Issue 2: What are the appropriate customer service characteristics to use for the cost allocation process (e.g., flow, BOD, TSS, etc.)?

Overview of the Issue

Regardless of cost allocation approach selected, the cost-of-service analyses will require the selection of customer service characteristics for the cost allocations. The selection of the customer service characteristics determines which measures of wastewater strength are included in the cost allocations.

In developing an appropriate list of customer service characteristics, the analyst may consider the following standards:

1. Does the utility incur cost to treat the constituent that comprises the customer service characteristic?

2. Do customers vary in their contribution of the constituent under consideration? Is the contribution by customers closely correlated with another customer service characteristic already being used?

3. Can the utility measure the differences in the contributions by customer class with reasonable accuracy?

The first standard considers costs. Since the purpose of identifying a customer service characteristic and the corresponding wastewater constituent is to allocate costs, those constituents that are not treated or controlled may not warrant including in the cost allocations. The constituents that are responsible for costs vary by utility. For example, some utilities are required to control the total heat load they place on their receiving waters. In these cases, utility may incur significant costs to manage the heat of its wastewater discharge and temperature may be an important customer service characteristic. On the other hand, other utilities may not be required to control temperature and spend very little to mitigate this characteristic of wastewater. In some cases, wastewater utilities incur costs to treat a constituent in wastewater even if that constituent is not regulated as part of the utility's discharge permit.

The second standard addresses the variation in contributions of a constituent by customer class. If all customers contribute an equal concentration of the constituent measured by the customer service characteristic in question, then very little benefit would be derived by separating the costs for this additional customer service characteristic. Similarly, if the contribution of a constituent under consideration as a customer service characteristic is correlated to another constituent being measured, then the costs of the correlated constituent can be allocated according to the contributions of the original constituent. In general, because of the administrative cost of conducting testing, etc., adding constituents to the list of customer service characteristics should be carefully considered.

The final standard is the ability to accurately measure variations in wastewater contributions by class. Using tests that are subject to significant sampling error may reduce the overall accuracy of the resulting cost allocations. Therefore, the impact of the sampling error should be incorporated in any decision regarding the selection of customer service characteristics.

Description of Alternatives

Many alternative measures of wastewater strength exist. However, considering the three standards listed above, three alternatives appear most relevant to AWU. These are:

1. Flow, BOD, and TSS only (current);
2. Add Total Kjeldahl Nitrogen (TKN)[4]; and
3. Add Phosphorus.

For this evaluation, the current approach is compared to approaches that add either TKN or Phosphorus to the list of customer service characteristics included in the cost allocations. The selection of appropriate customer service characteristics for the cost-of-service analysis depends on the design and operation of the wastewater system.

Evaluation of Alternatives

Overall, our evaluation suggests that AWU may consider collecting sampling data on TKN and Phosphorus to determine the importance of these customer service characteristics in allocating costs in the future. Without adequate data, it may be difficult to implement these cost allocations at this time. Specifically, the utility should consider collecting TKN and Phosphorus data as part of its industrial pretreatment program.

When considering the addition of either customer service characteristic, the administrative burden and risk of implementation were of particular concern. Currently AWU does not collect samples from its industrial pretreatment program for these constituents. Developing accurate cost allocations by customer class would likely require a significant sampling period to acquire adequate data. This sampling period might delay implementation of this study and present other administrative burdens. This likely delay resulted in a lower rating for these alternatives for public acceptance. It is likely that the importance of allocating costs to either TKN or Phosphorus will become increasingly important in the future. For that reason the addition of TKN and Phosphorus were considered to meet the policy durability criterion better than the current approach.

[4]Total Kjeldahl Nitrogen (TKN) is the sum of organic nitrogen, ammonia, NH_3, and ammonium, NH_{4+} in biological wastewater treatment. TKN is determined in the same manner as organic nitrogen, except that the ammonia is not driven off before the digestion step.

The equity criteria generally favored the addition of TKN and Phosphorus. That finding recognizes the impact that these constituents likely have on the treatment costs at AWU's wastewater treatment facilities. Allocating costs to these customer service characteristics likely improves the interclass and intraclass equity of the cost allocations. Intergenerational and inside-outside city equity are likely unaffected by the change in customer service characteristics. The current approach is the most common used throughout the industry, and, therefore, received a slightly higher rating. Although somewhat less common than using flow, BOD, and TSS alone, allocating costs to TKN and Phosphorus are well within the industry standard. Therefore, the difference in rating for this criterion is relatively small.

The customer criteria do not vary based on the alternatives.

Sustainability may be enhanced by adding cost allocations based on TKN or Phosphorus customer service characteristics. If AWU adopts extra-strength surcharges for these constituents, customers with higher loadings may adopt practices that reduce their overall contribution of the constituent to the wastewater system, thereby reducing the environmental impacts of treating these constituents. The other conservation criteria do not vary based on the alternatives.

The financial criteria do not vary based on the alternatives.

Preliminary Findings and Recommendations

The consulting team recommends AWU implement a sampling protocol to develop data on TKN and Phosphorus for its industrial pretreatment program. Once data are available, the consulting team recommends that AWU consider adding these customer service characteristics to its cost-of-service methodology. The consulting team further recommends that the cost-of-service model be developed to facilitate the introduction of these customer service characteristics.

Issue 3: How should I/I be estimated and allocated in the cost allocation process?

Overview of the Issue

The total volume of wastewater at AWU's wastewater treatment plants consists of contributed wastewater and inflow and infiltration (I/I). Infiltration is the flow entering the sanitary sewer resulting from high groundwater or precipitation that occurred days or weeks before the observed flow in the sanitary sewer. Inflow results from rainfall that enters the sanitary collection system through a number of direct connections such as catch basins, roof drains, foundation drains, and manhole covers. The I/I in the system may be estimated based on available studies or comparisons of contributed wastewater and metered plant flows[5]. Customers generally cannot influence the level of I/I in the system. Generally, the utility mitigates I/I to reduce the flow-related costs of treatment and allow the flow-related capacity of the facilities to be available to customers, thereby avoiding expansions of capacities. Utilities generally establish a threshold for cost-effectiveness of I/I abatement measures based on the present worth cost of conveying and treating I/I.

The cost associated with collecting, conveying, and treating I/I must be allocated within the cost-of-service methodology. Currently the assumed I/I flow used to determine the cost of service in AWU's wastewater system is 10.5 percent of total flows.

Description of Alternatives

As described on page 11of this issue paper, the USEPA has issued guidelines on the allocation and recovery of I/I costs using several approaches. Based on these approaches, four alternatives are evaluated here.[6] These are:

1. Combined connections and volume (Current),
2. Contributed wastewater volume,
3. Number of connections, and
4. Land area.

As described on page 12, the primary differences among the alternatives are base on alternative philosophies regarding the appropriate allocation of costs. AWU currently uses the combined approach which attributes 50 percent of the I/I flows to customer classes based on the number of connections and 50 percent based on the class' contributed wastewater flow. The other approaches are consistent with USEPA guidelines.

Evaluation of Alternatives

Implementing the first three alternatives should be simple. A significant administrative burden is expected from using land area since these data are not readily available. For similar reasons, the land area has a greater risk of implementation. Public understanding may be enhanced by a simpler method, so both contributed wastewater volume and number of connections scored somewhat better than the combined approach. The number of connections may be slightly less understandable since most costs spent on I/I are incurred to augment flow-related capacities of the utility (e.g., collection, lift stations, treatment, etc.). All of the alternatives are legally defensible since they are specifically identified by the USEPA. Also, all the alternatives should have similar policy durability.

[5] Water Environment Federation, *Financing and Charges for Wastewater Systems*, Manual No. 27, (Alexandria, VA: Water Environment Federation, 2004).
[6] Since AWU does not base its user charges on *ad valorem* property taxes, the value of property would not be consistent with USEPA guidelines. Therefore, it is not considered in this evaluation.

Interclass and intraclass equity should not be affected by the alternatives. As mentioned above, the difference in philosophies may be reflected by differences in preferences for each of the alternatives. These preferences may be reflected in how one evaluates interclass and intraclass equity. Other than philosophic reasoning, no technical advantage for interclass and intraclass equity exists. Intergenerational and inside/outside city equity would not vary by alternative. Each of the alternatives is consistent with industry standards, but combined approach and land area are relatively less common.

