Introduction

We are pleased to present a summary of the wastewater cost of service study for Knoxville Utilities Board (KUB). This report summarizes the Cost of Service Report that includes additional information, discussion on study results and the significant assumptions used in the development of the cost of service study. The purpose of a cost of service study is to identify the following:

1) Identify the wastewater utility's revenue requirements for fiscal year 2020
2) Identify if cross-subsidies exist between rate classes
3) Identify potential rate adjustments needed to meet targeted revenue requirements
4) Identify the appropriate monthly customer charge for each customer class

Cost of Service Summary Results

The cost of service study determines costs to provide service to each class of customer and assists in design of wastewater rates. The table below provides the cost of service summary results comparing projected costs to serve each customer class with projected revenues from each customer class. The "% change" column is the adjustment necessary to meet projected cost of service requirements. Negative adjustments suggest current rates are collecting more than cost of service and positive adjustments suggest current rates are short of recovering costs spent to serve that customer class.

Customer Class	Cost of Service	Projected Revenues	% Change
Residential	$51,841,782	$47,339,887	9.5%
Nonresidential	45,659,637	50,325,388	-9.3%
Schedule C Holding Tanks (waste pumping trucks)	739,260	679,581	8.8%
Schedule E Wholesale Treatment (service provided to other utility districts)	522,668	417,189	25.3%
Total	**$98,763,348**	**$98,762,045**	**0.0%**

Surcharge Rates			
*Surcharge - BOD (biochemical oxygen demand)	$ 465,481	$ 103,840	348.3%
*Surcharge - SS (suspended solids)	$ 436,598	$ 146,062	198.9%

*Biochemical oxygen demand (BOD) and suspended solids (SS) result from customer wastewater which is more concentrated than average, costing more to treat and causing greater strain on the system.

The study indicates the Nonresidential class is paying rates exceeding their cost of providing service. The Residential class is paying rates below their cost of providing service.

Based on UFS experience, KUB's study results are typical for many utilities around the nation with results showing the Nonresidential class needing less increases and the Residential class greater increases.

Cost of Service Rates

The table below identifies the cost of service rates for each customer class and includes costs for treatment, collection, and direct customer-related. Charging these rates would directly match the cost of providing service to customers identified in the study. The first table below compares the current Inside City customer charges with the cost-based customer charges and the second table identifies the cost-based commodity rates for each Inside City class.

Total Costs by Inside City Customer Class

Customer Class	Current Customer Charge	COS Customer Charge
5/8"	$ 35.90	$ 32.59
1"	50.90	52.65
1.5"	62.90	102.35
2"	82.90	164.88
3"	161.00	307.35
4"	264.00	509.70
6"	562.00	1,013.80
8"	977.00	1,617.90
10"	1,481.00	2,321.99
12"	2,182.00	4,246.57

Customer Class	Average Commodity Charge	COS Average Commodity Charge
Residential	$ 6.12	$ 8.00
Nonresidential	9.51	7.86
Schedule C Holding Tanks (waste pumping trucks)	102.80	111.63
Schedule E Wholesale Treatment (service provided to other utility districts)	5.80	7.23

Residential Customer Charge

The customer charge consists of expenses related to 1) collecting a minimum amount of wastewater from the residential customer, and 2) expenses related to servicing a meter on the customer premise, in effect determining the cost to deliver a single Ccf of wastewater to the utility. The methodology used in this study is consistent with methodologies and practices used in the wastewater industry. The 5/8" meter is most consistent with residential customers. The cost of service study identified minimum system charges of $28.81 in minimum system costs and $3.78 for direct costs to service the 5/8" inside city account. The total monthly customer charge cost breakdown is listed in the table below and includes minimum system costs (blue) and direct costs (brown).

Monthly Customer Charge Cost Breakdown

	5/8" Inside
Customer Service	$ 1.28
Meters	1.06
Services	0.07
Billing	1.37
Collection Facilities	23.78
Collection O&M	5.03
Customer Charge	**$ 32.59**

Based on UFS experience with similar size utilities, KUB's cost-based residential customer charge, in total, is within a normal range. The direct costs to servicing the account are below similar size utilities due to shared costs (economies of scale) between electric, water, gas, and wastewater.

Conclusions:

1) The cost of service study indicates that some customer classes are paying above cost of service and some below cost of service. The KUB Board may consider movement toward cost of service in a gradual manner to limit annual impacts on customers.

2) The cost of service study indicates that some customer classes are paying customer charges below cost of service. The Board may consider applying a portion of future rate adjustments to the monthly customer charge for these classes. KUB cost of service results are common and the residential cost-based customer charge is within a normal range.

