	**$51.00 10 orgs**

Table 10. Residential water: mean charge for 5,000 gallons of water by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$67.00 2 orgs	1.7%	0 orgs	$101.00 1 org	$33.00 1 org	0 orgs
Municipality	$45.48 23 orgs	19.2%	$43.12 4 orgs	$49.74 11 orgs	$47.05 4 orgs	$34.58 4 orgs
Private	$42.30 6 orgs	5.0%	$68.00 1 org	$36.10 3 orgs	$38.04 1 org	$39.45 1 org
Association	$59.04 89 orgs	74.2%	$55.16 11 org	$60.54 55 orgs	$54.76 18 orgs	$66.45 5 orgs
All org types	**$55.74 120 orgs**	**100.0%**	**$52.96 16 orgs**	**$58.38 70 orgs**	**$51.87 25 orgs**	**$51.00 10 orgs**

Table 11. Residential water: mean charge for 10,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$66.98 22 orgs	18.3%	$51.39 3 orgs	$43.16 13 orgs	$44.67 5 orgs	$23.95 1 org
Coastal	$47.92 22 orgs	18.3%	0 orgs	$30.75 14 orgs	$22.99 7 orgs	$19.85 1 org
Delta	$47.92 9 orgs	7.5%	$44.41 6 orgs	$35.56 2 orgs	0 orgs	$38.25 1 org
Hills	$49.45 36 orgs	30.0%	$57.11 4 orgs	$29.43 22 orgs	$29.99 6 orgs	$20.80 4 orgs
Pines	$62.88 31 orgs	25.8%	$66.08 3 orgs	$38.68 19 orgs	$30.26 6 orgs	$37.17 3 orgs
All regions	**$55.74 120 orgs**	**100.0%**	**$52.96 16 orgs**	**$34.93 70 orgs**	**$31.08 24 orgs**	**$27.67 10 orgs**

Mean Total Charges for Commercial Water Usage

As with the previous residential analysis, we presented the total commercial charges for 3,000 gallons, 5,000 gallons, and 10,000 gallons (only organizations that provided complete rate structures were included in this analysis; this is the reason that the rates from 87 organizations are used in this part of the analysis). **Table 12** provides the mean charge for 3,000 gallons of commercial water reported by responding organizations organized by population class and treatment class, **Table 13** provides the same type of information by population class and type, and **Table 14** provides the mean total charges for 3,000 gallons of commercial water usage by population class and geographic location. **Table 15**, **Table 16**, and **Table 17** provides the same information for 5,000 gallons of commercial water usage, while **Table 18**, **Table 19**, and **Table 20** provide this information for 10,000 gallons of commercial water usage.

There are a number of important conclusions that are derived from **Tables 12** through **20**. First, although the very small organizations have lower charges than the small organizations for all scenarios, the charge for commercial water usage typically falls as the population served by the organization increases in number, thus indicating that organizations have some recognition of economies of scale in providing water to commercial customers.

Second, mean charges for the 10,000-gallon scenario fell as treatment procedures became simpler until the Class E organizations were observed. However, Class D treatment organizations had higher charges than Class C organizations for the 3,000-gallon and 5,000-gallon scenarios, likely due to relatively high base minimum rates for the organizations that fall into the very small population classification. Mean total charges for Class E organizations (organizations that purchase water) were higher than any other treatment classification for all quantity scenarios.

In all quantity scenarios, municipalities have a lesser mean total charge for water than do water associations. As with the residential water discussion, this is likely due to decreased distribution costs resulting from a geographically denser population for municipalities when compared with association densities. While districts reported the highest average charge of all the organization types, it is important to realize that there were only two districts that reported rate information and to be careful in utilizing these charges as a guide. Private systems had a higher average total charge for water than did municipalities for the 3,000-gallon scenario, but lower average charges for the 5,000-gallon and 10,000-gallon scenarios. This suggests that the private systems have relatively higher base minimum charges, but block flow rates are lower.

Mean total charges for commercial water usage by geographic location presents a bit different picture than did the mean total charges for residential water usage. In all quantity scenarios, the Capital/River Region had the highest level of mean total charges for commercial water usage, followed by the Delta Region, the Pines Region, the Coastal Region, and finally the Hills Region.

Furthermore, the mean total charges for commercial water tended to be higher than the mean total charges for residential water for any category or cross-tabulation examined. This suggests that organizations supplying potable water tend to use commercial businesses to subsidize the water rates charged to residential customers.

Table 12. Commercial water: mean charge for 3,000 gallons by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$31.55 10 orgs	11.5%	$16.62 1 org	$33.83 3 orgs	$31.27 4 orgs	$36.13 2 orgs
Class C	$22.67 18 orgs	20.7%	0 orgs	$25.28 12 orgs	$22.25 3 orgs	$12.63 3 orgs
Class D	$27.09 54 orgs	62.1%	$28.64 7 orgs	$27.92 34 orgs	$24.67 10 orgs	$22.19 3 orgs
Class E	$79.68 5 orgs	5.7%	0 orgs	$93.77 4 orgs	$23.30 1 org	0 orgs
All classes	**$29.71 87 orgs**	**100.0%**	**$27.14 8 orgs**	**$32.63 53 orgs**	**$25.66 18 orgs**	**$22.09 8 orgs**

Table 13. Commercial water: mean charge for 3,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$39.63 2 orgs	2.3%	0 orgs	$52.00 1 org	$27.25 1 org	0 orgs
Municipality	$23.91 17 orgs	19.8%	$23.78 4 orgs	$24.71 8 orgs	$30.48 3 orgs	$14.44 3 orgs
Private	$32.08 5 orgs	5.7%	0 orgs	$35.61 3 orgs	$37.93 1 org	$15.65 1 org
Association	$30.93 62 orgs	71.3%	$30.49 4 orgs	$33.48 41 orgs	$23.48 13 orgs	$29.44 4 orgs
All org types	**$29.71 87 orgs**	**100.0%**	**$27.14 8 orgs**	**$32.63 53 orgs**	**$25.66 18 orgs**	**$22.09 8 orgs**

Table 14. Commercial water: mean charge for 3,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$44.49 19 orgs	21.8%	$18.94 2 orgs	$56.53 11 orgs	$32.90 5 orgs	$21.07 1 org
Coastal	$25.82 16 orgs	18.4%	0 orgs	$27.56 10 orgs	$22.92 6 orgs	0 orgs
Delta	$36.74 5 orgs	5.7%	$35.24 3 orgs	$50.25 1 org	0 orgs	$27.75 1 org
Hills	$20.78 25 orgs	28.7%	$20.00 2 orgs	$22.30 15 orgs	$22.32 4 orgs	$13.91 4 orgs
Pines	$28.34 22 orgs	25.3%	$33.50 1 org	$27.95 16 orgs	$23.50 3 orgs	$36.13 2 orgs
All regions	**$29.71 87 orgs**	**100.0%**	**$27.14 8 orgs**	**$32.63 53 orgs**	**$25.66 18 orgs**	**$22.09 8 orgs**

Table 15. Commercial water: total charge for 5,000 gallons by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$41.82 10 orgs	11.5%	$23.06 1 org	$45.83 3 orgs	$43.47 4 orgs	$41.88 2 orgs
Class C	$32.23 18 orgs	20.7%	0 orgs	$36.04 12 orgs	$31.08 3 orgs	$18.14 3 orgs
Class D	$35.38 54 orgs	62.1%	$35.57 7 orgs	$36.41 34 orgs	$32.62 10 orgs	$33.38 3 orgs
Class E	$87.61 5 orgs	5.7%	0 orgs	$100.79 4 orgs	$34.90 1 org	0 orgs
All classes	**$38.47 87 orgs**	**100.0%**	**$34.00 8 orgs**	**$41.72 53 orgs**	**$34.90 18 orgs**	**$29.46 8 orgs**

Table 16. Commercial water: mean charge for 5,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$48.88 2 orgs	2.3%	0 orgs	$66.00 1 org	$31.75 1 org	0 orgs
Municipality	$31.43 18 orgs	19.8%	$29.65 4 orgs	$33.40 8 orgs	$38.98 3 orgs	$20.98 3 orgs
Private	$38.66 5 orgs	5.7%	0 orgs	$39.84 3 orgs	$51.81 1 org	$21.95 1 org
Association	$40.16 62 orgs	71.3%	$38.36 4 org	$42.89 41 orgs	$32.90 13 orgs	$37.69 4 orgs
All org types	**$38.47 87 orgs**	**100.0%**	**$34.00 8 orgs**	**$41.72 53 orgs**	**$34.90 18 orgs**	**$29.46 8 orgs**

Table 17. Commercial water: mean charge for 5,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$53.50 19 orgs	21.8%	$25.40 2 orgs	$65.41 11 orgs	$43.13 5 orgs	$53.50 1 org
Coastal	$34.01 16 orgs	18.4%	0 orgs	$35.71 10 orgs	$31.19 6 orgs	0 orgs
Delta	$44.35 5 orgs	5.7%	$40.91 3 orgs	$60.75 1 org	0 orgs	$38.25 1 org
Hills	$28.81 25 orgs	28.7%	$28.00 2 orgs	$30.41 15 orgs	$31.23 4 orgs	$20.80 4 orgs
Pines	$38.37 22 orgs	25.3%	$42.50 1 org	$38.59 16 orgs	$33.50 3 orgs	$41.88 2 orgs
All regions	**$38.47 87 orgs**	**100.0%**	**$34.00 8 orgs**	**$41.72 53 orgs**	**$34.90 18 orgs**	**$29.46 8 orgs**

Table 18. Commercial water: mean charge for 10,000 gallons by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$67.50 10 orgs	11.5%	$39.16 1 org	$75.83 3 orgs	$73.95 4 orgs	$56.25 2 orgs
Class C	$56.42 18 orgs	20.7%	0 orgs	$62.56 12 orgs	$53.17 3 orgs	$35.11 3 orgs
Class D	$55.68 54 orgs	62.1%	$52.90 7 orgs	$57.66 34 orgs	$50.12 10 orgs	$58.24 3 orgs
Class E	$107.84 5 orgs	5.7%	0 orgs	$118.83 4 orgs	$63.90 1 org	0 orgs
All classes	**$60.19** **87 orgs**	**100.0%**	**$51.18** **8 orgs**	**$64.41** **53 orgs**	**$56.69** **18 orgs**	**$49.07** **8 orgs**

Table 19. Commercial water: total charge for 10,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$72.00 2 orgs	2.3%	0 orgs	$101.00 1 org	$43.00 1 org	0 orgs
Municipality	$51.01 18 orgs	19.8%	$44.31 4 orgs	$55.05 8 orgs	$60.23 3 orgs	$32.94 2 orgs
Private	$52.26 5 orgs	5.7%	0 orgs	$53.02 3 orgs	$62.81 1 org	$39.45 1 org
Association	$63.11 62 orgs	71.3%	$58.05 4 org	$66.18 41 orgs	$56.45 13 orgs	$63.11 5 orgs
All org types	**$60.19** **87 orgs**	**100.0%**	**$51.18** **8 orgs**	**$64.41** **53 orgs**	**$56.69** **18 orgs**	**$49.07** **8 orgs**

Table 20. Commercial water: mean charge for 10,000 gallons of water by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$76.03 19 orgs	21.8%	$41.58 2 orgs	$87.61 11 orgs	$68.72 5 orgs	$53.97 1 org
Coastal	$53.50 16 orgs	18.4%	0 orgs	$56.86 10 orgs	$47.89 6 orgs	0 orgs
Delta	$63.36 5 orgs	5.7%	$55.09 3 orgs	$87.00 1 org	0 orgs	$64.50 1 org
Hills	$49.33 25 orgs	28.7%	$48.00 2 orgs	$50.78 15 orgs	$53.48 4 orgs	$40.39 4 orgs
Pines	$62.99 22 orgs	25.3%	$65.00 1 org	$64.55 16 orgs	$58.50 3 orgs	$56.25 2 orgs
All regions	**$60.19 87 orgs**	**100.0%**	**$51.18 8 orgs**	**$64.41 53 orgs**	**$56.69 18 orgs**	**$49.07 8 orgs**

Other Water Charges

Forty of the responding organizations (26 percent) charged a separate rate to non-residential customers such as agricultural, industrial, or commercial customers. For those systems charging a separate rate to non-residential users, the monthly charge for 10,000 gallons of water for agricultural customers ranged from $28 to $97.32 with an average of $62.42. The monthly charge for commercial users ranged from $24 to $5,202, with an average of $211.96. The monthly charge for 10,000 gallons of water for industrial users ranged from $42.14 to $530 with an average of $212.20.

TOTAL CHARGES FOR WASTEWATER USAGE

Mean Total Charges for Residential Wastewater Usage

As previously discussed in the water section, comparing the base minimum rates and flow rates among different populations and classifications of systems is certainly beneficial, but applying these rates to a specific number of gallons can be more illuminating because total charges, rather than individual billing components, can facilitate more meaningful comparisons. As previously mentioned, while the typical rate survey report provides the total charges for a customer using 10,000 gallons, the effects of combinations of the base rate and block flow rates can result in large relative variations as consumption varies.

In order to provide a more comprehensive comparison, we present mean total wastewater charges for 3,000 gallons, 5,000 gallons, and 10,000 gallons of water usage (only organizations that provided complete rate structures were included in this analysis; this is the reason that the rates from 29 organizations are used in this part of the analysis). **Table 21** provides the average charge for 3,000 gallons of residential wastewater usage reported by responding organizations organized by population class and wastewater treatment class[5], **Table 22** provides the same type of information by population class and type, and **Table 23** provides this information by population class and geographic location. **Table 24**, **Table 25**, and **Table 26** provide the mean total residential wastewater charges for 5,000 gallons of residential water usage while **Table 27**, **Table 28**, and **Table 29** provide the mean total residential wastewater charges for 10,000 gallons of residential water usage.

[5] Class I wastewater treatment facilities include those facilities (of any capacity) that utilize waste stabilization lagoons or septic tank-sand filter treatment methods. Class II wastewater treatment facilities include aerated lagoons (all capacities), trickling filters (less than 300,000 gallons per day capacity), or activated sludge (less than 100,000 gallons per day capacity). Class III wastewater treatment facilities include those facilities that utilize trickling filters (300,000 to 3,000,000 gallons per day capacity) or activated sludge (100,000 to 2,000,000 gallons per day capacity). Class IV wastewater treatment facilities include those facilities that utilize trickling filters (greater than 3,000,000 gallons per day capacity) or activated sludge (greater than 2,000,000 gallons per day capacity).