Since residential customers have relatively more connections than flow, allocating I/I to classes based on the number of connections may increase the cost to residential customers, thereby reducing affordability. Similarly, because the combined approach includes an element allocated based on the number of connections, it too may be less affordable. The opposite is likely true for economic development. Since commercial and industrial customers likely have fewer connections than flow, allocating costs based on the number of connections may provide more economic development benefits. Basing the allocation on flow would likely increase the costs to non-residential customers thereby reducing their ratings for economic development. The other customer criteria do not vary based on the alternatives.

Since customers cannot control the system's I/I, the conservation criteria do not vary based on the alternatives.

The financial criteria do not vary based on the alternatives.

Preliminary Findings and Recommendations

The consulting team recommends AWU allocate and recover its I/I cost based on the contributed flow of each customer class. This recognizes the fact that individual customers cannot manage I/I, and that the cost of I/I is primarily in consuming flow-related capacity.

A2908-083

City of Austin
Issue Paper #3: Wastewater Cost Allocations

Attachment

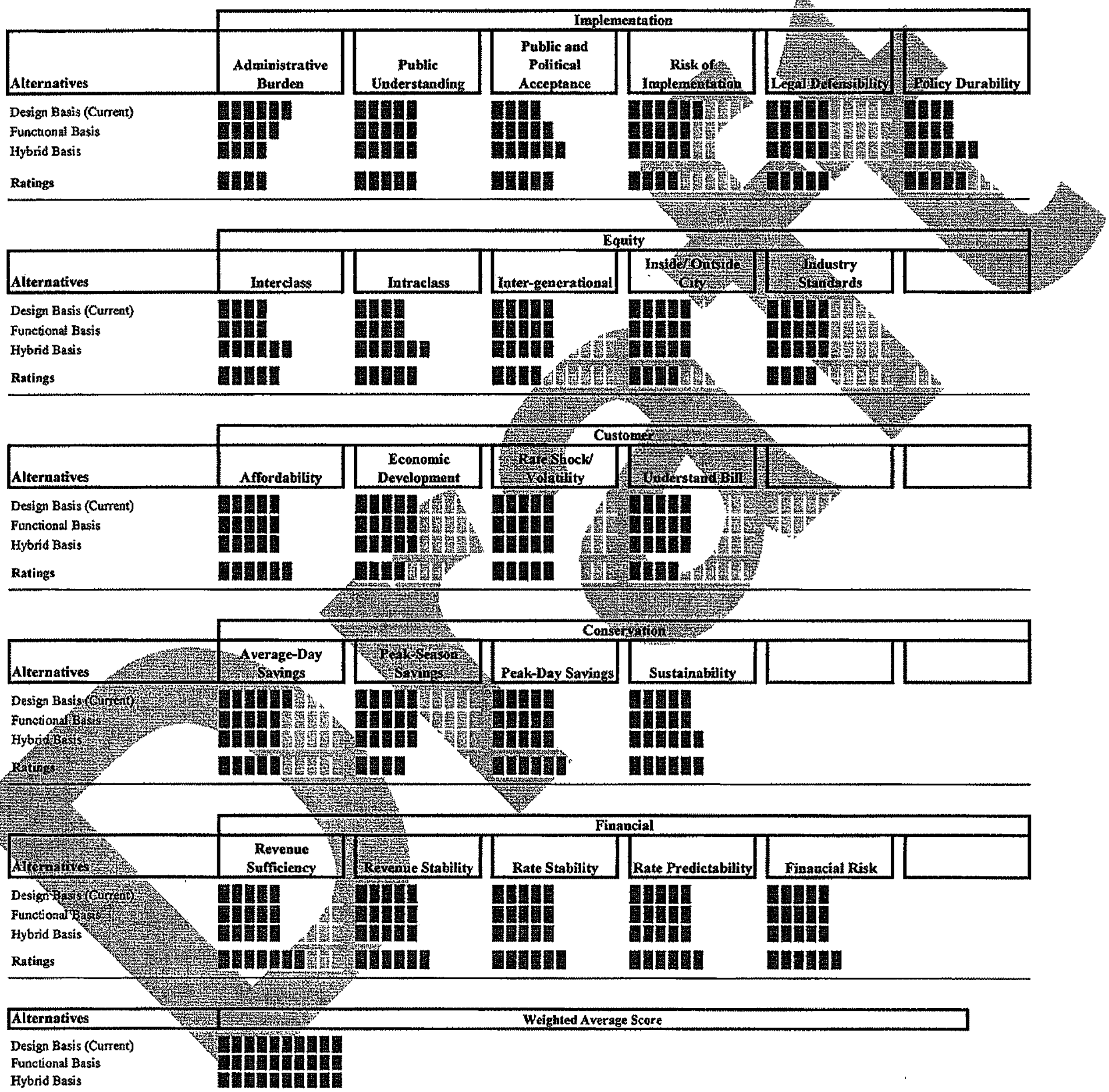
A

Evaluations of Alternatives

REDOAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

2908-083 / POR

Evaluations Based on Average Ratings
Cost Allocation Methods



Average Ratings
Cost Allocation Methods

Alternatives	Implementation					
	Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
Design Basis (Current)	6.0	5.0	4.0	6.0	5.0	4.0
Functional Basis	5.0	5.0	5.0	5.0	5.0	4.0
Hybrid Basis	4.0	5.0	6.0	5 0	5.0	6.0
Weights Rated from 0 to 10 (10 most important)	4.0	5.2	5.2	4.0	4.8	4.8

Alternatives	Equity					
	Interclass	Intraclass	Inter-generational	Inside/ Outside City	Industry Standards	
Design Basis (Current)	4.0	4.0	5.0	5.0	5.0	
Functional Basis	4.0	4.0	5.0	5.0	5.0	
Hybrid Basis	6.0	6.0	5.0	5.0	5.0	
Weights Rated from 0 to 10 (10 most important)	5.3	4.9	4 1	3.6	4.0	

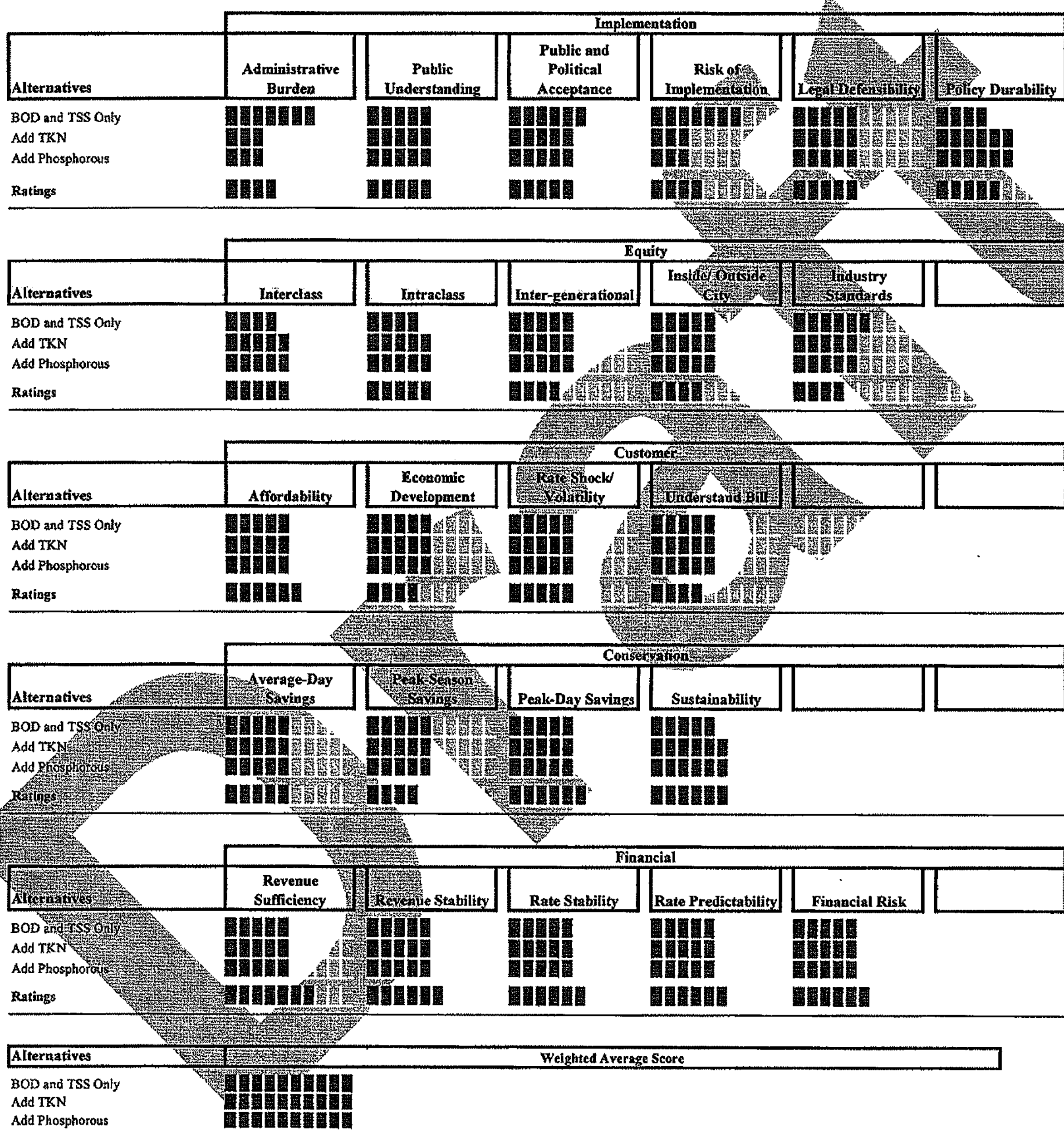
Alternatives	Customer					
	Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
Design Basis (Current)	5.0	5.0	5.0	5.0		
Functional Basis	5 0	5 0	5.0	5 0		
Hybrid Basis	5.0	5.0	5.0	5.0		
Weights Rated from 0 to 10 (10 most important)	5.8	4.1	4.6	3.9		