UFS Qualifications

Utility Financial Solutions (UFS) has provided cost of service and rate studies for utilities since 2001 and is one of the largest providers of wastewater rate studies in the country. UFS has provided services to some of the largest and smallest utility systems in the United States, Cooperatives and Investor-Owned Utilities. UFS is an international firm providing rate studies in over 38 states, Barbados, Bermuda and Guam. Examples of some of the wastewater studies include; Groton, CT; Danville, VA; Benton, AR; Sikeston, MO; and Holland, MI. Mark Beauchamp, president of Utility Financial Solutions, has been in the utility industry for 37 years with 29 years providing wastewater rate studies. Mark is a frequent speaker at regional and national conferences around the nation on industry rate trends and cost of service.

Introduction

We are pleased to present a summary of the water cost of service study for Knoxville Utilities Board (KUB). This report summarizes the Cost of Service Report that includes additional information, discussion on study results and the significant assumptions used in the development of the cost of service study. The purpose of a cost of service study is to identify the following:

1) Identify the water utility's revenue requirements for fiscal year 2020
2) Identify if cross-subsidies exist between rate classes
3) Identify potential rate adjustments needed to meet targeted revenue requirements
4) Identify the appropriate monthly customer charge for each customer class

Cost of Service Summary Results

The cost of service study determines costs to provide service to each class of customer and assists in design of water rates. The table below provides the cost of service summary results comparing projected costs to serve each customer class with projected revenues from each customer class. The "% change" column is the adjustment necessary to meet projected cost of service requirements. Negative adjustments suggest current rates are collecting more than cost of service and positive adjustments suggest current rates are short of recovering costs spent to serve that customer class.

Customer Class	Cost of Service	Projected Revenues	% Change
Residential	28,662,011	23,749,615	20.7%
Nonresidential	21,166,385	26,175,085	-19.1%
Schedule B Private Fire Service (individual fire lines)	3,568,014	4,187,397	-14.8%
Schedule D Public Fire Service (city fire hydrants)	4,393,052	3,919,518	12.1%
Schedule C (unmetered water from fire hydrants)	154,782	140,578	10.1%
Schedule E Sales for Resale (water sold to other utility districts)	1,502,463	1,276,807	17.7%
Total	**$ 59,446,707**	**$ 59,449,000**	**0.0%**

The study indicates the Nonresidential class is paying rates exceeding their cost of providing service. The Residential class is paying rates below their cost of providing service.

Based on UFS experience, KUB's study results are typical for many utilities around the nation with results showing the Nonresidential class needing less increases and the Residential class greater increases.

Cost of Service Rates

The table below identifies the cost of service rates for each customer class and includes costs for treatment, distribution, direct customer-related, and fire protection costs. Charging these rates would directly match the cost of providing service to customers identified in the study. The first table below compares the current Inside City customer charges with the cost-based customer charges and the second table identifies the cost-based commodity rates for each Inside City class.

Total Costs by Inside City Customer Class

Customer Class	Current Customer Charge	COS Customer Charge
5/8"	$ 18.00	$ 19.73
1"	32.10	30.49
1.5"	44.00	71.32
2"	60.00	99.69
3"	161.00	224.36
4"	266.00	308.45
6"	583.00	543.63
8"	1,026.00	872.81
10"	1,563.00	1,210.43
12"	2,311.00	2,010.54

Customer Class	Current Average Commodity Charge	COS Average Commodity Charge
Residential	$ 2.16	$ 2.83
Nonresidential	3.74	2.65
Schedule C (unmetered water from fire hydrants)	-	2.59
Schedule E Sales for Resale (water sold to other utility districts)	1.70	1.92

Residential Customer Charge

The customer charge consists of expenses related to 1) providing a minimum amount of water to the residential customer, and 2) expenses related to servicing a meter on the customer premise, in effect determining the cost to deliver a single Ccf of water to the customer. The methodology used in this study is consistent with methodologies and practices used in the water industry. The 5/8" meter is most consistent with residential customers. The cost of service study identified minimum system charges of $11.16 in minimum system costs and $8.57 for direct costs to service the 5/8" inside city account. The total monthly customer charge cost breakdown is listed in the table below and includes minimum system costs (blue) and direct costs (brown).

Monthly Customer Charge Cost Breakdown

	5/8" Inside	
Customer Service	$	0.91
Meters		6.30
Services		0.85
Billing		0.51
Distribution Facilities		5.95
Distribution O&M		5.21
Customer Charge	**$**	**19.73**

Based on UFS experience with similar size utilities, KUB's cost-based residential customer charge, in total, is within a normal range. The direct costs to servicing the account are below similar size utilities due to shared costs (economies of scale) between electric, water, gas, and wastewater.

Conclusions:

1) The cost of service study indicates that some customer classes are paying above cost of service and some below cost of service. The KUB Board may consider movement toward cost of service in a gradual manner to limit annual impacts on customers.

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