For all quantity scenarios, very small organizations have the lowest mean total charge for residential wastewater. However, with only two very small organizations providing wastewater services to their customers, we urge caution in using these data to guide rate setting or establish trends. Mean total residential wastewater charges declined as organization population increased with the exception of a slight increase in medium population organizations over small organizations in the 10,000-gallon scenario. However, the overall trend seems to suggest that wastewater operations, much like water operations, seem to recognize some economies of scale with larger populations.

Furthermore, Class I treatment organizations had the lowest mean total charge for residential wastewater in all quantity scenarios. In contrast to water usage charges, the mean total charge for residential water fell in all quantity scenarios as wastewater treatment complexity increased, but these declines are likely due to the increase in organization population that is typically seen as Class III and Class IV treatment techniques are utilized.

Districts and private organizations had the highest charges, and associations had the lowest charges for all quantity scenarios, although caution should be used in attempting to derive trends or guidance for rate setting for these organization types given the small number of responses. Mean total charges for residential wastewater for municipalities increased as the population served by the organization increased for the 5,000-gallon and 10,000-gallon scenarios (this was generally true for the 3,000-gallon scenario, as well, with the exception of a slight decrease in the charge for organizations that served medium populations).

The Coastal Region had the highest mean total charge for residential wastewater, followed by the Capital/River Region and the Pines Region for all quantity scenarios. The Hills and Delta Regions consistently had the lowest charges, although the rank of these geographies changed with the quantity scenario being considered. Given the fact that the Hills Region had the lowest mean total charge for residential wastewater for the 3,000-gallon scenario and the Delta Region had the lowest mean total charge for the 5,000-gallon and 10,000-gallon scenarios, it can be surmised that the Delta Region typically has higher base minimum rates and higher block flow rates for wastewater services.

Table 21. Residential wastewater: mean charge for 3,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$19.42 10 orgs	34.5%	$16.00 1 org	$22.39 7 orgs	$10.75 2 orgs	0 orgs
Class II	$27.51 7 orgs	24.1%	$29.45 1 org	$28.11 4 orgs	$21.75 1 org	$28.92 1 org
Class III	$22.59 7 orgs	24.1%	$6.96 1 org	$16.36 1 org	$26.96 5 orgs	0 orgs
Class IV	$17.98 5 orgs	17.2%	0 orgs	0 orgs	0 orgs	$17.98 5 orgs
All classes	**$21.89 29 orgs**	**100.0%**	**$17.47 3 orgs**	**$23.79 12 orgs**	**$22.25 8 orgs**	**$19.81 6 orgs**

Table 22. Residential wastewater: mean charge for 3,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$48.75 2 orgs	6.9%	0 orgs	$62.00 1 org	$35.50 1 org	0 orgs
Municipality	$18.52 21 orgs	72.4%	$17.47 3 orgs	$17.56 9 orgs	$16.86 4 orgs	$22.20 5 orgs
Private	$29.02 4 orgs	13.8%	0 orgs	$32.74 2 orgs	$42.76 1 org	$7.82 1 org
Association	$16.18 2 orgs	6.9%	0 orgs	0 orgs	$16.18 2 orgs	0 orgs
All org types	**$21.89 29 orgs**	**100.0%**	**$17.47 3 orgs**	**$23.79 12 orgs**	**$22.25 8 orgs**	**$19.81 6 orgs**

Table 23. Residential wastewater: mean charge for 3,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$26.69 6 orgs	20.7%	$6.96 1 org	$39.18 2 orgs	$26.73 1 org	$24.03 2 orgs
Coastal	$30.89 6 orgs	20.7%	0 orgs	$32.74 2 orgs	$33.34 3 orgs	$19.87 1 org
Delta	$16.00 1 org	3.4%	$16.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$15.95 8 orgs	27.6%	0 orgs	$15.00 3 orgs	$15.85 2 orgs	$16.97 3 orgs
Pines	$18.22 8 orgs	27.6%	$29.45 1 org	$19.34 5 orgs	$9.80 2 orgs	0 orgs
All regions	**$21.89 29 orgs**	**100.0%**	**$17.47 3 orgs**	**$23.79 12 orgs**	**$22.25 8 orgs**	**$19.81 6 orgs**

Table 24. Residential wastewater: mean charge for 5,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$25.43 10 orgs	34.5%	$20.00 1 org	$29.59 7 orgs	$13.55 2 orgs	0 orgs
Class II	$35.58 7 orgs	24.1%	$38.25 1 org	$35.84 4 orgs	$31.25 1 org	$36.20 1 org
Class III	$30.22 7 orgs	24.1%	$10.40 1 org	$22.34 1 org	$35.76 5 orgs	0 orgs
Class IV	$25.73 5 orgs	17.2%	0 orgs	0 orgs	0 orgs	$25.73 5 orgs
All classes	**$29.09 29 orgs**	**100.0%**	**$22.88 3 orgs**	**$31.07 12 orgs**	**$29.65 8 orgs**	**$27.47 6 orgs**

Table 25. Residential wastewater: mean charge for 5,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$60.25 2 orgs	6.9%	0 orgs	$76.00 1 org	$44.50 1 org	0 orgs
Municipality	$25.35 21 orgs	72.4%	$22.88 3 orgs	$23.71 9 orgs	$24.08 4 orgs	$30.77 5 orgs
Private	$36.67 4 orgs	13.8%	0 orgs	$41.72 2 orgs	$52.28 1 org	$10.98 1 org
Association	$22.03 2 orgs	6.9%	0 orgs	0 orgs	$22.03 2 orgs	0 orgs
All org types	**$29.09 29 orgs**	**100.0%**	**$22.88 3 orgs**	**$31.07 12 orgs**	**$29.65 8 orgs**	**$27.47 6 orgs**

Table 26. Residential wastewater: mean charge for 5,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$34.50 6 orgs	20.7%	$10.40 1 org	$49.17 2 orgs	$34.63 1 org	$31.80 2 orgs
Coastal	$40.32 6 orgs	20.7%	0 orgs	$41.72 2 orgs	$42.68 3 orgs	$30.47 1 org
Delta	$20.00 1 org	3.4%	$20.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$22.06 8 orgs	27.6%	0 orgs	$19.67 3 orgs	$23.35 2 orgs	$23.59 3 orgs
Pines	$24.76 8 orgs	27.6%	$38.25 1 org	$26.41 5 orgs	$13.90 2 orgs	0 orgs
All regions	**$29.09 29 orgs**	**100.0%**	**$22.88 3 orgs**	**$31.07 12 orgs**	**$29.65 8 orgs**	**$27.47 6 orgs**

Table 27. Residential wastewater: mean charge for 10,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$38.78 10 orgs	34.5%	$30.00 1 org	$45.25 7 orgs	$20.55 2 orgs	0 orgs
Class II	$55.57 7 orgs	24.1%	$60.25 1 org	$54.84 4 orgs	$55.00 1 org	$54.40 1 org
Class III	$49.31 7 orgs	24.1%	$19.00 1 org	$37.29 1 org	$57.77 5 orgs	0 orgs
Class IV	$45.09 5 orgs	17.2%	0 orgs	0 orgs	0 orgs	$45.09 5 orgs
All classes	**$46.46 29 orgs**	**100.0%**	**$36.42 3 orgs**	**$47.78 12 orgs**	**$48.12 8 orgs**	**$46.64 6 orgs**

Table 28. Residential wastewater: mean charge for 10,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$89.00 2 orgs	6.9%	0 orgs	$111.00 1 org	$67.00 1 org	0 orgs
Municipality	$41.97 21 orgs	72.4%	$36.42 3 orgs	$38.06 9 orgs	$42.15 4 orgs	$52.20 5 orgs
Private	$53.96 4 orgs	13.8%	0 orgs	$59.91 2 orgs	$76.08 1 org	$18.85 1 org
Association	$36.65 2 orgs	6.9%	0 orgs	0 orgs	$36.65 2 orgs	0 orgs
All org types	**$46.46 29 orgs**	**100.0%**	**$36.42 3 orgs**	**$47.78 12 orgs**	**$48.12 8 orgs**	**$46.64 6 orgs**

Table 29. Residential wastewater: mean charge for 10,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$54.02 6 orgs	20.7%	$19.00 1 org	$74.15 2 orgs	$54.38 1 org	$51.22 2 orgs
Coastal	$62.48 6 orgs	20.7%	0 orgs	$59.91 2 orgs	$66.03 3 orgs	$56.97 1 org
Delta	$30.00 1 org	3.4%	$30.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$36.33 8 orgs	27.6%	0 orgs	$28.67 3 orgs	$42.10 2 orgs	$40.15 3 orgs
Pines	$40.98 8 orgs	27.6%	$60.25 1 org	$43.85 5 orgs	$24.15 2 orgs	0 orgs
All regions	**$46.46 29 orgs**	**100.0%**	**$36.42 3 orgs**	**$47.78 12 orgs**	**$48.12 8 orgs**	**$46.64 6 orgs**

Mean Total Charges for Commercial Wastewater Usage

As with the other mean total charges presented in this report, the mean total commercial wastewater charges for 3,000 gallons, 5,000 gallons, and 10,000 gallons of water usage by population class, treatment class, organization type, and geographic location are presented in **Tables 30** through **38**. While general observations are made regarding the level of charges for each usage classification, we caution readers that these tables represent a relatively small number of observations, and that the reader should be careful in deriving specific guidelines.

Large population organizations have the lowest mean total charge for commercial wastewater for the 3,000-gallon and 5,000-gallon scenarios, primarily due to relatively low rates reported by one organization (since only four large organizations reported rates for commercial wastewater, one organization that has exceptionally low rates substantially affects the mean). Excluding the large organizations, mean total charges for commercial wastewater increases as the population of the organization increases for all quantity scenarios.

Mean total charges increase as treatment complexity increases for all quantity scenarios with the exception of organizations that are classified as Class IV treatment facilities. The Class IV organizations typically have the lowest mean total treatment charges, but this is likely due to the fact that all Class IV organizations are classified as having large populations. The logic presented in the preceding paragraph is applicable in this discussion as well.

Municipalities have the lowest mean total charges for commercial wastewater in the 5,000-gallon and 10,000-gallon scenarios, but associations have the lowest level of charges in the 3,000-gallon scenario. Districts and private organizations have the highest level of mean total charges for all scenarios, but their ranked positions change as usage quantity changes.

Usage quantities have a large effect on charge rankings by geographic region. While the Coastal Region has the highest level of mean total charges for commercial wastewater in all usage scenarios, the Pines Region has the second highest ranking for the 3,000-gallon and 10,000-gallon scenarios, while the Capital/River Region has the second highest ranking for the 5,000-gallon scenario. The Delta and Hills Regions have the lowest levels of mean total charges for commercial wastewater, with the Hills Region having the lowest level of charges for the 3,000-gallon scenario and the Delta Region reporting the lowest levels of mean total charges for the 5,000-gallon and 10,000-gallon scenarios.

Table 30. Commercial wastewater: charge for 3,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$34.57 6 orgs	33.3%	$16.00 1 org	$44.73 4 orgs	$12.50 1 org	0 orgs
Class II	$26.79 4 orgs	22.2%	$41.75 1 org	$14.75 1 org	$21.75 1 org	$28.92 1 org
Class III	$42.25 5 orgs	27.8%	$6.69 1 org	$16.57 1 org	$62.58 3 orgs	0 orgs
Class IV	$14.26 3 orgs	16.7%	0 orgs	0 orgs	0 orgs	$14.26 3 orgs
All classes	**$31.59 18 orgs**	**100.0%**	**$21.57 3 orgs**	**$35.04 6 orgs**	**$44.40 5 orgs**	**$17.93 4 orgs**

Table 31. Commercial wastewater: charge for 3,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$54.50 1 org	5.6%	0 orgs	0 orgs	$54.50 1 org	0 orgs
Municipality	$23.06 12 orgs	66.7%	$21.57 3 orgs	$19.58 4 orgs	$34.93 2 orgs	$21.29 3 orgs
Private	$53.90 4 orgs	22.2%	0 orgs	$65.96 2 orgs	$75.86 1 org	$7.82 1 org
Association	$21.75 1 org	5.6%	0 orgs	0 orgs	$21.75 1 org	0 orgs
All org types	**$31.59 18 orgs**	**100.0%**	**$21.57 3 orgs**	**$35.04 6 orgs**	**$44.40 5 orgs**	**$17.93 4 orgs**

Table 32. Commercial wastewater: mean charge for 3,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$25.42 4 orgs	22.2%	$6.96 1 org	$16.57 1 org	$57.37 1 org	$20.80 1 org
Coastal	$56.81 5 orgs	27.8%	0 orgs	$65.96 2 orgs	$50.70 3 orgs	0 orgs
Delta	$16.00 1 org	5.6%	$16.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$15.53 6 orgs	33.3%	0 orgs	$14.88 2 orgs	$12.50 1 org	$16.97 3 orgs
Pines	$36.88 2 orgs	11.1%	$41.75 1 org	$32.00 1 org	0 orgs	0 orgs
All regions	**$31.59 18 orgs**	**100.0%**	**$21.57 3 orgs**	**$35.04 6 orgs**	**$44.40 5 orgs**	**$17.93 4 orgs**

Table 33. Commercial wastewater: charge for 5,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$40.01 6 orgs	33.3%	$20.00 1 org	$50.90 4 orgs	$16.50 1 org	0 orgs
Class II	$34.74 4 orgs	22.2%	$52.25 1 org	$19.25 1 org	$31.25 1 org	$36.20 1 org
Class III	$53.08 5 orgs	27.8%	$10.40 1 org	$22.61 1 org	$77.46 3 orgs	0 orgs
Class IV	$21.35 3 orgs	16.7%	0 orgs	0 orgs	0 orgs	$21.35 3 orgs
All classes	**$39.36 18 orgs**	**100.0%**	**$27.55 3 orgs**	**$40.91 6 orgs**	**$56.03 5 orgs**	**$25.06 4 orgs**

Table 34. Commercial wastewater: charge for 5,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$63.50 1 org	5.6%	0 orgs	0 orgs	$63.50 1 org	0 orgs
Municipality	$29.71 12 orgs	66.7%	$27.55 3 orgs	$25.72 4 orgs	$40.88 2 orgs	$29.76 3 orgs
Private	$64.30 4 orgs	22.2%	0 orgs	$71.29 2 orgs	$103.62 1 org	$10.98 1 org
Association	$31.25 1 org	5.6%	0 orgs	0 orgs	$31.25 1 org	0 orgs
All org types	**$39.36 18 orgs**	**100.0%**	**$27.55 3 orgs**	**$40.91 6 orgs**	**$56.03 5 orgs**	**$25.06 4 orgs**