Alternatives	Conservation					
	Average-Day Savings	Peak Season Savings	Peak-Day Savings	Sustainability		
Design Basis (Current)	6.0	5.0	5.0	5 0		
Functional Basis	5.0	5 0	5.0	5.0		
Hybrid Basis	5.0	5.0	5.0	6.0		
Weights Rated from 0 to 10 (10 most important)	4.8	4.5	5.9	5 6		

Alternatives	Financial					
	Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
Design Basis (Current)	5.0	5.0	5.0	5.0	5 0	
Functional Basis	5.0	5.0	5.0	5.0	5.0	
Hybrid Basis	5.0	5.0	5.0	5.0	5.0	
Weights Rated from 0 to 10 (10 most important)	6.7	6.3	5.9	5 9	6.1	

Alternatives	Weighted Average Score
Design Basis (Current)	593
Functional Basis	585
Hybrid Basis	622

Evaluations Based on Average Ratings
Selection of Customer Service Characteristics



Average Ratings
Selection of Customer Service Characteristics

Alternatives	Implementation					
	Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
BOD and TSS Only	7.0	5.0	6.0	7.0	5.0	4.0
Add TKN	3.0	5.0	5.0	3.0	5.0	6.0
Add Phosphorous	3.0	5.0	5.0	3.0	5.0	6.0
Weights Rated from 0 to 10 (10 most important)	4.0	5.2	5.2	4.0	4.8	4.8

Alternatives	Equity					
	Interclass	Intraclass	Inter-generational	Inside/Outside City	Industry Standards	
BOD and TSS Only	4.0	4.0	5.0	5.0	6.0	
Add TKN	5.0	5.0	5.0	5.0	5.0	
Add Phosphorous	5.0	5.0	5.0	5.0	5.0	
Weights Rated from 0 to 10 (10 most important)	5.3	4.9	4.1	3.6	4.0	

Alternatives	Customer					
	Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
BOD and TSS Only	5.0	5.0	5.0	5.0		
Add TKN	5.0	5.0	5.0	5.0		
Add Phosphorous	5.0	5.0	5.0	5.0		
Weights Rated from 0 to 10 (10 most important)	5.8	4.1	4.6	3.9		

Alternatives	Conservation					
	Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
BOD and TSS Only	5.0	5.0	5.0	5.0		
Add TKN	5.0	5.0	5.0	6.0		
Add Phosphorous	5.0	5.0	5.0	6.0		
Weights Rated from 0 to 10 (10 most important)	4.8	4.5	5.9	5.6		

Alternatives	Financial					
	Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
BOD and TSS Only	5.0	5.0	5.0	5.0	5.0	
Add TKN	5.0	5.0	5.0	5.0	5.0	
Add Phosphorous	5.0	5.0	5.0	5.0	5.0	
Weights Rated from 0 to 10 (10 most important)	6.7	6.3	5.9	5.9	6.1	

Alternatives	Weighted Average Score
BOD and TSS Only	612
Add TKN	596
Add Phosphorous	596

Evaluations Based on Average Ratings
Allocation and Recovery of I/I

Alternatives	Implementation					
	Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
Combined Connections and Volume (Current)						
Contributed Wastewater Volume						
Number of Connections						
Land Area						
Ratings						

Alternatives	Equity					
	Interclass	Intraclass	Inter-generational	Inside/Outside City	Industry Standards	
Combined Connections and Volume (Current)						
Contributed Wastewater Volume						
Number of Connections						
Land Area						
Ratings						

Alternatives	Customer					
	Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
Combined Connections and Volume (Current)						
Contributed Wastewater Volume						
Number of Connections						
Land Area						
Ratings						

Alternatives	Conservation					
	Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
Combined Connections and Volume (Current)						
Contributed Wastewater Volume						
Number of Connections						
Land Area						
Ratings						

Alternatives	Financial					
	Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
Combined Connections and Volume (Current)						
Contributed Wastewater Volume						
Number of Connections						
Land Area						
Ratings						

Alternatives	Weighted Average Score
Combined Connections and Volume (Current)	
Contributed Wastewater Volume	
Number of Connections	
Land Area	

Average Ratings
Allocation and Recovery of I/I

Alternatives	Implementation: Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
Combined Connections and Volume (Current)	5.1	4.1	5.1	5.1	5.1	5.1
Contributed Wastewater Volume	6.2	6.2	5.1	5.1	5.1	5.1
Number of Connections	6.2	5.1	4.1	5.1	5.1	5.1
Land Area	2.1	3.1	3.1	2.1	5.1	5.1
Weights Rated from 0 to 10 (10 most important)	4.0	5.1	5.3	4.3	5.1	5.0

Alternatives	Equity: Interclass	Intraclass	Inter-generational	Inside/ Outside City	Industry Standards	
Combined Connections and Volume (Current)	5.1	5.1	5.1	5.1	4.1	
Contributed Wastewater Volume	5.1	5.1	5.1	5.1	5.1	
Number of Connections	5.1	5.1	5.1	5.1	3.1	
Land Area	5.1	5.1	5.1	5.1	3.1	
Weights Rated from 0 to 10 (10 most important)	5.3	5.0	4.0	3.9	3.9	

Alternatives	Customer: Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
Combined Connections and Volume (Current)	5.1	5.1	5.1	5.1		
Contributed Wastewater Volume	6.2	4.1	5.1	5.1		
Number of Connections	4.1	6.2	5.1	5.1		
Land Area	5.1	5.1	5.1	5.1		
Weights Rated from 0 to 10 (10 most important)	5.6	4.2	4.7	4.1		

Alternatives	Conservation: Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
Combined Connections and Volume (Current)	5.1	5.1	5.1	5.1		
Contributed Wastewater Volume	5.1	5.1	5.1	5.1		
Number of Connections	5.1	5.1	5.1	5.1		
Land Area	5.1	5.1	5.1	5.1		
Weights Rated from 0 to 10 (10 most important)	4.6	4.5	6.0	5.5		

Alternatives	Financial: Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
Combined Connections and Volume (Current)	5.1	5.1	5.1	5.1	5.1	
Contributed Wastewater Volume	5.1	5.1	5.1	5.1	5.1	
Number of Connections	5.1	5.1	5.1	5.1	5.1	
Land Area	5.1	5.1	5.1	5.1	5.1	
Weights Rated from 0 to 10 (10 most important)	6.2	6.2	5.7	5.7	6.2	

Alternatives	Weighted Average Score
Combined Connections and Volume (Current)	606
Contributed Wastewater Volume	626
Number of Connections	613
Land Area	561

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Issue Paper #4
Customer Classification

Subject: Classifying Customers, Estimating Peaking Factors and Wastewater Strengths

Date: February 15, 2008

Introduction

Water and wastewater costs-of-service analyses use customer classification approaches to segregate customers into classes that have relatively similar costs of service. Specifically, the customer classification approach identifies customers that use the utility's facilities in similar manners, thereby having similar costs of service. For water utilities, the primary driver is the nature of customer peaking. For wastewater utilities, the primary drivers are measures of wastewater flows and strengths.