Table 35. Commercial wastewater: mean charge for 5,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$31.94 4 orgs	22.2%	$10.40 1 org	$22.61 1 org	$65.27 1 org	$29.48 1 org
Coastal	$68.19 5 orgs	27.8%	0 orgs	$71.29 2 orgs	$66.12 3 orgs	0 orgs
Delta	$20.00 1 org	5.6%	$20.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$20.92 6 orgs	33.3%	0 orgs	$19.13 2 orgs	$16.50 1 org	$23.59 3 orgs
Pines	$47.13 2 orgs	11.1%	$52.25 1 org	$42.00 1 org	0 orgs	0 orgs
All regions	**$39.36 18 orgs**	**100.0%**	**$27.55 3 orgs**	**$40.91 6 orgs**	**$56.03 5 orgs**	**$25.06 4 orgs**

Table 36. Commercial wastewater: charge for 10,000 gallons by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$53.62 6 orgs	33.3%	$30.00 1 org	$66.31 4 orgs	$26.50 1 org	0 orgs
Class II	$54.60 4 orgs	22.2%	$78.50 1 org	$30.50 1 org	$55.00 1 org	$54.40 1 org
Class III	$70.67 5 orgs	27.8%	$19.00 1 org	$37.71 1 org	$98.88 3 orgs	0 orgs
Class IV	$39.36 3 orgs	16.7%	0 orgs	0 orgs	0 orgs	$39.36 3 orgs
All classes	**$56.20 18 orgs**	**100.0%**	**$42.50 3 orgs**	**$55.57 6 orgs**	**$75.63 5 orgs**	**$43.12 4 orgs**

Table 37. Commercial wastewater: charge for 10,000 gallons by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$86.00 1 org	5.6%	0 orgs	0 orgs	$86.00 1 org	0 orgs
Municipality	$46.33 12 orgs	66.7%	$42.50 3 orgs	$41.05 4 orgs	$55.76 2 orgs	$50.92 3 orgs
Private	$78.65 4 orgs	22.2%	0 orgs	$84.62 2 orgs	$125.62 1 org	$19.73 1 org
Association	$55.00 1 org	5.6%	0 orgs	0 orgs	$55.00 1 org	0 orgs
All org types	**$56.20 18 orgs**	**100.0%**	**$42.50 3 orgs**	**$55.57 6 orgs**	**$75.63 5 orgs**	**$43.12 4 orgs**

Table 38. Commercial wastewater: mean charge for 10,000 gallons by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$48.22 4 orgs	22.2%	$19.00 1 org	$37.71 1 org	$85.02 1 org	$51.17 1 org
Coastal	$87.17 5 orgs	27.8%	0 orgs	$84.62 2 orgs	$88.87 3 orgs	0 orgs
Delta	$30.00 1 org	5.6%	$30.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$34.55 6 orgs	33.3%	0 orgs	$29.75 2 orgs	$26.50 1 org	$40.44 3 orgs
Pines	$72.75 2 orgs	11.1%	$78.50 1 org	$67.00 1 org	0 orgs	0 orgs
All regions	**$56.20 18 orgs**	**100.0%**	**$42.50 3 orgs**	**$55.57 6 orgs**	**$75.63 5 orgs**	**$43.12 4 orgs**

RATE SETTING

Organizations that offer water and wastewater services vary not only in rates and rate structures, but also in the method used to determine whether to increase or adjust rates. Of the 128 organizations that responded to the survey, 116 organizations (90.6 percent) indicated that the board reviewed rates on an annual basis (this practice has long been considered a prime indicator that a board is governing the water organization effectively). When considering whether a rate adjustment needed to be implemented, as well as the size of the adjustment, there were several methods that were used by various water organizations, and many organizations used more than one method. **Figure 5** presents the methods that responding organizations reported using to set rates.

Ninety of the responding organizations (70.3 percent) indicated that the organizations' board members analyzed the fixed and variable costs, budgets, revenues and expenditures, changes in customer base, and future renovations and expansions of the organization when making rate decisions. Forty-eight of the responding organizations (37.5 percent) indicated that they contacted a technical assistance provider to conduct a comprehensive rate analysis to determine potential revenue increases of various rate structures. These technical assistance providers included the Mississippi Rural Water Association (34 organizations), the Mississippi State University Extension Service (six organizations), and Communities Unlimited (three organizations). Seven organizations indicated that they used some other technical assistance provider.

Nineteen organizations (14.8 percent) indicated that the board sets rates that are comparable to the rates of neighboring water systems while 11 organizations (8.6 percent) adjusted rates by a fixed amount at a routine time. No organizations indicated that they did not examine their rates.

Of the 128 organizations included in the survey results, 115 provided information regarding the organization's last rate adjustment. Of these 115 organizations, 86 organizations (74.7 percent) indicated that rates had been increased within the past 5 years (2017 to 2021). This number is potentially greater since the surveys were completed in mid-2021 and rates may have been adjusted since that time for some organizations. Twenty-eight organizations (24.3 percent) indicated that their rates had remained constant for the past 6 to 10 years (2011 to 2016), and only one organization (0.9 percent) indicated that its rates had remained constant for more than 10 years.

Fifty of the responding organizations (39.1 percent) indicated that they are planning to increase rates in the near future (no organization indicated plans to decrease rates), and 31 of these organizations provided information regarding the timing of the expected rate increase. Of these, 20 organizations (60.6 percent) expected a rate increase in 2021 after the survey response was completed, and eight organizations (24.2 percent) expected to implement a rate increase in 2022.

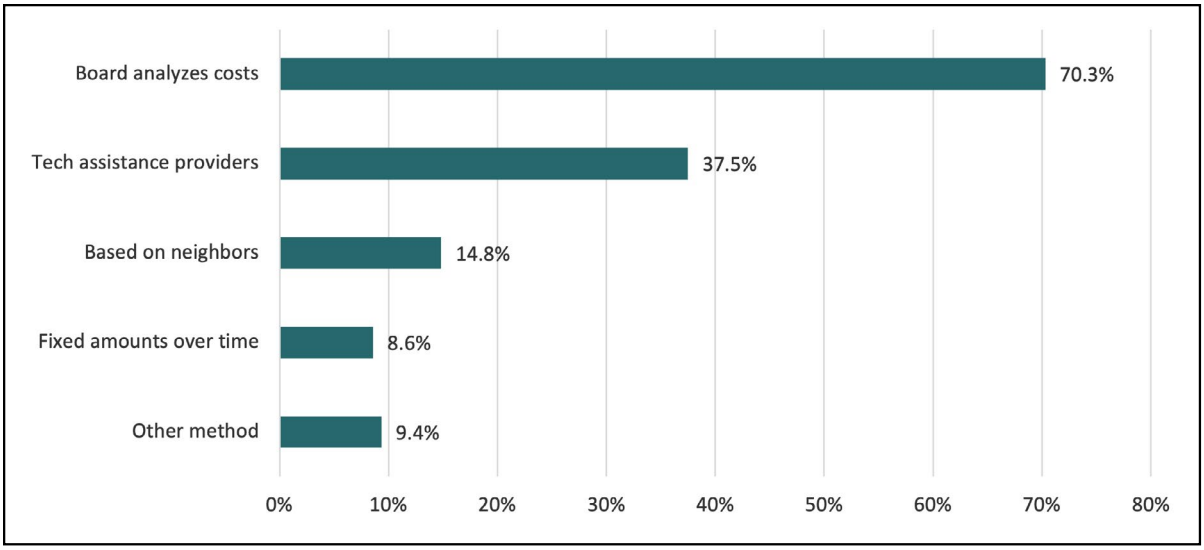

Figure 5. Methods used to set rates.

CONCLUSIONS

Although this analysis presents a fairly representative sample of water rate structures and levels throughout Mississippi, it cannot be concluded that the rates reported are financially viable for any organization. As such, any organization comparing their rate structure to the scenarios presented in this study should make final rate structure and rate level decisions based on their individual financial situation.

A wide variety of information regarding Mississippi's community water organizations was collected through the water rate survey. Most of the state's community water organizations were either very small or medium, serving a population between 500 and 10,000 persons. All responding organizations charged a minimum fee and a block rate (with a majority utilizing a uniform block rate). Given the mean total charges for residential water and wastewater usage shown in **Table 39**, we can see the use of increasing block rate structures of common enough within this sample of organizations that the mean charges tend to increase fairly rapidly as quantity consumed increases. In addition, while the conventional wisdom states that it typically costs more to treat wastewater as compared to water, the mean total wastewater charges for the responding organizations are lower water charges.

Approximately 30 percent of the organizations surveyed provided additional services other than providing drinking water. Those organizations that provided at least one other service to customers charged less for drinking water than those organizations providing only drinking water. Water rates and average monthly charges varied for different regions of the state. For further information or analysis regarding this study or to obtain assistance in analyzing the water rates for your system, please contact Alan Barefield [(662) 325-7995, alan.barefield@msstate.edu] with the Mississippi State University Extension Service.

When interpreting this information, it is important to remember that it was reported for organizations as a whole, which often contain more than one Public Water System Identification Number, though in some cases, one organization may represent only one Public Water System Identification Number.

Table 39. Mean charges for residential water and wastewater usage.

TYPE OF USAGE	3,000 GALLONS	5,000 GALLONS	10,000 GALLONS
Residential water	$24.44	$33.38	$55.74
Residential wastewater	$21.89	$29.09	$46.46

APPENDIX I: RATE COMPONENTS FOR RESIDENTIAL WATER

The commonly accepted purpose of the base minimum fee has historically been to cover the fixed costs incurred by the water organizations.[6] The average residential base minimum fee for very small and small organizations was greater than the average minimum fee when taking all organizations into consideration. Statistical analyses of the averages of the minimum fee for population class revealed that there was no statistical difference between the very small and small, the small and medium, and the medium and large population class pairs. This indicated that an organization with a relatively large number of customers would be able to charge a lower minimum fee than an organization with a smaller number of connections since the fixed costs of the organization could be dispersed among a greater number of customers.

There were 12 unique quantities that are used as base minimums by the organizations. Groupings of these levels in 1,000 increments by population class, water treatment class, and organization type are shown in **Table A1-1**, **Table A1-2**, and **Table A1-3**. The base minimum gallons ranges from zero gallons (three organizations) to 4,000 gallons (two organizations), with the most common usage included in the base minimum being 2,000 gallons (81 organizations). As can be seen in **Table A1-1**, **Table A1-2**, and **Table A1-3**, the base minimum rate and accompanying gallons vary across the responding organizations by population class, organization type, and treatment class.

Table A1-1. Number of organizations with base minimum gallon amounts by population class, organization type, and water treatment class.

RATE STRUCTURE	POPULATION CLASS	ORGANIZATION TYPE	TREATMENT CLASS
0 gallons (3 organizations)	Very small – 1	Association – 1	Class B – 0
	Small – 1	District – 0	Class C – 0
	Medium – 1	Private – 0	Class D – 3
	Large – 0	Municipal – 2	Class E – 0
1 to 1,999 gallons (10 organizations)	Very small – 1	Association – 5	Class B – 1
	Small – 4	District – 0	Class C – 2
	Medium – 4	Private – 0	Class D – 4
	Large – 1	Municipal – 2	Class E – 0
2,000 gallons (81 organizations)	Very small – 9	Association – 62	Class B – 8
	Small – 51	District – 2	Class C – 13
	Medium – 17	Private – 4	Class D – 55
	Large – 4	Municipal – 13	Class E – 5
2,001 to 3,000 gallons (28 organizations)	Very small – 5	Association – 21	Class B – 4
	Small – 13	District – 0	Class C – 8
	Medium – 5	Private – 1	Class D – 15
	Large – 5	Municipal – 6	Class E – 1
Over 3,000 gallons (2 organizations)	Very small – 0	Association – 0	Class C – 0
	Small – 1	District – 0	Class C – 1
	Medium – 0	Private – 1	Class C – 1
	Large – 1	Municipal – 1	Class C – 0

[6] AWWA. Developing Rates for Small Systems. Publication M54. Denver, Colorado. Page 35.

Given the different levels of usage included in the base minimum gallons used by the different organizations, we "prorated" or adjusted the reported base minimum rates to be based on 2,000 gallons of customer water usage (the most often used base minimum customer usage level) for all observations except those observations that had a base minimum charge for zero gallons of customer usage (three organizations).

Table A1-2 presents the mean (average) base minimum rate normalized to 2,000 gallons and the number of organizations included in each treatment class by population class for the 118 organizations that reported rate information and did not use zero gallons as the base minimum amount. There are two findings that are of great interest to those concerned with the determination of system/organization water rates. First, the mean base minimum rate tends to decline as the population of the organization increases. This seems to indicate that the typical water organization realizes economies of scale in water production. Organizations that are able to experience economies of scale[7] are able to charge lower rates due to the decrease in the average cost required to serve customers.

Second, the normalized mean base minimum rate tends to increase as the intensity or complexity of water treatment increases. This indicates that more complex water treatment methods result in increased water treatment costs.

Table A1-2. Residential water: mean base minimum rate (2,000 gallons) by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$23.15 13 orgs	11.0%	$12.01 1 org	$26.55 4 orgs	$26.57 5 orgs	$16.61 3 orgs
Class C	$17.60 24 orgs	20.3%	0 orgs	$20.20 16 orgs	$17.44 3 orgs	$9.39 5 orgs
Class D	$19.69 75 orgs	63.6%	$22.48 14 orgs	$20.56 44 orgs	$14.06 14 orgs	$16.70 3 orgs
Class E	$21.09 6 orgs	5.1%	$10.00 1 org	$21.81 5 orgs	$17.50 1 org	0 orgs
All classes	**$19.72 118 orgs**	**100.0%**	**$21.78 15 orgs**	**$20.92 69 orgs**	**$17.81 23 orgs**	**$13.36 11 orgs**

[7] The term "economies of scale" refers to the reduced average costs per unit of production (i.e., 1,000 gallons of water) that results from an increased level of production or an increase in the size (scale) of the production plant (water system treatment facility).