In addition to segregating customers, methods of estimating peaking characteristics for water customers and wastewater strengths for wastewater customers are also used to allocate costs in a cost-of-service analysis.

This issue paper discusses the approaches to customer classification and methods of estimating peaking factors and wastewater strengths.

Customer Classification

Purpose of Customer Classification

The industry accepted methods for classifying customers are outlined by the American Water Works Association (AWWA) for water and the Water Environment Federation (WEF) for wastewater. One objective in classifying customers is to recover costs more fairly and equitably. That is, to recover costs that reflects the cost of providing services.

Factors for Classifying Customers

The factors for classifying customers, as described by both AWWA and WEF include:

1. General service requirements;
2. Demand patterns or usage characteristics; and
3. Geographic location.

General service requirements refer to the level of service that a customer receives that make it unique from other customers, (e.g., retail versus wholesale customers.) Water demand patterns refer to peak-day and peak-hour demands placed on the system, relative to average demand. For wastewater, the usage characteristics include wastewater strengths such as biochemical oxygen demand, total suspended solids, etc. For some utilities, geographic location may be a consideration because there may be additional physical demands placed on a system to be able to serve customers outside the city.

With all three factors, legal requirements should be considered in classifying customers when a wholesale contract is involved. Requirements may also be defined by city ordinances, charters, etc., as they relate to serving outside-city customers.

The next section discusses the industry approaches for defining customer classes for water and wastewater. There are different approaches to classify customers, and there are limitations and costs associated with capturing the data needed to define those classes.

Common Industry Approaches

Water

Water utilities typically have a minimum of three principal customer classes[1]:

1. Residential
2. Commercial
3. Industrial

How these customer classes are defined varies from utility-to-utility. A good example of this variability is with multifamily. Depending on the number of units, utilities may classify multifamily customers as residential, commercial, or, as in the case with Austin Water Utility (AWU), as a separate class. The same distinctions can be made within the industrial class, e.g., industrial customers with high or low peaking factors. Developing a customer classification approach begins with understanding the water use characteristics, or demand patterns, of the customers in question.

General water service requirements address the level of service that a particular customer or class of customers receives that is different from other customers. Wholesale customers are good examples since they often receive a different level of service than the other customers. For purposes of defining the level of service for a wholesale customer, AWWA recommends reviewing the following factors:

- Wholesale purchaser's customer-class characteristics;
- Wholesale purchaser's distribution system arrangement;
- Number and location of booster pumping stations operated by the wholesale purchaser;
- Number, location, and size of distribution storage reservoirs operated by the wholesale purchaser; and
- Limitations imposed by the selling utility's own transmission and distribution system.[2]

[1] American Water Works Association, *Manual of Water Supply Practices-M1, Principles of Water Rates, Fees, and Charges*, Fifth Edition, (Denver, Colorado: American Water Works Association, 2000).
[2] American Water Works Association.

These factors can be reviewed for outside-city customers, contract customers, and large industrial customers.

Wastewater

Wastewater utilities often use residential, commercial, and industrial customer classifications. However, rather than demand patterns, wastewater utilities normally use strength characteristics for wastewater classification purposes. Because of the costs associated with gathering strength information (e.g., biochemical oxygen demand, total suspended solids, nitrogen, phosphorous, etc.), obtaining data for wastewater classifications presents a challenge. There are two approaches generally used for wastewater rate design. Although rate design is an issue for a subsequent issue paper, the choice of rate design may affect the classification of customers. The general approaches to wastewater rate design include:

1. Extra-strength surcharges; and
2. Strength-based classifications.[3]

Under the extra-strength surcharge approach, costs associated with serving high-strength customers are separated from the total costs, and what remains is recovered from the non-surcharged customers. Utilities with established pretreatment programs have strength information from their extra-strength customers to implement this type of approach.

Strength-based classifications[4] require more information than is typically available from pretreatment programs. Short of extended, site-specific sampling, there are methods for approximating the strengths by types of businesses, (e.g., dry cleaners, restaurants, etc.) Utilities may use multiple sources for obtaining strength-based information in order to classify their commercial and industrial customers. Estimating wastewater strengths is discussed further in this paper.

Some utilities mix the two general approaches to enhance the equitability of their system of rates while maintaining control of the costs of sampling and administration.

Estimating Peaking Factors by Class

Peaking Factors in Setting Water Rates

Water systems are designed to have sufficient capacity to meet average and peak demands of their customers. Because customers or groups of customers use water differently, their capacity requirements and usage demands are unique. Issue Paper #2 presents more information on the role of peaking factors in setting water rates.

[3] Water Environment Federation, *Financing and Charges for Wastewater Systems*, Manual No. 27, (Alexandria, VA: Water Environment Federation, 2004).
[4] The strength-based classification is also referred to as the quantity/quality method.

Common Data Limitations

Customer class peaking factors serve as the basis to allocate functionalized costs to each customer class. Customer class peaking factors are based on peak-day and peak-hour demands. These demands are not typically available on a customer class level. In fact, usage data for individual customer classes are typically available only on a monthly basis (or in some cases, less frequently.) Nonetheless, estimates of peaking factors by customer class can serve as a proxy to assign functional cost components in an equitable manner.

Method of Prorating System-Wide Peaking Factors

Considering the limitations on meter reading frequencies, the water industry has developed approaches to estimate peaking factors by customer class. Some utilities maintain meters that record daily and hourly reads for a sample of customers. In fact, during the early 1990s AWU did just that. The costs of these programs are often considerable and the challenges of attaining usable data are significant. For those reasons, AWU abandoned its daily and hourly meter-reading program.

Published data from comprehensive sampling programs may be used to develop estimates of peaking factors by class. However, these data are often specific to the climatic and demographic conditions where the studies are conducted and generally do not provide adequate information for other utilities.

As an alternative, peaking factors are often derived by prorating the system-wide peaking factors to customer classes based on each class's contribution to the system peak-month demands. The derivation of customer class peaking factors uses the following information:

- System average-day demands
- System peak-day demands
- System peak-hour demands
- System peak-month demands
- Customer class average-month and peak-month demands

The following formulas are often used:

$$Class\ Peak\ Day\ Factor = \left(\frac{Class\ Peak\ Month\ Demand}{Class\ Average\ Month\ Demand} X \frac{System\ Peak\ Day\ Demand}{System\ Peak\ Month\ Demand} \right)$$

And:

$$Class\ Peak\ Hour\ Factor = \left(\frac{Class\ Peak\ Month\ Demand}{Class\ Average\ Month\ Demand} X \frac{System\ Peak\ Hour\ Demand}{System\ Peak\ Month\ Demand} \right)$$

Preliminary Findings for Austin

Attachment A presents our preliminary findings for AWU. Table A-1 presents a summary of monthly consumption by class from AWU's billing system for 2003 to 2006. These data were calculated using the total consumption of bills issued by month during that period. Also shown in Table A-1 are totals by class for the four-year period analyzed, and the maximum month total by class. AWU uses non-coincidental peak month totals for its rate methodologies. We have shown the same in Table A-1.

Table A-2 provides a summary of daily consumption by class. Also calculated in Table A-2 are the average daily consumption by class, peak-season daily consumption by class, and peak-month daily consumption by class. Again, the peak-month numbers represent the non-coincidental peak months for each class.

Table A-3 presents the estimated peaking factors by class using the proration method discussed above. The average-day demand, peak-season demand, and peak-month demand by class from Table A-2 were converted to millions of gallons per day (MGD). The peak-season demand was divided by the average-day demand for each class to estimate the peak-season peaking factor.[5]

Using system-wide peak-day and peak-hour demand data provided by AWU, we estimated system-wide peaking factors for peak-day and peak-hour demands. These factors were then prorated to each class using the formulas described above. Table A-4 provides a summary of the estimated peaking factors.

Estimating Wastewater Strengths by Class

Wastewater Strengths in Setting Wastewater Rates

Variations in wastewater strengths account for much of the differences in providing treatment service to a utility's customers. Estimating the differences in wastewater strengths by customer class, therefore, is important to estimating the cost of service. Issue Paper #3 included a discussion of the impact of wastewater strengths on the cost of service.

Common Data Limitations

Collecting wastewater strength data is often quite expensive and in many cases, very difficult. The process of determining strength requires laboratory sampling of wastewater collected directly from customer connections. Also, operating concerns often suggest that multiple samples be taken for customers to ensure the samples are representative of the customer's overall loadings. These limitations generally mean wastewater sampling is limited to industrial customers and customers with significant wastewater strengths.

[5] The peak-season factors are by definition, coincidental peaking factors. That is, these peaking factors measure the ratio of demands by customers during the utility's peak season to average annual.

AWU's commercial and industrial sampling program is very comprehensive and provides better data than most utilities.

Method of Balancing Wastewater Strength Estimates

Developing estimates of wastewater strengths by customer class is normally accomplished by using estimates developed from local samples with published information. Local samples for AWU include the extensive sampling program conducted by AWU for its high-strength commercial and industrial customers. The process of developing wastewater strength estimates is often called mass balancing.

The approach attempts to determine concentrations of pollutants for each class so that the total pollutant load measured at the wastewater treatment plant roughly approximates the assumed pollutant concentrations and contributed flow of each customer class.[6] In other words, the analyst uses the best estimates of concentrations and contributed flow for those classes where data exists, and attributes the remaining loadings to the other classes. The loadings that remain are typically converted to concentrations and assigned to the other classes.

The following information is required to prepare a mass balance:

- Estimates of wastewater volumes received at the wastewater treatment plants
- Concentrations of wastewater pollutants as sampled at the wastewater treatment plant (e.g., BOD, TSS, TKN, Phosphorus, etc.)
- Strength data for customers within AWU's wastewater sampling program
- Measures of contributed flow by customer class

A study conducted by the California State Water Resources Board and the Environmental Protection Agency (EPA) in 1982 (subsequently revised in 1998,) developed a listing of common commercial customer classes with estimated strengths. This document has been used in numerous studies over the years and is accepted as a proxy for estimating commercial customer class strengths. Combining the estimates of contributed flows for each class and the concentrations from the California study, with the contributions from those customers with sampling data, the concentrations of pollutants in non-commercial wastewater can be estimated.

Preliminary Findings for Austin

Attachment B presents an example of a mass balance calculation for two treatment plants: the Walnut Creek Wastewater Treatment Plant and the South Austin Regional Wastewater Treatment Plant. Data for the Govalle treatment plant was incomplete, and therefore not included in the analysis. Data from four of AWU's large-volume customers (e.g., Freescale Semiconductors, Samsung, Spansion, and the University of Texas) were

[6] Wastewater concentrations are a measure of the amount of pollutant in a given volume of wastewater. These concentrations are converted to the weight of the pollutant load when the flows are estimated.

collected and subtracted from the system total to show the contribution of all other customer classes on wastewater flow and strength.

Methodological Options Under Review

This issue paper examines three policy questions relating to the classification of customers. These policies are:

1. Should the large-volume class (i.e., industrial customers) be disaggregated?

2. Should the threshold for inclusion in the large-volume class be adjusted?

3. Should an irrigation class be created?

Each of these issues is explored further in the following sections. The discussion for each issue includes:

- Overview of the issue,
- Description of the alternatives,
- Evaluation of the alternatives using the executive team's evaluation criteria, and
- Consultant's preliminary findings and recommendations.

After presentation to the executive team and public involvement committee, the consulting team will finalize its recommendations.

Issue 1: Should the large-volume customer class be disaggregated?

Overview of the Issue

As the name implies, large-volume customers have a significant impact on the total water and wastewater services provided by AWU. In the past, these customers have been grouped into one customer class and their demands aggregated to calculate a class-average peaking factor. Accordingly, the cost-of-service rates for these customers were based on the average cost of serving the customer class as a whole.

Each wholesale customer, on the other hand, is treated as a single customer class within AWU's rate setting process. The question addressed here is whether a similar approach should be used for large-volume customers.

Description of Alternatives

Two alternatives are evaluated:

1. Maintain one class (current approach), or
2. Separate classes for each large-volume customer.

Evaluation of Alternatives

Attachment C presents the weighted evaluations of the alternatives.

Implementation Criteria

The administrative burden of the one-class approach is somewhat less than separating the classes for each large-volume customer. Considering the small size of the large-volume class, this administrative burden is likely to be quite small. The alternatives did not vary for the other implementation criteria.

Equity Criteria

Attachment D presents a preliminary calculation of peak-month peaking factors for AWU's current large-volume customers. Although the calculations are preliminary, the results of the analyses indicate that AWU's large-volume customers differ in their monthly peak demands. This suggests that disaggregating the class would improve intraclass equity. For industry standards, although disaggregating large-volume customers occurs, it is certainly less common. The alternatives did not vary for the other equity criteria.

Customer Criteria

The alternatives did not vary for the customer criteria.

Conservation Criteria

Disaggregating large-volume customers may increase water conservation since these customers can directly benefit from reducing the peak-demands placed on the system. For that reason, the separate customer class option was preferred for peak-season savings, peak-day savings, and sustainability.

Financial Criteria

The alternatives did not vary for the financial criteria.

Preliminary Findings and Recommendations

The consulting team recommends AWU disaggregate its large-volume customers and establish individual rates for each customer based on that customer's estimated water and wastewater usage characteristics.

Issue 2: Should the threshold for inclusion in the large-volume class be adjusted?

Overview of the Issue

AWU historically has placed customers with demands exceeding 85 million gallons per year in its large-volume class. This threshold was set to balance the administrative burden of managing a large-volume class with the relatively few customers that use water for significant industrial processes. Generally, large industrial customers have lower peaking factors, and therefore, a lower cost of service. The large-volume threshold was set, in part, to identify these types of customers. As industries have implemented conservation measures, concerns have been raised regarding their abilities to meet the threshold requirements with diminished water demands.

Description of Alternatives

Three alternatives are evaluated:

1. Maintain 85 MG per year as the threshold (current approach), or
2. Increase the threshold to 100 MG per year, or
3. Reduce the threshold to 50 MG per year.

In 2006, AWU had approximately 14 accounts with water purchases exceeding 30 MG.[7] The annual water purchases of these 14 largest accounts ranged from almost 31 MG to over 1,877 MG. Attachment E includes Figure E-1 that depicts the cumulative distribution of accounts with consumption exceeding 30 MG per year in 2006. The green vertical line in Figure E-1 is AWU's current threshold of 85 MG per year. Table E-1 presents the actual billing records for 2003 through 2006.

Evaluation of Alternatives

Our preliminary analyses indicate that all of the customers who have accounts exceeding 30 million gallons a year are current large-volume customers.[8] This suggests that changing the threshold may not have a significant impact on AWU.

Implementation Criteria

Reducing the threshold from its current level may affect administrative burden especially if the utility chooses to create separate classes for its large-volume customers. If the threshold is too low, additional customers may qualify and that would require the creation of additional customer classes. This is an unlikely outcome. This possibility may also adversely affect the policy durability criterion. The alternatives did not vary for the other implementation criteria.

Equity Criteria

The alternatives did not vary for the equity criteria.

Customer Criteria

The alternatives did not vary for the customer criteria.

[7] This excludes AWU's wholesale customers. Large-volume customers typically have multiple accounts. Of the 14 accounts identified, all were those of large-volume customers.
[8] Our findings are preliminary an additional data will be included in our analyses when available. We will revise this issue paper if the new data have a material impact on our assumptions.

Conservation Criteria

Reducing the threshold may have a small conservation benefit if this results in more customers being placed within their own customer class. Placing customers within their own class may provide a greater incentive to manage their peak demands.

Financial Criteria

The alternatives did not vary for the financial criteria.