It is also interesting to examine the mean base minimum rate by organization type (**Table A1-3**) for the 118 organizations that reported rate information and did not use zero gallons as the base minimum amount. Districts have the highest average base minimum rate (normalized to 2,000 gallons of usage) at $30; however, only two districts responded to the survey. The 88 associations that did not utilize zero gallons as the base unit amount had an average base unit charge of $20.63, while the 22 municipalities and six privately owned organizations had similar average base unit charges of $16.21 and $15.80, respectively.

Table A1-3. Residential water: mean base minimum rate (2,000 gallons) by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$30.00 2 orgs	1.7%	0 orgs	$45.00 1 org	$15.00 1 org	0 orgs
Municipality	$16.21 22 orgs	18.6%	$17.67 3 orgs	$17.82 11 orgs	$19.17 3 orgs	$10.01 5 orgs
Private	$15.80 6 orgs	5.1%	$26.67 1 org	$12.21 3 orgs	$19.00 1 org	$15.80 1 org
Association	$20.63 88 orgs	74.6%	$22.46 11 orgs	$21.59 54 orgs	$17.67 18 orgs	$20.63 5 orgs
All org types	**$19.72** **118 orgs**	**100.0%**	**$21.78** **15 orgs**	**$20.92** **69 orgs**	**$17.81** **23 orgs**	**$13.36** **11 orgs**

Table A1-4 presents the mean base minimum amount by population class and geographic location. It is interesting to note that the Coastal Region (northeast Mississippi) has the lowest mean base minimum rate, while the Capital/River Region has the highest mean base minimum rate. The Delta Region has the second highest mean base minimum rate, followed by the Pines Region and then the Hills Region. This trend is generally seen throughout the organization population classes as well.

Table A1-4. Residential water: mean base minimum rate (2,000 gallons) by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$25.98 22 orgs	18.6%	$17.67 3 orgs	$28.96 13 orgs	$28.47 4 orgs	$14.18 2 orgs
Coastal	$14.72 22 orgs	18.6%	0 orgs	$16.41 14 orgs	$12.18 7 orgs	$8.81 1 org
Delta	$25.26 9 orgs	7.6%	$26.18 6 org	$23.89 2 orgs	0 orgs	$22.50 1 org
Hills	$17.00 36 orgs	30.5%	$16.67 4 orgs	$18.25 22 orgs	$17.75 6 orgs	$9.35 4 orgs
Pines	$20.40 29 orgs	24.6%	$25.00 2 orgs	$21.55 18 orgs	$17.33 6 orgs	$16.61 3 orgs
All regions	**$19.72 118 orgs**	**100.0%**	**$21.78 15 orgs**	**$20.92 69 orgs**	**$17.81 23 orgs**	**$13.36 11 orgs**

Of the 121 organizations that reported their block rate customer usage levels and associated charges, 109 organizations (90.1 percent) use 1,000 gallons as the block customer usage level for the first and second residential blocks (this number increased to 117 for the third, fourth, and fifth reported blocks). The remaining customer usage levels for the first residential block ranged from 2,000 gallons to 28,000 gallons.

As a result of the varied block sizes, it is necessary to normalize the charges per customer usage block in the same manner as the base minimum amounts above. Given the overwhelming prevalence of the 1,000-gallon block size, all responses are normalized to this block size.[8] **Table A1-5** provides the number of responding organizations and the mean of the first 1,000-gallon flow rate block by population class and water treatment class while **Table A1-5** provides the same type of information by population class and organization type.

Table A1-5 reveals several interesting pieces of information. First, with the exception of Class C organizations, large organizations have higher average flow rates than do other organization sizes. Furthermore, while Class E organizations do not treat water (these organizations purchase water from other organizations), Class E organizations have the highest mean flow rate for small organizations and the second highest mean flow rate for medium organizations. This suggests that the true cost of purchased water is recognized by the organization selling to the Class E organizations responding to this survey. This is reinforced by examining the mean block flow rate for all population classes in each treatment class. The mean flow rate falls from $5.86 for Class B organizations to $4.13 for Class D organizations but then increases to $6.22 for Class E organizations.

Table A1-5. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$5.86 13 orgs	10.7%	$3.22 1 org	$5.90 4 orgs	$5.88 5 orgs	$6.67 3 orgs
Class C	$4.51 24 orgs	19.8%	0 orgs	$4.96 16 orgs	$4.42 3 orgs	$3.11 5 orgs
Class D	$4.13 78 orgs	64.5%	$4.03 15 orgs	$4.33 45 orgs	$3.43 15 orgs	$5.15 3 orgs
Class E	$6.22 6 orgs	5.0%	0 orgs	$6.31 5 orgs	$5.80 1 org	0 orgs
All classes	**$4.50 121 orgs**	**100.0%**	**$3.98 16 orgs**	**$4.71 70 orgs**	**$4.16 24 orgs**	**$4.64 11 orgs**

[8] It is important to note that there is no "bleed-over" between the block flow amounts. For example, if an organization utilized 1,500-gallon blocks with the first block being $10 and the second being $15, then the normalized rate for the first block would be $6.67 ($10 ÷ 1,000/1,500), and the second block would be $10 ($15 ÷ 1,000/1,500). The additional 500 gallons from the first block is not carried over into the second block.

Table A1-6 reveals some interesting information as well. With the exception of very small municipalities, the mean flow rate charged by municipalities declines as the population increases, but there is a substantial increase in the mean flow rate charged by large associations over the other association population classes. Also, since there are only two districts and six private organizations that provided this information, the reader should use particular caution when making assumptions of the ability of the reported information for these organization types to adequately include the actual cost of producing water.

Table A1-6. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.63 2 orgs	1.7%	0 orgs	$7.00 1 org	$2.25 1 org	0 orgs
Municipality	$3.63 24 orgs	19.8%	$2.91 4 orgs	$3.95 11 orgs	$3.74 4 orgs	$3.42 5 orgs
Private	$3.06 6 orgs	5.0%	$4.00 1 org	$2.95 3 orgs	$2.38 1 org	$3.15 1 org
Association	$4.82 89 orgs	73.6%	$4.37 11 org	$4.91 55 orgs	$4.46 18 orgs	$6.15 5 orgs
All org types	**$4.50 121 orgs**	**100.0%**	**$3.98 16 orgs**	**$4.71 70 orgs**	**$4.16 24 orgs**	**$4.64 11 orgs**

Table A1-7 presents the mean flow rate for the first 1,000 gallons of water above the base minimum amount by geographic location. In contrast to **Table A1-4**, the Delta Region has the lowest mean flow rate, and the Pines Region has the highest, followed closely by the Capital/River Region. Comparison of **Table A1-4** and **Table A1-7** suggests that organizations that have higher base minimum rates typically have lower flow rates. The converse is true as well.

Table A1-7. Residential water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$5.19 23 orgs	19.0%	$4.16 3 orgs	$5.71 13 orgs	$5.12 4 orgs	$3.56 2 orgs
Coastal	$4.06 22 orgs	18.2%	0 orgs	$4.45 14 orgs	$3.39 7 orgs	$3.32 1 org
Delta	$3.18 9 orgs	7.4%	$2.92 6 org	$2.93 2 orgs	0 orgs	$5.25 1 org
Hills	$4.02 36 orgs	29.8%	$4.59 4 orgs	$3.82 22 orgs	$4.46 6 orgs	$3.83 4 orgs
Pines	$5.24 31 orgs	25.6%	$5.13 3 orgs	$5.43 19 orgs	$3.97 6 orgs	$6.67 3 orgs
All regions	**$4.50 121 orgs**	**100.0%**	**$3.98 16 orgs**	**$4.71 70 orgs**	**$4.16 23 orgs**	**$4.64 11 orgs**

Table A1-8, **Table A1-9**, and **Table A1-10** provide the average of all flow rates reported by the individual organization normalized to 1,000-gallon blocks by population class, treatment class, organization type, and geographic location. Note that in many cases, the mean rate provided in **Table A1-8**, **A1-9**, and **Table A1-10** for a specific classification is the same as was provided in **Table A1-5**, **Table A1-6**, and **A1-7**, thus indicating that these organizations utilized a uniform block rate structure. If the information contained in **Tables A1-8** through **A1-10** is different from that contained in **Tables A1-5** through **A1-7**, the values recorded in Tables A1-8 through **A1-10** are typically lower. This indicates that the organizations utilize a decreasing block rate system more than an increasing block rate system, affirming the information presented in **Table 2**.

The information provided in **Table A1-8** confirms that presented in **Table A1-5**. The average flow rate for all blocks increases as treatment complexity increases with the exception of Class E organizations. The mean flow rate for all blocks increases for Class B and Class D organizations as the population of the organization increases, but this does not hold for Class C organizations. However, with the exception of the very small organizations, the average flow rate for all blocks declines for all organizations as organization population increases except for a slight uptick in the average flow rate for large organizations.

Table A1-8. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$5.79 13 orgs	10.7%	$3.22 1 org	$5.67 4 orgs	$5.88 5 orgs	$6.67 3 orgs
Class C	$4.45 24 orgs	19.8%	0 orgs	$4.89 16 orgs	$4.42 3 orgs	$3.04 5 orgs
Class D	$4.11 78 orgs	64.5%	$3.94 15 orgs	$4.37 45 orgs	$3.42 15 orgs	$4.52 3 orgs
Class E	$6.24 6 orgs	5.0%	0 orgs	$6.33 5 orgs	$5.80 1 org	0 orgs
All classes	**$4.46** **121 orgs**	**100.0%**	**$3.90** **16 orgs**	**$4.70** **70 orgs**	**$4.16** **24 orgs**	**$4.43** **11 orgs**

The information reported in **Table A1-9** corresponds closely to that reported in **Table A1-6**. The average flow rate for all 1,000-gallon blocks declines for municipalities as the population of the municipality increases with the exception of the very small municipalities. The average flow rate for all blocks is relatively constant for associations across smaller populations but is significantly higher for large population associations. It is difficult to discern any type of trend for private organizations or districts due to the small number of these organization types that responded.

Table A1-9. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.63 2 orgs	1.7%	0 orgs	$7.00 1 org	$2.25 1 org	0 orgs
Municipality	$3.53 24 orgs	19.8%	$2.91 4 orgs	$3.95 11 orgs	$3.74 4 orgs	$2.95 5 orgs
Private	$2.93 6 orgs	5.0%	$4.00 1 org	$2.63 3 orgs	$2.38 1 org	$3.29 1 org
Association	$4.82 89 orgs	73.6%	$4.25 11 org	$4.92 55 orgs	$4.45 18 orgs	$6.15 5 orgs
All org types	**$4.46** **121 orgs**	**100.0%**	**$3.90** **16 orgs**	**$4.70** **70 orgs**	**$4.16** **24 orgs**	**$4.43** **11 orgs**

Table A1-10 presents the mean of all flow rates above the base minimum rate tabulated by population class and geographic location. The information presented in this table is closely related to **Table A1-7**, reinforcing the earlier finding that most organizations utilize a uniform block flow rate structure. As with other examples presented in this section (**Table A1-8** and **Table A1-9**), the mean of all block flow rates is generally less than the mean of the first block flow rate above the base minimum, suggesting that organizations that do not employ a uniform block rate structure have generally adopted a decreasing block rate structure.

Table A1-10. Residential water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$5.07 23 orgs	19.0%	$4.16 3 orgs	$5.64 13 orgs	$5.12 4 orgs	$2.62 2 orgs
Coastal	$4.00 22 orgs	18.2%	0 orgs	$4.35 14 orgs	$3.39 7 orgs	$3.32 1 org
Delta	$3.02 9 orgs	7.4%	$2.68 6 org	$2.93 2 orgs	0 orgs	$5.25 1 org
Hills	$4.02 36 orgs	29.8%	$4.59 4 orgs	$3.85 22 orgs	$4.46 6 orgs	$3.74 4 orgs
Pines	$5.28 31 orgs	25.6%	$5.13 3 orgs	$5.50 19 orgs	$3.94 6 orgs	$6.67 3 orgs
All regions	**$4.46 121 orgs**	**100.0%**	**$3.90 16 orgs**	**$4.70 70 orgs**	**$4.16 23 orgs**	**$4.43 11 orgs**

Table A1-11, **Table A1-13**, **Table A1-15**, and **Table A1-17** provide mean base minimum rate (normalized to 2,000 gallons) statistical summaries by population class, treatment class, organization type, and geographic location, respectively. **Table A1-12**, **Table A1-14**, **Table A1-16**, and **Table A1-18** provide statistical summaries for the first 1,000-gallon block above the base minimum amount and the average rates for all flow blocks population class, treatment class, organization type, and geographic location. There are several interesting points to note from these tables.

- The minimum base minimum and flow rates reported for each organization metric tend to suggest that the true cost of producing and distributing finished water to customers is not being calculated (or at least implemented) for some organizations. However, given the mean rates and charges , this seems to be the exception rather than the rule.
- Organizations selling water to Class E organizations seem to be more adept at recouping or covering labor and equipment costs due to the higher rates charged by the Class E organizations.
- Municipalities typically have lower flow rates (charge less) than associations for each of the statistical measures presented. This is likely due to a municipality having a more population-dense customer base with a corresponding smaller geographic distribution system than associations.
- There seems to be a "trade-off" between the level of the base minimum rate and the flow rates for organizations based on geographic location. The Delta Region has a relatively high base minimum rate, but charges lower flow rates. On the other hand, the Hills Region and the Coastal Region charge relatively low base minimum rates and relatively high flow rates. High base minimum rates tend to place most of the cost for system maintenance and upgrades on customers that use low amounts of water while higher flow rates tend to place system costs on high users.

Table A1-11. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class.

POPULATION CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Very small	15	$21.78	$12.01	$50.00
Small	69	$20.92	$8.13	$60.00
Medium	23	$17.81	$1.25	$45.67
Large	11	$13.36	$5.80	$22.50
All pop classes	**118**	**$19.72**	**$1.25**	**$60.00**

Table A1-12. Residential water: mean, maximum, and minimum residential block flow rates by population class.

POPULATION CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Very small	$3.98	$2.00	$6.35	$3.90	$2.00	$6.35
Small	$4.71	$0.60	$13.00	$4.70	$0.60	$13.00
Medium	$4.16	$2.25	$8.00	$4.16	$2.16	$8.00
Large	$4.63	$2.41	$7.25	$4.43	$2.41	$7.25
All pop classes	**$4.50**	**$0.60**	**$13.00**	**$4.46**	**$0.60**	**$13.00**

Table A1-13. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by water treatment class.

WATER TREATMENT CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Class B	13	$23.15	$11.50	$45.67
Class C	24	$17.60	$5.80	$40.00
Class D	75	$19.69	$1.25	$60.00
Class E	6	$21.09	$15.00	$33.00
All classes	**118**	**$19.72**	**$1.25**	**$60.00**

Table A1-14. Residential water: mean, maximum, and minimum residential block flow rates by water treatment class.

WATER TREATMENT CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Class B	$5.86	$3.22	$9.00	$5.79	$3.22	$9.00
Class C	$4.51	$2.41	$10.18	$4.45	$2.41	$9.64
Class D	$4.13	$0.60	$10.00	$4.11	$0.60	$10.00
Class E	$6.22	$3.03	$13.00	$6.24	$3.13	$13.00
All classes	**$4.50**	**$0.60**	**$13.00**	**$4.46**	**$0.60**	**$13.00**

Table A1-15. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type.

ORGANIZATION TYPE	COUNT	MEAN	MINIMUM	MAXIMUM
District	2	$30.00	$15.00	$45.00
Municipal	22	$16.21	$5.80	$26.00
Private	6	$15.80	$8.13	$26.67
Association	88	$20.63	$1.25	$60.00
All org types	**118**	**$19.72**	**$1.25**	**$60.00**

Table A1-16. Residential water: mean, maximum, and minimum residential block flow rates by organization type.

ORGANIZATION TYPE	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
District	$4.63	$2.25	$7.00	$4.63	$2.25	$7.00
Municipal	$3.63	$0.60	$6.25	$3.53	$0.60	$6.25
Private	$3.06	$2.38	$4.00	$2.93	$1.89	$4.00
Association	$4.82	$1.75	$13.00	$4.82	$1.14	$13.00
All org types	**$4.50**	**$0.60**	**$13.00**	**$4.46**	**$0.60**	**$13.00**

Table A1-17. Residential water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region.

GEOGRAPHIC REGION	COUNT	MEAN	MINIMUM	MAXIMUM
Capital/River	22	$25.98	$12.01	$60.00
Coastal	22	$14.72	$1.25	$23.00
Delta	9	$25.26	$50.00	$26.67
Hills	36	$17.00	$5.80	$32.00
Pines	29	$20.40	$11.50	$28.00
All regions	**118**	**$19.72**	**$1.25**	**$60.00**

Table A1-18. Residential water: mean, maximum, and minimum residential block flow rates by geographic region.

GEOGRAPHIC LOCATION	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Capital/River	$5.19	$2.00	$13.00	$5.07	$1.14	$13.00
Coastal	$4.06	$1.75	$7.50	$4.00	$1.75	$7.50
Delta	$3.18	$0.60	$5.25	$3.02	$0.60	$5.25
Hills	$4.02	$2.00	$7.50	$4.02	$2.00	$7.50
Pines	$5.24	$2.35	$10.18	$5.28	$2.16	$9.64
All regions	**$4.50**	**$0.60**	**$13.00**	**$4.46**	**$0.60**	**$13.00**

APPENDIX II: RATE COMPONENTS FOR COMMERCIAL WATER

While residential water rates and charges tend to attract most of the attention in this type of rate study, commercial water rates play an important role in the overall financial health of the organization. In many cases, the amount of water used by a relatively small number of commercial firms will exceed the consumption by residential customers. Therefore, it is critical that organization managers and board members exercise the same due diligence in analyzing commercial (as well as industrial[9]) water rates as they do with residential rates.

Table A2-1 presents the mean commercial base minimum rate normalized to a 2,000-gallon base and the number of organizations by population class and treatment class, **Table A2-2** presents the same information organized by population class and organization type, and **Table A2-3** presents this information by population class and geographic location.

There are two findings that are of great interest to those concerned with the determination of system/organization water rates. First, with the exception of the very small population class organizations, the mean base minimum rate decreases as the population of the organization increases. This seems to indicate that the typical water organization realizes economies of scale in water production. Organizations that are able to experience economies of scale are able to charge lower rates due to the decrease in the average cost required to serve customers.

Second, one would expect the normalized mean base minimum rate to increase as the complexity of water treatment increases. This would indicate that more complex water treatment methods result in increased water treatment costs. However, this does not seem to be the case with the mean base minimum rate. This metric does decrease as one moves from the Class B to Class C treatment organizations, but then increases substantially for Class D treatment organizations. It is interesting to note that the average commercial Class E charge is lower than the average commercial Class D treatment charge, the same situation that is found when examining the residential base minimum charges (see **Table A1-2**).

Table A2-1. Commercial water: mean base minimum rate (2,000 gallons) by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$21.06 10 orgs	11.6%	$12.01 1 org	$26.73 3 orgs	$23.97 4 orgs	$11.25 2 orgs
Class C	$17.84 18 orgs	20.9%	0 orgs	$20.28 12 orgs	$17.44 3 orgs	$8.47 3 orgs
Class D	$22.32 53 orgs	61.6%	$23.64 6 orgs	$22.79 35 orgs	$21.50 9 orgs	$16.70 3 orgs
Class E	$21.58 5 orgs	5.8%	0 orgs	$22.59 4 orgs	$17.50 1 org	0 orgs
All classes	**$21.19 86 orgs**	**100.0%**	**$21.98 7 orgs**	**$22.44 54 orgs**	**$21.13 17 orgs**	**$12.25 8 orgs**

[9] Due to the low number of organizations that reported having a specific rate structure designated for industrial customers, an analysis of industrial rates is not included in this report.

It is also interesting to examine the average commercial base unit rate by organization type (**Table A2-2**). Districts have the highest average base unit rate (normalized to 2,000 gallons of usage) at $35.00; however, only two districts responded to the survey. The 63 associations that did not utilize zero gallons as the base unit amount had an average commercial base unit charge of $21.31, while the 16 municipalities and five privately owned organizations had average base unit charges of $18.57 and $22.58, respectively. The gap between the mean commercial base minimum charge for municipalities and private organizations is much larger than that for the mean residential base minimum charge for these organization types.

Table A2-2. Commercial water: mean base minimum rate (2,000 gallons) by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$35.00 2 orgs	2.3%	0 orgs	$45.00 1 org	$25.00 1 org	0 orgs
Municipality	$18.57 16 orgs	18.6%	$17.67 3 orgs	$20.51 8 orgs	$25.75 2 orgs	$9.50 3 orgs
Private	$22.58 5 orgs	5.8%	0 orgs	$17.50 3 orgs	$47.90 1 org	$12.50 1 org
Association	$21.31 63 orgs	73.3%	$25.22 4 org	$22.62 42 orgs	$18.06 13 orgs	$14.25 4 orgs
All org types	**$21.19 86 orgs**	**100.0%**	**$21.98 7 orgs**	**$22.44 54 orgs**	**$21.13 17 orgs**	**$12.25 8 orgs**

Table A2-3. Commercial water: mean base minimum rate (2,000 gallons) by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$27.51 18 orgs	20.9%	$15.00 2 orgs	$32.33 11 orgs	$23.47 4 orgs	$15.61 1 org
Coastal	$18.65 17 orgs	19.8%	0 orgs	$17.32 11 orgs	$21.08 6 orgs	0 orgs
Delta	$32.94 5 orgs	5.8%	$32.40 3 orgs	$45.00 1 org	0 orgs	$22.50 1 org
Hills	$16.80 25 orgs	29.1%	$13.33 2 org	$18.10 15 orgs	$21.13 4 orgs	$9.35 4 orgs
Pines	$20.27 21 orgs	24.4%	0 orgs	$21.80 16 orgs	$18.11 3 orgs	$11.25 2 orgs
All regions	**$21.19 86 orgs**	**100.0%**	**$21.98 7 orgs**	**$22.44 54 orgs**	**$21.13 17 orgs**	**$12.25 8 orgs**

As with the residential flow rate charges examined in Appendix 1, it is necessary to normalize flow rates to a common amount (1,000 gallons). **Table A2-4** presents the mean commercial flow rate for the first 1,000 gallons of usage above the base minimum amount and reveals several interesting pieces of information. First, the mean commercial flow rate for the first 1,000 gallons of consumption above the base minimum amount tends to rise as treatment complexity increases, with the exception of Class E organizations. Second, this metric is fairly constant across the small, medium, and large organizations, but it is substantially higher for Class E organizations ($6.57 for the first 1,000 gallons of consumption above the base minimum amount). This suggests that, as with the residential flow rate charges, organizations selling water to Class E organizations are adept at recouping additional costs, thus more closely accounting for the true cost of producing water) involved with additional production levels.

Table A2-4. Commercial water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$5.74 10 orgs	11.5%	$3.22 1 org	$6.00 3 orgs	$6.10 4 orgs	$5.88 2 orgs
Class C	$4.88 18 orgs	20.7%	0 orgs	$5.39 12 orgs	$4.42 3 orgs	$3.28 3 orgs
Class D	$4.18 54 orgs	62.1%	$3.47 7 orgs	$4.30 34 orgs	$3.98 10 orgs	$5.15 3 orgs
Class E	$6.57 5 orgs	5.7%	0 orgs	$6.76 4 orgs	$5.80 1 org	0 orgs
All classes	**$4.64 87 orgs**	**100.0%**	**$3.44 8 orgs**	**$4.83 53 orgs**	**$4.62 18 orgs**	**$4.63 8 orgs**

Table A2-5 presents the normalized mean commercial flow rate for the first 1,000 gallons of consumption above the base minimum amount. The rate pattern for this metric closely follows that of the previous residential discussion. With the exception of very small municipalities, the mean flow rate charged by municipalities declines as organization population increases, but there is a substantial increase in the mean flow rate charged by large associations over the other association population classes. Also, since there are only two districts and six private organizations that provided this information, the reader should use particular caution when making assumptions of the ability of the reported information for these organization types to adequately include the actual cost of producing water.

Table A2-5. Commercial water: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.63 2 orgs	2.3%	0 orgs	$7.00 1 org	$2.25 1 org	0 orgs
Municipality	$3.92 18 orgs	20.7%	$2.93 4 orgs	$4.34 8 orgs	$4.25 3 orgs	$3.79 3 orgs
Private	$3.80 5 orgs	5.7%	0 orgs	$2.95 3 orgs	$7.00 1 org	$3.15 1 org
Association	$4.92 62 orgs	71.3%	$3.94 4 org	$5.01 41 orgs	$4.71 13 orgs	$5.63 4 orgs
All org types	**$4.64** **87 orgs**	**100.0%**	**$3.44** **8 orgs**	**$4.83** **53 orgs**	**$4.62** **18 orgs**	**$4.63** **8 orgs**

Table A2-6 presents the normalized mean flow rate for the first 1,000 gallons of consumption above the base minimum amount categorized by population class and geographic location. The ranked order of rates in this table is very different than was seen in **Table A2-3**. While the Delta Region had the highest mean base minimum rate, it had the lowest mean flow rate, at least for the first flow rate block of usage. This suggests that organizations in the Delta Region tend to place most of the burden for system upgrades and maintenance on low-usage customers. In contrast, the Hills Region and the Pines Region have relatively low mean base minimum rates, but relatively high mean flow rates, suggesting that high-usage customers shoulder more of the burden for system upgrades and maintenance.

Table A2-6. Commercial water: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$5.19 19 orgs	21.8%	$3.24 2 orgs	$5.62 11 orgs	$5.12 5 orgs	$4.70 1 org
Coastal	$4.26 16 orgs	18.4%	0 orgs	$4.32 10 orgs	$4.14 6 orgs	0 orgs
Delta	$3.80 5 orgs	5.7%	$2.84 3 orgs	$5.25 1 org	0 orgs	$5.25 1 org
Hills	$4.06 25 orgs	28.7%	$4.00 2 org	$4.03 15 orgs	$4.45 4 orgs	$3.83 2 orgs
Pines	$5.30 22 orgs	25.3%	$4.50 1 org	$5.33 16 orgs	$5.00 3 orgs	$5.88 4 orgs
All regions	**$4.64 87 orgs**	**100.0%**	**$3.44 8 orgs**	**$4.83 53 orgs**	**$4.62 18 orgs**	**$4.63 8 orgs**

Table A2-7. Commercial water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and water treatment class.

WATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class B	$5.64 10 orgs	11.5%	$3.22 1 org	$5.69 3 orgs	$6.10 4 orgs	$5.64 2 orgss
Class C	$4.80 18 orgs	20.7%	0 orgs	$5.30 12 orgs	$4.42 3 orgs	$3.16 3 orgs
Class D	$4.16 54 orgs	62.1%	$3.47 7 orgs	$4.35 34 orgs	$3.88 10 orgs	$4.52 3 orgs
Class E	$6.59 5 orgs	5.7%	0 orgs	$6.78 4 orgs	$5.80 1 org	0 orgs
All classes	**$4.60 87 orgs**	**100.0%**	**$3.44 8 orgs**	**$4.82 53 orgs**	**$4.57 18 orgs**	**$4.35 8 orgs**

Table A2-7, **Table A2-8**, and **Table A2-9** present the mean of all commercial water flow rates normalized to 1,000 gallons for population class and water treatment class/organization type/geographic location, respectively. With the exception of very small systems, the average of all flow rates tends to fall as organization population increases. Also, the average of all flow rates tends to rise as treatment complexity increases except for Class E organizations. These are the same types of results that were seen for residential charges (see **Table A1-4**).

Table A2-8 reveals that, as with the earlier residential analysis, the average commercial flow rate for municipalities is substantially lower than for associations. Furthermore, the average commercial flow rate for private systems falls below that of municipalities, thus leaving one to wonder if private systems are allowed to generate revenues in a sufficient quantity to cover the true costs of producing water.

Table A2-8. Commercial water: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.63 2 orgs	2.3%	0 orgs	$7.00 1 org	$2.25 1 org	0 orgs
Municipality	$3.78 18 orgs	20.7%	$2.93 4 orgs	$4.33 8 orgs	$4.25 3 orgs	$3.00 3 orgs
Private	$3.44 5 orgs	5.7%	0 orgs	$2.63 3 orgs	$6.01 1 org	$3.29 1 org
Association	$4.93 62 orgs	71.3%	$3.94 4 org	$5.03 41 orgs	$4.71 13 orgs	$5.63 4 orgs
All org types	**$4.60 87 orgs**	**100.0%**	**$3.44 8 orgs**	**$4.82 53 orgs**	**$4.57 18 orgs**	**$4.35 8 orgs**

The information presented in **Table A2-9** closely resembles that shown in **Table A2-6**. This table makes it clear that while most organizations utilize a uniform block rate structure for commercial water rates, those organizations that do not use this type of rate structure typically employ a decreasing block rate structure except for the Pines Region. Mean flow rates tend to decline as organization population increase, with the exception of the very small organizations that have the lowest mean rates of all population classifications.