Preliminary Findings and Recommendations

The consulting team recommends AWU maintain its current thresholds. If AWU determines that large-volume customers should be treated as individual customer classes, the consulting team suggests aggregating the water purchases for each location for the determination of the individual rate.

Issue 3: Should an irrigation class be created?

Overview of the Issue

AWU currently uses increasing block rates to send conservation pricing signals to its single-family residential customers. The highest block rates reflect the cost of providing water during peak periods. Much of this water is used for lawn irrigation and other outdoor uses. AWU uses seasonal rates to provide a conservation price incentive for its other customers.

The City's Water Conservation Task Force has identified water conservation potential from changes in water rate design. Some of the proposals are dependent on implementing a new utility billing system that will support more complex water rate designs. In the interim, however, the Water Conservation Task Force has identified changes in the water rates applied to irrigation accounts as a potential source of water savings. Assessing water rates for irrigation accounts will require the creation of an irrigation customer class.

Description of Alternatives

Two alternatives are evaluated:

1. Do not implement an irrigation class (current approach), or
2. Implement an irrigation class.

Evaluation of Alternatives

Implementation Criteria

The administrative burden of maintaining no irrigation class is less than introducing a new class. The primary challenge for implementing the new customer class will be developing the necessary data, programming the utility billing system, and answering customer questions about the new classifications. The data development efforts should not be significant since the irrigation status of an account is incorporated in the current utility billing system for wastewater bills. Given the extensive efforts of the Water Conservation Task Force, a separate irrigation class is likely more acceptable to the public and elected officials. The risk of implementation is higher for the new irrigation class. Neither alternative is highly rated for policy durability since the constraints of the current utility billing system will likely be removed within a few years. However, moving forward on developing an irrigation class may contribute to the ultimate resolution of this issue. The alternatives did not vary for the other implementation criteria.

Equity Criteria

Many of the equity criteria ultimately will depend on the nature of the rates developed for the proposed irrigation class. It is likely that interclass equity will remain unchanged since the cost of service for the new irrigation class can be determined separately. The impact on intraclass equity is particularly difficult to anticipate. Generally, adding customer classes improves intraclass equity as the classes become relatively more homogenous. In this case, however, an offsetting diminishment of intraclass equity may result since some customers that use water for irrigation purposes will not have an irrigation meter. These customers will remain in their original customer classes and benefit from the reduction in the peak-related costs of their class while maintaining the use of irrigation water. This phenomenon may reduce intraclass equity. The alternatives did not vary for the other equity criteria.

Customer Criteria

The only significant impact on customers will be the possibility of rate shock for customers with irrigation meters if a new irrigation rate is implemented. The alternatives did not vary for the other customer criteria.

Conservation Criteria

Creating an irrigation class may increase water conservation since irrigation customers will have an enhanced incentive to use outdoor water wisely. For that reason, creating an irrigation class was preferred for peak-season savings, peak-day savings, and sustainability.

Financial Criteria

Depending on the ultimate rate design selected for the proposed irrigation class, introducing this class may reduce the stability of AWU's revenues. This reduction results from recovering more revenues (assuming higher rates for the irrigation class) from sales of water that may be more affected by weather conditions. The alternatives did not vary for the other financial criteria.

Preliminary Findings and Recommendations

The consulting team recommends AWU not create an irrigation class at this time. Rather, we recommend that AWU consider using rate design alternatives within the existing customer classes until a new utility billing system is in place. Many of the objectives of creating the irrigation class can be addressed through the rate design process. In addition, this approach will allow AWU to be more deliberate in its future policy development on irrigation water use without the implementing alternatives that will likely be significantly revised within a few years.

A2908-083

City of Austin
Issue Paper #4: Customer Classifications

SECTION

A

Preliminary Analysis of Peaking Factors

REDOAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

Table A-1
AWU Water Cost of Service
Development of Peaking Factors (2003-2006)
Summary of Average Monthly Consumption by Class (Kgal)

Customer Class	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Inside City Residential	1,045,593	884,006	901,160	1,074,953	1,227,047	1,477,933	1,635,379	1,774,177	1,850,433	1,471,084	1,176,423	1,143,647	15,661,834
Inside City Multi-Family	642,119	582,023	608,684	622,299	637,151	715,354	756,356	764,687	816,338	752,122	683,254	699,231	8,279,617
Inside City Commercial	789,758	715,560	722,528	802,928	882,277	1,056,399	1,168,991	1,232,560	1,324,866	1,151,284	1,006,423	924,386	11,777,960
Inside City Industrial	241,846	214,275	218,131	230,093	227,889	248,441	262,346	246,033	268,094	257,759	239,351	254,425	2,908,684
Inside City Golf Courses	2,779	2,819	2,421	3,566	7,063	10,359	10,512	11,886	13,756	8,019	7,636	5,722	86,537
Utility	6,473	5,910	7,143	7,349	5,874	6,726	6,703	7,528	8,438	6,618	7,098	7,198	83,059
Outside City Residential	88,793	73,384	71,637	86,129	101,825	123,808	137,113	149,896	153,857	121,235	95,041	93,135	1,295,853
Outside City Multi-Family	28,868	25,401	25,369	27,944	30,525	34,723	37,194	40,089	40,054	35,808	33,241	32,055	391,271
Outside City Commercial	53,752	43,122	43,870	50,952	48,003	68,182	81,439	80,420	95,416	74,750	57,613	50,251	747,770
Outside City Golf Course	105	64	62	69	75	2,061	423	107	117	120	89	87	3,379
Anderson Mill	37,911	34,933	33,436	35,150	38,354	41,425	46,118	52,434	53,984	53,807	41,624	40,823	509,999
Creedmore-Maha	2,725	2,847	2,432	2,541	2,669	3,186	3,398	4,000	4,292	3,498	3,243	3,513	38,344
High Valley	520	463	440	555	497	552	616	665	659	639	557	594	6,754
Lost Creek	18,409	17,213	14,352	17,195	23,163	27,343	31,279	35,180	39,076	32,321	26,263	23,597	305,389
Manor, City of (1)	3,726	81	397	631	368	48	0	0	60	10,446	7,927	4,069	27,753
Manville WSC	4,896	4,272	3,606	4,763	5,465	6,168	7,976	8,077	9,949	9,191	7,601	6,754	78,716
Marsha Water	779	722	705	768	811	827	909	1,020	1,011	976	751	788	10,067
Nighthawk	818	744	710	782	836	880	979	981	1,013	980	792	802	10,318
North Austin MUD	23,258	23,865	21,863	22,816	26,951	31,221	36,580	43,517	44,434	41,515	31,257	29,244	376,522
Northtown MUD	9,063	8,587	8,159	9,288	10,890	12,073	14,011	15,122	15,679	14,515	12,299	12,169	141,856
Rivercrest	7,054	5,824	4,385	5,289	7,806	8,412	9,244	11,546	11,856	11,172	9,120	7,974	99,682
Rollingwood	8,159	6,766	5,508	6,647	10,208	12,498	14,932	14,624	18,938	15,825	11,454	9,713	135,270
Shady Hollow	14,133	13,400	11,467	13,814	20,905	21,708	26,219	29,403	34,589	27,819	19,851	17,991	251,300
Sunset Valley MUD	5,403	5,082	4,842	5,149	6,270	8,075	9,991	11,114	11,138	10,640	8,158	7,240	93,099
Water District 10	53,596	51,735	43,557	44,301	70,403	77,484	88,903	102,222	113,030	97,897	77,043	72,073	892,243
Wells Branch MUD	39,478	35,563	33,065	38,532	40,671	44,497	54,390	55,404	56,246	51,734	43,764	41,390	534,733
Windermere	915	1,023	552	236	269	443	1,247	3,619	2,593	8,813	2,539	1,269	23,518
Totals	3,130,928	2,759,681	2,790,482	3,114,739	3,434,265	4,040,824	4,443,246	4,696,310	4,989,914	4,270,586	3,610,411	3,490,139	44,771,526

(1) City of Manor data includes consumption from October 2006 - September 2007.