Table A2-10, **Table A2-12**, **Table A2-14**, and **Table A2-16** provide mean base minimum rate (normalized to 2,000 gallons) statistical summaries by population class, treatment class, organization type, and geographic location, respectively. **Table A2-11**, **Table A2-13**, **Table A2-15**, and **Table A2-17** provide statistical summaries for the first 1,000-gallon block above the base minimum amount and the average rates for all flow blocks by population class, treatment class, organization type, and geographic location. There are several interesting points to note from these tables.

- The base minimum rate and flow rates tend to be higher for commercial water users than for residential water users. This suggests that commercial water users are carrying more of the burden for system upgrades and maintenance than are residential water users.
- The minimum flow rates reported for each organization metric tend to suggest that the true cost of producing and distributing finished water to customers is not being calculated (or at least implemented) for some organizations.
- While most organizations utilize a uniform block rate structure, the prevalent type of structure used if a unform block rate structure is not used is a decreasing block rate structure.
- Organizations selling water to Class E organizations seem to be more adept at recouping or covering labor and equipment costs due to the higher rates charged by the Class E organizations.
- Municipalities typically have lower base minimum flow rates (charge less) than associations for each of the statistical measures presented. This is likely due to a municipality having a more population-dense customer base with a corresponding smaller geographic distribution system than associations.
- While mean flow rates increase as treatment complexity increases for Class D through Class B organizations, this trend cannot be seen for the mean base minimum rates. This suggests that the responding organizations may utilize the base minimum rate for non-variable costs.
- Very small organizations tend to be anomalies in rate levels. Lower base minimum rates and flow rates tend to suggest that many of these systems may not base water rates on the cost of producing and treating water.

Table A2-9. Commercial water: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$5.05 19 orgs	21.8%	$3.24 2 orgs	$5.54 11 orgs	$5.12 5 orgs	$2.82 1 org
Coastal	$4.13 16 orgs	18.4%	0 orgs	$4.23 10 orgs	$3.98 6 orgs	0 orgs
Delta	$3.80 5 orgs	5.7%	$2.84 3 orgs	$5.25 1 org	0 orgs	$5.25 1 org
Hills	$4.05 25 orgs	28.7%	$4.00 2 org	$4.03 15 orgs	$4.45 4 orgs	$3.74 2 orgs
Pines	$5.36 22 orgs	25.3%	$4.50 1 org	$5.42 16 orgs	$5.00 3 orgs	$5.88 4 orgs
All regions	**$4.60 87 orgs**	**100.0%**	**$3.44 8 orgs**	**$4.82 53 orgs**	**$4.57 18 orgs**	**$4.35 8 orgs**

Table A2-10. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class.

POPULATION CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Very small	7	$21.98	$12.01	$56.20
Small	54	$22.44	$10.00	$86.00
Medium	17	$21.13	$8.00	$47.90
Large	8	$12.25	$5.80	$22.50
All pop classes	**86**	**$21.19**	**$5.80**	**$86.00**

Table A2-11. Commercial water: mean, maximum, and minimum residential block flow rates by population class.

POPULATION CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Very small	$3.44	$2.00	$5.00	$3.44	$2.00	$5.00
Small	$4.83	$1.75	$13.00	$4.82	$1.14	$13.00
Medium	$4.62	$2.25	$8.00	$4.57	$2.25	$8.00
Large	$4.63	$3.13	$6.00	$4.35	$2.63	$6.00
All pop classes	**$4.64**	**$1.75**	**$13.00**	**$4.60**	**$1.14**	**$13.00**

Table A2-12. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by water treatment class.

WATER TREATMENT CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Class B	10	$21.06	$11.00	$32.00
Class C	18	$17.84	$5.80	$40.00
Class D	53	$22.32	$8.00	$86.00
Class E	5	$21.58	$15.00	$32.32
All classes	**86**	**$21.19**	**$5.80**	**$86.00**

Table A2-13. Commercial water: mean, maximum, and minimum residential block flow rates by water treatment class.

WATER TREATMENT CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Class B	$5.74	$3.22	$9.00	$5.64	$3.22	$9.00
Class C	$4.88	$3.00	$10.18	$4.80	$2.45	$9.64
Class D	$4.18	$1.75	$7.50	$4.16	$1.14	$7.60
Class E	$6.57	$3.50	$13.00	$6.59	$3.50	$13.00
All classes	**$4.64**	**$1.75**	**$13.00**	**$4.60**	**$1.14**	**$13.00**

Table A2-14. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type.

ORGANIZATION TYPE	COUNT	MEAN	MINIMUM	MAXIMUM
District	2	$35.00	$25.00	$45.00
Municipal	16	$18.57	$5.80	$34.00
Private	5	$22.58	$10.00	$47.90
Association	63	$21.31	$8.00	$86.00
All org types	**86**	**$21.19**	**80**	**$86.00**

Table A2-15. Commercial water: mean, maximum, and minimum residential block flow rates by organization type.

ORGANIZATION TYPE	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
District	$4.63	$2.25	$7.00	$4.63	$2.25	$7.00
Municipal	$3.92	$2.00	$6.25	$3.78	$2.00	$6.25
Private	$3.80	$2.50	$7.00	$3.44	$1.89	$6.01
Association	$4.92	$1.75	$13.00	$4.93	$1.14	$13.00
All org types	**$4.64**	**$1.75**	**$13.00**	**$4.60**	**$1.14**	**$13.00**

Table A2-16. Commercial water: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region.

GEOGRAPHIC REGION	COUNT	MEAN	MINIMUM	MAXIMUM
Capital/River	18	$27.51	$12.01	$86.00
Coastal	17	$18.65	$8.00	$47.90
Delta	5	$32.94	$16.00	$56.20
Hills	25	$16.80	$5.80	$34.00
Pines	21	$20.27	$11.00	$27.00
All regions	**86**	**$21.19**	**$5.80**	**$86.00**

Table A2-17. Commercial water: mean, maximum, and minimum residential block flow rates by geographic region.

GEOGRAPHIC REGION	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Capital/River	$5.19	$2.00	$13.00	$5.05	$1.14	$13.00
Coastal	$4.26	$1.75	$7.50	$4.13	$1.75	$7.50
Delta	$3.80	$2.00	$5.25	$3.80	$2.00	$5.25
Hills	$4.06	$2.00	$7.50	$4.05	$2.00	$7.50
Pines	$5.30	$3.00	$10.18	$5.36	$2.70	$9.64
All regions	**$4.64**	**$1.75**	**$13.00**	**$4.60**	**$1.14**	**$13.00**

APPENDIX III: RATE COMPONENTS FOR RESIDENTIAL WASTEWATER

Thirty-five of the responding organizations indicated that they provided wastewater services to customers. All 26 municipalities that responded to the survey indicate that they provide wastewater services, as well as two districts, four privately owned organizations, and three associations.

Twenty-nine of the 35 organizations (82.9 percent) that indicated that they provided wastewater services provided information on their rates. All of the wastewater-providing organizations utilized some type of a block rate structure with a base minimum and block flow rate.

Base minimum wastewater amounts for these organizations are varied, ranging from zero gallons to 3,000 gallons. **Table A3-1** presents the number of organizations in four base minimum level ranges for wastewater charges delineated by population class, organization type, and wastewater treatment class.

Table A3-1. Number of organizations with base minimum gallon amounts by population class, organization type, and treatment class.

RATE STRUCTURE	POPULATION CLASS	ORGANIZATION TYPE	TREATMENT CLASS
0 gallons (5 organizations)	Very small – 1	Association – 0	Class I – 1
	Small – 1	District – 0	Class II – 2
	Medium – 1	Private – 1	Class III – 1
	Large – 1	Municipal – 3	Class IV – 1
1 to 1,999 gallons (2 organizations)	Very small – 0	Association – 0	Class I – 1
	Small – 1	District – 0	Class II – 0
	Medium – 1	Private – 0	Class III – 1
	Large – 0	Municipal – 2	Class IV – 0
2,000 gallons (18 organizations)	Very small – 1	Association – 2	Class I – 8
	Small – 10	District – 2	Class II – 5
	Medium – 6	Private – 3	Class III – 4
	Large – 2	Municipal – 12	Class IV – 1
2,001 to 3,000 gallons (4 organizations)	Very small – 1	Association – 0	Class I – 0
	Small – 0	District – 0	Class II – 0
	Medium – 0	Private – 0	Class III – 1
	Large – 3	Municipal – 4	Class IV – 3

Given the different levels of usage included in the base minimum gallons used by the different organizations, we "prorated" or normalized the reported base minimum rates to be based on 2,000 gallons of customer water usage for wastewater charges (the most often used base minimum customer usage level) for all observations except the five observations that had a base minimum charge for zero gallons of customer usage.

Table A3-2 presents the mean (average) base minimum rate normalized to 2,000 gallons and the number of organizations included in each treatment class by population class for the 25 organizations that reported rate information and did not use zero gallons as the base minimum amount. Two findings should be of interest to those concerned with the determination of system/organization water rates. First, the mean base minimum rate tends to decline as the population of the organization increases for Class I and Class II wastewater treatment facilities. The exception to this includes an increase from small- to medium-population organizations (the charge for the single Class III wastewater treatment was reported by a very small system and seems to indicate that this system may not account for the cost of treating wastewater in its wastewater base minimum rate).

This trend is evident in the aggregate mean base minimum wastewater charge for all treatment classes across the organization population classes as well. This seems to indicate that the typical organization that provides wastewater services realizes economies of scale between Class III and Class IV treatment facilities if the organization provides a more accurate accounting for treatment costs in its rates. Organizations that are able to experience economies of scale are able to charge lower rates due to the decrease in the average cost required to serve customers.

Table A3-2. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$16.50 9 orgs	36.0%	$14.00 1 org	$18.33 6 orgs	$12.25 2 orgs	0 orgs
Class II	$22.80 5 orgs	20.0%	0 orgs	$24.25 4 orgs	$17.00 1 org	0 orgs
Class III	$18.45 6 orgs	24.0%	$4.88 1 org	$15.84 1 org	$22.50 4 orgs	0 orgs
Class IV	$12.54 5 orgs	20.0%	0 orgs	0 orgs	0 orgs	$12.54 5 orgs
All classes	**$17.44 25 orgs**	**100.0%**	**$9.44 2 orgs**	**$20.26 11 orgs**	**$18.79 7 orgs**	**$12.54 5 orgs**

It is also interesting to examine the mean base minimum rate by organization type (**Table A3-3**) for the 25 organizations that reported rate information and did not use zero gallons as the base minimum amount. Districts have the highest average base minimum rate (normalized to 2,000 gallons of usage) at $43; however, only two districts responded to the survey. The 18 municipalities that did not utilize zero gallons as the base unit amount had an average base unit charge of $13.57, while the two associations and three privately owned organizations had average base unit charges of $13.25 and $26.42, respectively.

Table A3-3. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$43.00 2 orgs	8.0%	0 orgs	$55.00 1 org	$31.00 1 org	0 orgs
Municipality	$13.57 18 orgs	72.0%	$9.44 2 orgs	$14.76 9 orgs	$12.00 3 orgs	$14.12 4 orgs
Private	$26.42 3 orgs	12.0%	0 orgs	$35.00 1 org	$38.00 1 org	$6.25 1 org
Association	$13.25 2 orgs	8.0%	0 orgS	0 orgs	$13.25 2 orgs	0 orgs
All org types	**$17.44 25 orgs**	**100.0%**	**$9.44 2 orgs**	**$20.26 11 orgs**	**$18.79 7 orgs**	**$12.54 5 orgs**

Table A3-4 provides information on the normalized mean base minimum rate for residential wastewater customers categorized by organization population and geographic location. The ranking and level of these rates bear little semblance to the same analysis found for residential water rates found in **Table A1-4**. The Coastal Region has the highest mean base rate, while the Hills Region had the lowest. Given the relatively low number of responses for this service, the reader is encouraged to use caution in using this information as a guideline to set rates or discern trends.

Table A3-4. Residential wastewater: mean base minimum rate (2,000 gallons) by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$21.90 5 orgs	20.0%	$4.88 1 org	$35.42 2 orgs	0 orgs	$16.89 2 orgs
Coastal	$26.85 5 orgs	20.0%	0 orgs	$35.00 1 org	$28.67 3 orgs	$13.25 1 org
Delta	$14.00 1 org	4.0%	$14.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$11.96 7 orgs	28.0%	0 orgs	$12.67 3 orgs	$15.00 2 orgs	$7.84 2 orgs
Pines	$13.50 7 orgs	28.0%	0 orgs	$15.80 5 orgs	$7.75 2 orgs	0 orgs
All regions	**$17.44 25 orgs**	**100.0%**	**$9.44 2 orgs**	**$20.26 11 orgs**	**$18.79 7 orgs**	**$12.54 5 orgs**

Of the 28 organizations that reported block rate customer usage levels and associated charges, 26 organizations (92.9 percent) used 1,000 gallons as the block customer usage level for all blocks. The other two customer usage levels for the first residential block were 5,000 gallons and 12,717 gallons.

As a result of the varied block sizes, it is necessary to normalize the charges per customer usage block in the same manner as the base minimum amounts above. Given the overwhelming prevalence of the 1,000-gallon block size, all responses are normalized to this block size. **Table A3-5** provides the number of responding organizations and the mean of the first 1,000-gallon flow rate block by population class and treatment class, **Table A3-6** provides the same type of information by population class and organization type, and **Table A3-7** provides the information by population class and geographic location.

Table A3-5 reveals several interesting pieces of information. First, with the exception of Class I organizations, large population organizations have higher average flow rates than do other population classes. Furthermore, while Class IV organizations (the most complex wastewater treatment methodology) have the highest mean flow rate, the highest mean flow rate is for the one Class II medium-population organization. With the possible exceptions of the medium-population Class I organizations and the Class I and Class III very small population organizations, it seems at first glance that the true cost of treating wastewater is recognized by the organizations providing this service. This is reinforced by examining the mean flow rate for all population classes in each treatment class. The mean flow rate falls from $3.73 for Class IV organizations to $3.34 for Class I organizations.

However, the conventional wisdom is that the cost of treating wastewater is higher than the cost of treating raw water. If this is correct, then the majority of the responding organizations either have not recognized the true cost of providing wastewater services or are using revenue from water sales to subsidize wastewater treatment costs if the comparison between the mean flow rate for the first 1,000 gallons for treating wastewater ($3.73) is lower than the flow rate for drinking water ($4.50; see **Table A1-5** through **Table A1-10**).

Table A3-5. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$3.34 9 orgs	32.1%	$2.00 1 org	$4.20 6 orgs	$1.40 2 orgs	0 orgs
Class II	$4.03 7 orgs	25.0%	$4.40 1 org	$3.86 4 orgs	$4.75 1 org	$3.64 1 org
Class III	$3.82 7 orgs	25.0%	$1.72 1 org	$2.99 1 org	$4.40 5 orgs	0 orgs
Class IV	$3.87 5 orgs	17.9%	0 orgs	0 orgs	0 orgs	$3.87 5 orgs
All classes	**$3.73 28 orgs**	**100.0%**	**$2.71 3 orgs**	**$3.97 11 orgs**	**$3.70 8 orgs**	**$3.83 6 orgs**

Table A3-6 reveals that the mean flow rate charged by municipalities increases as population increases and this trend holds for the mean flow rate for the first 1,000 gallons of consumption for all organizations as well. Private organizations have the highest overall flow rate for the first 1,000 gallons of consumption, followed by districts. Associations have the lowest flow rate for the first 1,000 gallons of consumption. Since there are only two districts, two association, and two private organizations providing information regarding wastewater rates, the reader should use particular caution when making assumptions of the ability of the reported information for these organization types to adequately include the actual cost of wastewater treatment.

Table A3-6. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$5.75 2 orgs	7.1%	0 orgs	$7.00 1 org	$4.50 1 org	0 orgs
Municipality	$3.41 21 orgs	75.0%	$2.71 3 orgs	$3.08 9 orgs	$3.61 4 orgs	$4.29 5 orgs
Private	$5.10 3 orgs	10.7%	0 orgs	$8.98 1 org	$4.76 1 org	$1.58 1 org
Association	$2.93 2 orgs	7.1%	0 orgS	0 orgs	$2.93 2 orgs	0 orgs
All org types	**$3.73** **28 orgs**	**100.0%**	**$2.71** **3 orgs**	**$3.97** **11 orgs**	**$3.83** **8 orgs**	**$3.73** **6 orgs**

Table A3-7 shows that the ranking for the first mean flow block above the base minimum closely resembles the ranking found in **Table A1-4** for the mean base minimum rates. The Delta Region has the lowest mean flow rate, while the Coastal Region has the highest (likely due to the presence of county utility authorities formed to treat wastewater from utilities on the coast after Hurricane Katrina; these utility authorities typically set the flow rate charges for member utilities).

Table A3-7. Residential wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$3.90 6 orgs	21.4%	$1.72 1 org	$5.00 2 orgs	$3.95 1 org	$3.88 2 orgs
Coastal	$5.66 5 orgs	17.9%	0 orgs	$8.98 1 org	$4.67 3 orgs	$5.30 1 org
Delta	$2.00 1 org	3.6%	$2.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$3.05 8 orgs	28.6%	0 orgs	$2.33 3 orgs	$3.75 2 orgs	$3.31 3 orgs
Pines	$3.27 8 orgs	28.6%	$4.40 1 org	$3.54 5 orgs	$2.05 2 orgs	0 orgs
All regions	**$3.73 28 orgs**	**100.0%**	**$2.71 3 orgs**	**$3.97 11 orgs**	**$3.70 8 orgs**	**$3.83 6 orgs**

Table A3-8, **Table A3-9**, and **Table A3-10** provide the average of all flow rates reported by the individual organization normalized to 1,000-gallon blocks by population class and treatment class/organization type/geographic location, respectively. Note that in many cases, the information provided in these tables for a specific population class and treatment class/organization type/geographic location is the same as was provided in **Table A3-5**, **Table A3-6**, and **Table A3-7**, thus indicating that these organizations utilized a uniform block rate structure. If the information contained in **Tables A3-5** through **A3-10**, **Table A3-6**, and **Table A3-7** is different from that contained in **Tables A3-5** through **A3-7**, the values recorded in **Tables A3-8** through **A3-10** are typically lower. This indicates that the organizations utilize a decreasing block rate system more than an increasing block rate system, affirming the information presented in **Table 2** above.

The information provided in **Table A3-8** confirms **Table A3-5**. The mean flow rate for all blocks increases as treatment complexity increases with the exception of a reduction for Class III organizations. This decline is due in large part to the relatively low rate charged by one Class III organization that is in the very small population class.

Table A3-8. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$2.87 9 orgs	32.1%	$2.00 1 org	$3.51 6 orgs	$1.40 2 orgs	0 orgs
Class II	$4.02 7 orgs	25.0%	$4.40 1 org	$3.84 4 orgs	$4.75 1 org	$3.64 1 org
Class III	$3.82 7 orgs	25.0%	$1.72 1 org	$2.99 1 org	$4.40 5 orgs	0 orgs
Class IV	$3.99 5 orgs	17.9%	0 orgs	0 orgs	0 orgs	$3.99 5 orgs
All classes	**$3.60 28 orgs**	**100.0%**	**$2.71 3 orgs**	**$3.58 11 orgs**	**$3.70 8 orgs**	**$3.94 6 orgs**

The information reported in **Table A3-9** corresponds closely to that reported in **Table A3-6**. The average flow rate for all 1,000-gallon blocks increases for municipalities as the population of the municipality increases. Districts have the highest mean flow rate, followed closely by the private organizations.

Municipalities have a slightly higher average rate than associations. Again, it is difficult to discern any type of trend for private organizations, districts, or association due to the small number of these organization types that responded or indicated that they provided wastewater services.

Table A3-9. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$5.75 2 orgs	7.1%	0 orgs	$7.00 1 org	$4.50 1 org	0 orgs
Municipality	$3.44 21 orgs	75.0%	$2.71 3 orgs	$3.06 9 orgs	$3.61 4 orgs	$4.41 5 orgs
Private	$3.85 3 orgs	10.7%	0 orgs	$5.22 1 org	$4.76 1 org	$3.85 1 org
Association	$2.93 2 orgs	7.1%	0 orgS	0 orgs	$2.93 2 orgs	0 orgs
All org types	**$3.61 28 orgs**	**100.0%**	**$2.71 3 orgs**	**$3.62 11 orgs**	**$3.70 8 orgs**	**$3.94 6 orgs**

As with previous analyses, the information in **Table A3-10** closely corresponds to that found in **Table A3-7**. Calculating the mean of all flow rate blocks shows that the Coastal Region continues to have the highest flow rates and the Delta Region the lowest. It is interesting that while the other regions change rank significantly depending on the rate type (base minimum versus flow rate), service (water versus wastewater), or customer type (residential versus commercial) being analyzed, the Capital/River Region charges among the higher rates.

Table A3-11, **Table A3-13**, **Table A3-15** and **Table A3-17** provide summaries of the counts, mean, minimum, and maximum rates for the mean residential wastewater base minimum rates normalized to 2,000 gallons by population class, treatment class, organization type, and geographic location. **Table A3-12**, **Table A3-14**, **Table A3-16** and **Table A3-18** provide summaries of the mean, minimum, and maximum rates for the first 1,000-gallon block above the base minimum amount and the average rates for all flow blocks by population class, treatment class, organization type, and geographic location. There are several interesting points to note from these tables.

- The minimum flow rates reported for each organization metric tend to suggest that the true cost of treating wastewater is not being calculated (or at least implemented) for some organizations. This seems to be particularly true for organizations with very small populations.
- Except for a slight decline in the average charge for Class III wastewater treatment facilities, the average wastewater charge per 1,000 of water sold increases as treatment complexity increases.
- Districts and private systems typically have higher flow rates than municipalities or associations for each of the measures presented. In some municipal cases, this is likely due to a municipality having a more population-dense customer base with a corresponding smaller geographic distribution system than districts or associations. However, the low rates exhibited by other municipal organizations, as well as with the two associations having wastewater services that responded to the survey, suggest that the base minimum rate or block flow rate charges are not of a sufficient magnitude to capture the true or full cost of treating wastewater or that wastewater collection and/or treatment is subsidized by water rates.
- There is large variation between the minimum and maximum residential wastewater rates, particularly in the Capital/River, Hills, and Pines Regions. While determining the appropriateness of rate structures for specific systems is beyond the scope of this study, this large variation does suggest that educational programs in setting wastewater rates could be effective in promoting sustainability.

Table A3-10. Residential wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$4.01 6 orgs	21.4%	$1.72 1 org	$5.00 2 orgs	$3.95 1 org	$3.19 2 orgs
Coastal	$4.91 5 orgs	17.9%	0 orgs	$5.22 1 org	$4.67 3 orgs	$5.30 1 org
Delta	$2.00 1 org	3.6%	$2.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$3.00 8 orgs	28.6%	0 orgs	$2.20 3 orgs	$3.75 2 orgs	$3.31 3 orgs
Pines	$3.26 8 orgs	28.6%	$4.40 1 org	$3.52 5 orgs	$2.05 2 orgs	0 orgs
All regions	**$3.60 28 orgs**	**100.0%**	**$2.71 3 orgs**	**$3.58 11 orgs**	**$3.70 8 orgs**	**$3.94 6 orgs**

A3-11. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class.

POPULATION CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Very small	2	$9.44	$4.88	$14.00
Small	11	$20.26	$10.00	$55.00
Medium	7	$18.79	$6.00	$38.00
Large	5	$12.54	$6.25	$18.17
All pop classes	**25**	**$17.44**	**$4.88**	**$55.00**

Table A3-12. Residential wastewater: mean, maximum, and minimum block flow rates by population class.

POPULATION CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Very small	$2.71	$1.72	$4.40	$2.71	$1.72	$4.40
Small	$3.97	$1.80	$8.98	$3.62	$1.80	$7.00
Medium	$3.70	$1.10	$5.80	$3.70	$1.10	$5.80
Large	$3.83	$1.58	$5.30	$3.94	$1.58	$5.30
All pop classes	**$3.73**	**$1.10**	**$8.98**	**$3.61**	**$1.10**	**$7.00**

Table A3-13. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by wastewater treatment class.

WASTEWATER TREATMENT CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Class I	9	$16.50	$9.50	$35.00
Class II	5	$22.80	$10.00	$55.00
Class III	6	$18.45	$4.88	$38.00
Class IV	5	$12.54	$6.25	$18.17
All classes	**25**	**$17.44**	**$4.88**	**$55.00**

Table A3-14. Residential wastewater: mean, maximum, and minimum block flow rates by wastewater treatment class.

WASTEWATER TREATMENT CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Class I	$3.34	$1.10	$8.98	$2.92	$1.10	$5.22
Class II	$4.03	$2.00	$7.00	$4.02	$1.90	$7.00
Class III	$3.82	$1.72	$5.80	$3.82	$1.72	$5.80
Class IV	$4.45	$3.43	$5.30	$3.99	$1.58	$5.30
All classes	**$3.81**	**$1.10**	**$8.98**	**$3.61**	**$1.10**	**$7.00**

Table A3-15. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type.

ORGANIZATION TYPE	COUNT	MEAN	MINIMUM	MAXIMUM
District	2	$43.00	$31.00	$55.00
Municipal	18	$13.57	$4.88	$22.00
Private	3	$26.42	$6.25	$38.00
Association	2	$13.25	$9.50	$17.00
All org types	**25**	**$17.44**	**$4.88**	**$55.00**

Table A3-16. Residential wastewater: mean, maximum, and minimum block flow rates by organization type.

GEOGRAPHIC LOCATION	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
District	$5.75	$4.50	$7.00	$5.75	$4.50	$7.00
Municipal	$3.41	$1.70	$5.80	$3.44	$1.70	$5.80
Private	$6.87	$4.76	$8.98	$3.85	$1.58	$5.22
Association	$2.93	$1.10	$4.75	$2.93	$1.10	$4.75
All locations	**$3.81**	**$1.10**	**$8.98**	**$3.61**	**$1.10**	**$7.00**

Table A3-17. Residential wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region.

GEOGRAPHIC REGION	COUNT	MEAN	MINIMUM	MAXIMUM
Capital/River	5	$21.90	$4.88	$55.00
Coastal	5	$26.85	$13.25	$38.00
Delta	1	$14.00	$14.00	$14.00
Hills	7	$11.96	$6.25	$15.00
Pines	7	$13.50	$6.00	$22.00
All regions	**25**	**$17.44**	**$4.88**	**$55.00**

Table A3-18. Residential wastewater: mean, maximum, and minimum block flow rates by geographic region.

GEOGRAPHIC REGION	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Capital/River	$3.90	$1.72	$7.00	$4.01	$1.72	$7.00
Coastal	$5.66	$4.50	$8.98	$4.91	$4.50	$5.30
Delta	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
Hills	$3.05	$1.58	$5.80	$3.00	$1.58	$5.80
Pines	$3.27	$1.10	$5.00	$3.26	$1.10	$5.00
All regions	**$3.73**	**$1.10**	**$8.98**	**$3.60**	**$1.10**	**$7.00**

APPENDIX IV – RATE COMPONENTS FOR COMMERCIAL WASTEWATER

As with commercial water sales, commercial wastewater charges are an important part of many organizations revenue structure. This section presents an overview of rates and charges reported by responding organizations. However, due to the relatively small number of organizations that submitted commercial wastewater rates, caution should be used in attempting to identify trends or using the information presented to gauge the structure or level of a specific organization's rates.

Table A4-1 presents the mean commercial wastewater base minimum rate normalized to a 2,000-gallon base for organizations that reported a non-zero base minimum rate and the number of organizations categorized by organization population class and treatment class, **Table A4-2** presents the same information organized by population class and organization type, and **Table A4-3** presents the mean base minimum rate by population class and geographic location.

There are three findings that are of great interest to those concerned with the determination of system/organization water rates. First, the mean base minimum rate increases as the population of the organization increases until the large population class is reached. This is likely due to the increasing complexity of wastewater treatment that is required as population increases. The significant decline in the base minimum rate as the reporting organizations reached the large category classification may be due to economies of scale that are realized as the served population increases.

Second, municipal organizations have the lowest mean commercial wastewater base minimum rate of all organization types for those organizations that reported a non-zero base minimum rate for this category. This could indicate that population density and perhaps even the subsidizing of wastewater services by drinking water services play important roles in the determination of municipal rate structures.