Table A-2
AWU Water Cost of Service
Development of Peaking Factors (2003-2006)
Summary of Average Daily Consumption in Kgal per Day

Customer Class	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Average	Peak Season	Peak Month
Number of Days in Month	31	28	31	30	31	30	31	31	30	31	30	31	365		
Peak-Season	0	0	0	0	0	0	1	1	1	1	0	0			
Inside City Residential	8,432.2	7,892.9	7,267.4	8,957.9	9,895.5	12,316.1	13,188.5	14,307.9	15,420.3	11,863.6	9,803.5	9,223.0	10,714.1	13,695.1	15,420.3
Inside City Multi-Family	5,178.4	5,196.6	4,908.7	5,185.8	5,138.3	5,961.3	6,099.6	6,166.8	6,802.8	6,065.5	5,693.8	5,639.0	5,669.7	6,283.7	6,802.8
Inside City Commercial	6,369.0	6,388.9	5,826.8	6,691.1	7,115.1	8,803.3	9,427.3	9,940.0	11,040.5	9,284.5	8,386.9	7,454.7	8,060.7	9,923.1	11,040.5
Inside City Industrial	1,950.4	1,913.2	1,759.1	1,917.4	1,837.8	2,070.3	2,115.7	1,984.1	2,234.1	2,078.7	1,994.6	2,051.8	1,992.3	2,103.2	2,234.1
Inside City Golf Courses	22.4	25.2	19.5	29.7	57.0	86.3	84.8	95.9	114.6	64.7	63.6	46.1	59.2	90.0	114.6
Utility	52.2	52.8	57.6	61.2	47.4	56.1	54.1	60.7	70.3	53.4	59.2	58.1	56.9	59.6	70.3
Outside City Residential	716.1	655.2	577.7	717.7	821.2	1,031.7	1,105.7	1,208.8	1,282.1	977.7	792.0	751.1	886.4	1,143.6	1,282.1
Outside City Multi-Family	232.8	226.8	204.6	232.9	246.2	289.4	300.0	323.3	333.8	288.8	277.0	258.5	267.8	311.5	333.8
Outside City Commercial	433.5	385.0	353.8	424.6	387.1	568.2	656.8	648.6	795.1	602.8	480.1	405.2	511.7	675.8	795.1
Outside City Golf Course	0.8	0.6	0.5	0.6	0.6	17.2	3.4	0.9	1.0	1.0	0.7	0.7	2.3	1.6	17.2
Anderson Mill	305.7	311.9	269.6	292.9	309.3	345.2	371.9	422.9	449.9	433.9	346.9	329.2	349.1	419.6	449.9
Creedmore-Maha	22.0	25.4	19.6	21.2	21.5	26.6	27.4	32.3	35.8	28.2	27.0	28.3	26.3	30.9	35.8
High Valley	4.2	4.1	3.5	4.6	4.0	4.6	5.0	5.4	5.5	5.1	4.6	4.8	4.6	5.2	5.5
Lost Creek	148.5	153.7	115.7	143.3	186.8	227.9	252.2	283.7	325.6	260.7	218.9	190.3	208.9	280.6	325.6
Manor, City of	30.0	0.7	3.2	5.3	3.0	0.4	0.0	0.0	0.5	84.2	66.1	32.8	18.9	21.2	84.2
Manville WSC	39.5	38.1	29.1	39.7	44.1	51.4	64.3	65.1	82.9	74.1	63.3	54.5	53.8	71.6	82.9
Marsha Water	6.3	6.4	5.7	6.4	6.5	6.9	7.3	8.2	8.4	7.9	6.3	6.4	6.9	8.0	8.4
Nighthawk	6.6	6.6	5.7	6.5	6.7	7.3	7.9	7.9	8.4	7.9	6.6	6.5	7.1	8.0	8.4
North Austin MUD	187.6	213.1	176.3	190.1	217.3	260.2	295.0	350.9	370.3	334.8	260.5	235.8	257.7	337.8	370.3
Northtown MUD	73.1	76.7	65.8	77.4	87.8	100.6	113.0	122.0	130.7	117.1	102.5	98.1	97.1	120.7	130.7
Rivercrest	56.9	52.0	35.4	44.1	63.0	70.1	74.5	93.1	98.8	90.1	76.0	64.3	68.2	89.1	98.8
Rollingwood	65.8	60.4	44.4	55.4	82.3	104.1	120.4	117.9	157.8	127.6	95.5	78.3	92.5	130.9	157.8
Shady Hollow	114.0	119.6	92.5	115.1	168.6	180.9	211.4	237.1	288.2	224.3	165.4	145.1	171.9	240.3	288.2
Sunset Valley MUD	43.6	45.4	39.0	42.9	50.6	67.3	80.6	89.6	92.8	85.8	68.0	58.4	63.7	87.2	92.8
Water District 10	432.2	461.9	351.3	369.2	567.8	645.7	717.0	824.4	941.9	789.5	642.0	581.2	610.3	818.2	941.9
Wells Branch MUD	318.4	317.5	266.7	321.1	328.0	370.8	438.6	446.8	468.7	417.2	364.7	333.8	366.0	442.8	468.7
Windermere	7.4	9.1	4.5	2.0	2.2	3.7	10.1	29.2	21.6	71.1	21.2	10.2	16.0	33.0	71.1
Totals	25,249.4	24,640.0	22,503.9	25,956.2	27,695.7	33,673.5	35,832.6	37,873.5	41,582.6	34,440.2	30,086.8	28,146.3	30,640.1	37,432.2	41,732.0

Table A-3
AWU Water Cost of Service
Development of Peaking Factors (2003-2006)
Estimation of Peaking Factors by Class by Prorating System Peaking Factors

Customer Class	Avg. Day Demand (MGD)	Peak Season Cons. (MGD)	Peak Month Cons. (MGD)	Estimated Peak-Season Factor	Estimated Peak-Day Factor	Peak-Day Demand	Estimated Peak-Hour Factor	Peak-Hour Demand
Inside City Residential	10.71	13.70	15.42	1.28	1.64	17.54	2.54	27.18
Inside City Multi-Family	5.67	6.28	6.80	1.11	1.36	7.74	2.11	11.99
Inside City Commercial	8.06	9.92	11.04	1.23	1.56	12.56	2.41	19.46
Inside City Industrial	1.99	2.10	2.23	1.06	1.28	2.54	1.98	3.94
Inside City Golf Courses	0.06	0.09	0.11	1.52	2.20	0.13	3.42	0.20
Utility	0.06	0.06	0.07	1.05	1.41	0.08	2.18	0.12
Outside City Residential	0.89	1.14	1.28	1.29	1.64	1.46	2.55	2.26
Outside City Multi-Family	0.27	0.31	0.33	1.16	1.42	0.38	2.20	0.59
Outside City Commercial	0.51	0.68	0.80	1.32	1.77	0.90	2.74	1.40
Outside City Golf Course	0.00	0.00	0.02	0.67	8.39	0.02	13.00	0.03
Anderson Mill	0.35	0.42	0.45	1.20	1.47	0.51	2.27	0.79
Creedmore-Maha	0.03	0.03	0.04	1.18	1.55	0.04	2.40	0.06
High Valley	0.00	0.01	0.01	1.13	1.35	0.01	2.09	0.01
Lost Creek	0.21	0.28	0.33	1.34	1.77	0.37	2.75	0.57
Manor, City of	0.02	0.02	0.08	1.12	5.08	0.10	7.88	0.15
Manville WSC	0.05	0.07	0.08	1.33	1.75	0.09	2.71	0.15
Marsha Water	0.01	0.01	0.01	1.16	1.39	0.01	2.15	0.01
Nighthawk	0.01	0.01	0.01	1.14	1.36	0.01	2.11	0.01
North Austin MUD	0.26	0.34	0.37	1.31	1.63	0.42	2.53	0.65
Northtown MUD	0.10	0.12	0.13	1.24	1.53	0.15	2.37	0.23
Rivercrest	0.07	0.09	0.10	1.31	1.65	0.11	2.55	0.17
Rollingwood	0.09	0.13	0.16	1.42	1.94	0.18	3.01	0.28
Shady Hollow	0.17	0.24	0.29	1.40	1.91	0.33	2.96	0.51
Sunset Valley MUD	0.06	0.09	0.09	1.37	1.66	0.11	2.57	0.16
Water District 10	0.61	0.82	0.94	1.34	1.76	1.07	2.72	1.66
Wells Branch MUD	0.37	0.44	0.47	1.21	1.46	0.53	2.26	0.83
Windermere	0.02	0.03	0.07	2.06	5.05	0.08	7.82	0.13
System Totals	30.64	37.43	41.73	1.22	1.55	47.46	2.40	73.55