Third, the Coastal Region reports significantly higher mean base rates for commercial wastewater customers than does any other location. This may be due to the cost of relatively new infrastructure as a result of damage caused by Hurricane Katrina. Also, given that a substantial proportion of the wastewater in the coastal counties is treated by county utility authorities and that many organizations utilize a pass-through billing, the major cost of local utilities for wastewater involves the collection, rather than the treatment, infrastructure.

Table A4-1. Commercial wastewater: base minimum rate (2,000 gallons) by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$34.20 5 orgs	35.7%	$14.00 1 org	$46.67 3 orgs	$17.00 1 org	0 orgs
Class II	$14.75 2 orgs	14.3%	0 orgs	$12.50 1 org	$17.00 1 org	0 orgs
Class III	$41.68 4 orgs	28.6%	$4.88 1 org	$16.05 1 org	$72.90 2 orgs	0 orgs
Class IV	$10.43 3 orgs	21.4%	0 orgs	0 orgs	0 orgs	$10.43 3 orgs
All classes	**$28.47 14 orgs**	**100.0%**	**$9.44 2 orgs**	**$33.71 5 orgs**	**$44.95 4 orgs**	**$28.47 3 orgs**

Table A4-2. Commercial wastewater: base minimum rate (2,000 gallons) by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$50.00 1 org	7.1%	0 orgs	0 orgs	$50.00 1 org	0 orgs
Municipality	$14.39 9 orgs	64.3%	$9.44 2 orgs	$17.14 4 orgs	$17.00 1 org	$12.53 2 orgs
Private	$67.35 3 orgs	21.4%	0 orgs	$100.00 1 org	$95.80 1 org	$6.25 1 org
Association	$17.00 1 org	7.1%	0 orgS	0 orgs	$17.00 1 org	0 orgs
All org classes	**$28.47 14 orgs**	**100.0%**	**$9.44 2 orgs**	**$33.71 5 orgs**	**$44.95 4 orgs**	**$10.43 3 orgs**

Table A4-3. Commercial wastewater: mean base minimum rate (2,000 gallons) by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$12.18 3 orgs	21.4%	$4.88 1 org	$16.05 1 org	0 orgs	$15.61 1 org
Coastal	$65.70 4 orgs	28.6%	0 orgs	$100.00 1 org	$54.27 3 orgs	0 orgs
Delta	$14.00 1 org	7.1%	$14.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$11.64 5 orgs	35.7%	0 orgs	$12.75 2 orgs	$17.00 1 org	$7.84 2 orgs
Pines	$27.00 1 org	7.1%	0 orgs	$27.00 1 org	0 orgs	0 orgs
All regions	**$28.47 14 orgs**	**100.0%**	**$9.44 2 orgs**	**$33.71 5 orgs**	**$44.95 4 orgs**	**$10.43 3 orgs**

To accurately compare the 18 organizations that reported flow block rate levels and flow block rate charges, it is again necessary to normalize the charges per customer usage block in the same manner as the base minimum amounts above. Given the overwhelming prevalence of the 1,000-gallon block size by survey respondents, all responses are normalized to this block size. **Table A4-4** provides the number of responding organizations and the mean of the first 1,000-gallon flow rate block categorized by population class and treatment class, **Table A4-5** presents the same information classified by population class and organization type, and **Table A4-6** presents this information by population class and geographic location. **Table A4-7**, **Table A4-8**, and **Table A4-9** provide the same information as **Tables A4-4** through **A4-6**, respectively, for the mean of all reported commercial wastewater flow rates (normalized to 1,000-gallon blocks).

The implications of **Tables A4-4** through **A4-6** are very similar to the base minimum rate analysis presented in **Tables A4-1** through **A4-3**. The commercial wastewater rate for the first 1,000 gallons of water usage increases as the treatment type moves from Class I to Class III, but then falls for Class IV treatment facilities. It is likely that the increase in the rate from Class I to Class III organizations is due to increased costs resulting from more complex or costly treatment methods and that the decline in the rate for Class IV organizations is due to an increased population where fixed costs can be spread over a larger number of customers.

Also, municipalities have the lowest first 1,000-gallon flow rate block of any of the organization types, although it is possible that this would change if more organizations that have a specific rate for commercial wastewater customers had responded to the survey.

Table A4-4. Commercial wastewater: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$2.72 6 orgs	33.3%	$2.00 1 org	$3.08 4 orgs	$2.00 1 org	0 orgs
Class II	$3.97 4 orgs	22.2%	$5.25 1 org	$2.25 1 org	$4.75 1 org	$3.64 1 org
Class III	$5.44 5 orgs	27.8%	$1.72 1 org	$3.02 1 org	$7.48 3 orgs	0 orgs
Class IV	$3.54 3 orgs	16.7%	0 orgs	0 orgs	0 orgs	$3.54 3 orgs
All classes	**$3.89** **18 orgs**	**100.0%**	**$2.99** **3 orgs**	**$2.93** **6 orgs**	**$5.84** **5 orgs**	**$3.57** **3 orgs**

Table A4-5. Commercial wastewater: flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.50 1 org	5.6%	0 orgs	0 orgs	$4.50 1 org	0 orgs
Municipality	$3.32 12 orgs	66.7%	$2.99 3 orgs	$3.07 4 orgs	$2.98 2 orgs	$4.23 3 orgs
Private	$5.23 4 orgs	22.2%	0 orgs	$2.66 2 orgs	$14.00 1 org	$1.58 1 org
Association	$4.75 1 org	5.6%	0 orgs	0 orgs	$4.75 1 org	0 orgs
All org types	**$3.89 18 orgs**	**100.0%**	**$2.99 3 orgs**	**$2.93 6 orgs**	**$5.84 5 orgs**	**$3.57 4 orgs**

Table A4-6. Commercial wastewater: mean flow rate (first 1,000 gallons above base minimum) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$3.26 4 orgs	22.2%	$1.72 1 org	$3.02 1 org	$3.95 1 org	$4.34 1 org
Coastal	$5.72 5 orgs	27.8%	0 orgs	$2.66 2 orgs	$7.75 3 orgs	0 orgs
Delta	$2.00 1 org	5.6%	$2.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$2.70 6 orgs	33.3%	0 orgs	$2.13 2 orgs	$2.00 1 org	$3.31 3 orgs
Pines	$5.13 2 orgs	11.1%	$5.25 1 org	$5.00 1 org	0 orgs	0 orgs
All regions	**$3.89 18 orgs**	**100.0%**	**$2.99 3 orgs**	**$2.93 6 orgs**	**$5.84 5 orgs**	**$3.57 4 orgs**

Table A4-7. Commercial wastewater: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and wastewater treatment class.

WASTEWATER TREATMENT CLASS	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Class I	$4.42 6 orgs	33.3%	$2.00 1 org	$5.64 4 orgs	$2.00 1 org	0 orgs
Class II	$3.97 4 orgs	22.2%	$5.25 1 org	$2.25 1 org	$4.75 1 org	$3.64 1 org
Class III	$5.04 5 orgs	27.8%	$1.72 1 org	$3.02 1 org	$6.82 3 orgs	0 orgs
Class IV	$3.77 3 orgs	16.7%	0 orgs	0 orgs	0 orgs	$3.77 3 orgs
All classes	**$4.39** **18 orgs**	**100.0%**	**$2.99** **3 orgs**	**$4.64** **6 orgs**	**$5.44** **5 orgs**	**$3.74** **3 orgs**

Table A4-8. Commercial wastewater: flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and organization type.

ORGANIZATION TYPE	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
District	$4.50 1 org	5.6%	0 orgs	0 orgs	$4.50 1 org	0 orgs
Municipality	$3.37 12 orgs	66.7%	$2.99 3 orgs	$3.07 4 orgs	$2.98 2 orgs	$4.44 3 orgs
Private	$7.30 4 orgs	22.2%	0 orgs	$7.77 2 orgs	$12.02 1 org	$1.64 1 org
Association	$4.75 1 org	5.6%	0 orgs	0 orgs	$4.75 1 org	0 orgs
All org types	**$4.39** **18 orgs**	**100.0%**	**$2.99** **3 orgs**	**$4.64** **6 orgs**	**$5.44** **5 orgs**	**$3.74** **4 orgs**

Table A4-9. Commercial wastewater: mean flow rate (all flow rates – 1,000-gallon blocks) for block rate systems by population class and geographic region.

GEOGRAPHIC REGION	ALL ORGANIZATIONS	PERCENT REPORTING	VERY SMALL	SMALL	MEDIUM	LARGE
Capital/River	$3.41 4 orgs	22.2%	$1.72 1 org	$3.02 1 org	$3.95 1 org	$4.95 1 org
Coastal	$7.36 5 orgs	27.8%	0 orgs	$7.77 2 orgs	$7.09 3 orgs	0 orgs
Delta	$2.00 1 org	5.6%	$2.00 1 org	0 orgs	0 orgs	0 orgs
Hills	$2.71 6 orgs	33.3%	0 orgs	$2.13 2 orgs	$2.00 1 org	$3.33 3 orgs
Pines	$5.13 2 orgs	11.1%	$5.25 1 org	$5.00 1 org	0 orgs	0 orgs
All regions	**$4.39 18 orgs**	**100.0%**	**$2.99 3 orgs**	**$4.64 6 orgs**	**$5.44 5 orgs**	**$3.74 4 orgs**

Table A4-7, **Table A4-8**, and **Table A4-9** present the means, minimums, and maximums of the first commercial wastewater block flow rate and all commercial wastewater block flow rates combined by organization population class, treatment class, and organization type, respectively. In most cases, there is substantial variation between a particular classification's minimum and maximum. This may suggest that there are systems that are not accounting for the true or full cost of providing wastewater service to commercial customers.

Table A4-10. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by population class.

POPULATION CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Very small	2	$9.44	$4.88	$14.00
Small	5	$33.71	$12.50	$100.00
Medium	4	$44.95	$17.00	$95.80
Large	3	$10.43	$6.25	$15.61
All pop classes	**14**	**$28.47**	**$4.88**	**$100.00**

Table A4-11. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by population class.

POPULATION CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Very small	$2.99	$1.72	$5.25	$2.99	$1.72	$5.25
Small	$2.93	$2.00	$5.00	$4.64	$2.00	$12.99
Medium	$5.84	$2.00	$14.00	$5.44	$2.00	$12.02
Large	$3.57	$1.58	$4.72	$3.74	$1.64	$4.95
All pop classes	**$3.89**	**$1.58**	**$14.00**	**$4.39**	**$1.64**	**$12.99**

Table A4-12. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by wastewater treatment class.

WASTEWATER TREATMENT CLASS	COUNT	MEAN	MINIMUM	MAXIMUM
Class I	5	$34.20	$13.00	$100.00
Class II	2	$14.75	$12.50	$17.00
Class III	4	$41.68	$4.88	$95.80
Class IV	3	$10.43	$6.25	$15.61
All classes	**14**	**$28.47**	**$4.88**	**$100.00**

Table A4-13. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by wastewater treatment class.

WASTEWATER TREATMENT CLASS	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Class I	$2.72	$2.00	$5.00	$4.42	$2.00	$12.99
Class II	$3.97	$2.25	$5.25	$3.97	$2.25	$5.25
Class III	$5.44	$1.72	$14.00	$5.04	$1.72	$12.02
Class IV	$3.54	$1.58	$4.72	$3.77	$1.64	$4.95
All classes	**$3.89**	**$1.58**	**$14.00**	**$4.39**	**$1.64**	**$12.99**

Table A4-14. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by organization type.

ORGANIZATION TYPE	COUNT	MEAN	MINIMUM	MAXIMUM
District	1	$50.00	$50.00	$50.00
Municipal	9	$14.39	$4.88	$27.00
Private	3	$67.35	$6.25	$100.00
Association	1	$17.00	$17.00	$17.00
All org types	**14**	**$28.47**	**$4.88**	**$100.00**

Table A4-15. Commercial wastewater: mean, minimum, and maximum of the first block flow rate and all block flow rates by organization type.

ORGANIZATION TYPE	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
District	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50
Municipal	$3.32	$1.73	$5.25	$3.37	$1.72	$5.25
Private	$5.23	$1.58	$14.00	$7.30	$1.64	$12.99
Association	$4.75	$4.75	$4.75	$4.75	$4.75	$4.75
All org types	**$3.89**	**$1.58**	**$14.00**	**$4.39**	**$1.64**	**$12.99**

Table A4-16. Commercial wastewater: count, mean, maximum, and minimum of mean base minimum rate (2,000 gallons) by geographic region.

GEOGRAPHIC REGION	COUNT	MEAN	MINIMUM	MAXIMUM
Capital/River	3	$12.18	$4.88	$16.05
Coastal	4	$65.70	$17.00	$100.00
Delta	1	$14.00	$14.00	$14.00
Hills	5	$11.64	$6.25	$17.00
Pines	1	$27.00	$27.00	$27.00
All regions	**14**	**$28.47**	**$4.88**	**$100.00**

Table A4-17. Commercial wastewater: mean, maximum, and minimum block flow rates by geographic region.

GEOGRAPHIC REGION	FIRST RESIDENTIAL BLOCK MEAN	FIRST RESIDENTIAL BLOCK MIN.	FIRST RESIDENTIAL BLOCK MAX.	ALL BLOCKS COMBINED MEAN	ALL BLOCKS COMBINED MIN.	ALL BLOCKS COMBINED MAX.
Capital/River	$3.26	$1.72	$4.34	$3.41	$1.72	$4.95
Coastal	$5.72	$2.55	$14.00	$7.36	$2.55	$12.99
Delta	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
Hills	$2.70	$1.58	$4.72	$2.71	$1.64	$4.72
Pines	$5.13	$5.00	$5.25	$5.13	$5.00	$4.72
All regions	**$3.89**	**$1.58**	**$14.00**	**$4.39**	**$1.64**	**$12.99**

Publication 2803 (03-22)

By **Alan Barefield,** PhD, Extension Professor; **Kalyn Coatney,** PhD, Associate Professor; **Adam Nathan**, Student Researcher; and **Emily Durr**, Student Researcher, Department of Agricultural Economics.

Copyright 2022 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

Mississippi State University is an equal opportunity institution. Discrimination in university employment, programs, or activities based on race, color, ethnicity, sex, pregnancy, religion, national origin, disability, age, sexual orientation, gender identity, genetic information, status as a U.S. veteran, or any other status protected by applicable law is prohibited.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director