Table A-4
AWU Water Cost of Service
Development of Peaking Factors (2003-2006)
Peaking Factors

Customer Class	Estimated Peak-Season Factor	Estimated Peak-Day Factor	Estimated Peak-Hour Factor
Inside City Residential	1.28	1.64	2.54
Inside City Multi-Family	1.11	1.36	2.11
Inside City Commercial	1.23	1.56	2.41
Inside City Industrial	1.06	1.28	1.98
Inside City Golf Courses	1.52	2.20	3.42
Utility	1.05	1.41	2.18
Outside City Residential	1.29	1.64	2.55
Outside City Multi-Family	1.16	1.42	2.20
Outside City Commercial	1.32	1.77	2.74
Outside City Golf Course	0.67	8.39	13.00
Anderson Mill	1.20	1.47	2.27
Creedmore-Maha	1.18	1.55	2.40
High Valley	1.13	1.35	2.09
Lost Creek	1.34	1.77	2.75
Manor, City of	1.12	5.08	7.88
Manville WSC	1.33	1.75	2.71
Marsha Water	1.16	1.39	2.15
Nighthawk	1.14	1.36	2.11
North Austin MUD	1.31	1.63	2.53
Northtown MUD	1.24	1.53	2.37
Rivercrest	1.31	1.65	2.55
Rollingwood	1.42	1.94	3.01
Shady Hollow	1.40	1.91	2.96
Sunset Valley MUD	1.37	1.66	2.57
Water District 10	1.34	1.76	2.72
Wells Branch MUD	1.21	1.46	2.26
Windermere	2.06	5.05	7.82
	------------	------------	------------
System-Wide Peaking Factors	1.22	1.55	2.40

City of Austin
Issue Paper #4: Customer Classifications

SECTION

B

Example of Wastewater Mass Balancing Analysis

REDOAK CONSULTING
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Wastewater System and Industrial Customer Flows and Strengths
October 1, 2006 to September 30, 2007

Treatment Plant	Inflow (MG)	BOD Lbs	BOD mg/L	TSS Lbs	TSS mg/L
Walnut	20,795	23,573,719	136	34,652,639	200
SAR	15,845	30,578,479	231	40,206,260	304
Total System	36,641	54,152,198	177	74,858,898	245
Industrial Customers					
Freescale Semiconductor, Inc.	588.5	446,864	91	63,838	13
Freescale Semiconductor, Inc.	323.2	318,282	118	234,665	87
Samsung Austin Semiconductor	464.6	279,125	72	116,302	30
Spansion LLC	607.9	106,520	21	65,941	13
University of Texas	0.9	604	80	785	104
University of Texas	26.8	8,060	36	3,582	16
Total Industrial Customers	2,012	1,159,455	69	485,114	29
System Less Industrial Customers	34,629	52,992,743	183	74,373,785	258

City of Austin
Issue Paper #4: Customer Classifications

SECTION

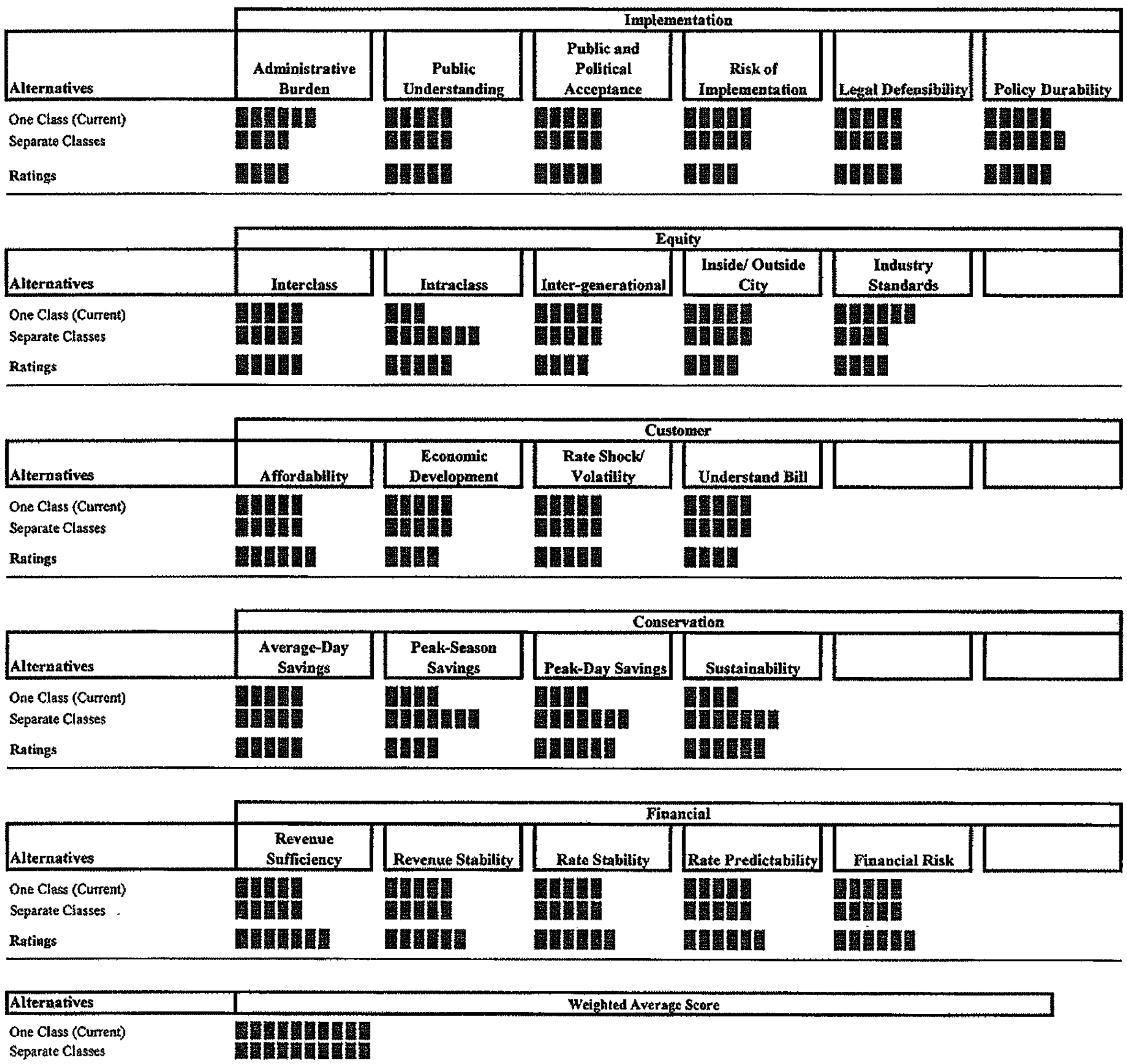
C

Evaluation of Alternatives

REDOAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

2908-083 / POR

Evaluations Based on Average Ratings
Disaggregate Industrial Class



Average Ratings
Disaggregate Industrial Class

	Implementation					
Alternatives	**Administrative Burden**	**Public Understanding**	**Public and Political Acceptance**	**Risk of Implementation**	**Legal Defensibility**	**Policy Durability**
One Class (Current)	5.9	4.9	4.9	4.9	4.9	4.9
Separate Classes	3.9	4.9	4.9	4.9	4.9	5.9
Weights Rated from 0 to 10 (10 most important)	4.0	5.2	5.2	4.0	4.8	4.8

	Equity					
Alternatives	**Interclass**	**Intraclass**	**Inter-generational**	**Inside/ Outside City**	**Industry Standards**	
One Class (Current)	4.9	3.0	4.9	4.9	5.9	
Separate Classes	4.9	6.9	4.9	4.9	3.9	
Weights Rated from 0 to 10 (10 most important)	5.3	4.9	4.1	3.6	4.0	

	Customer					
Alternatives	**Affordability**	**Economic Development**	**Rate Shock/ Volatility**	**Understand Bill**		
One Class (Current)	4.9	4.9	4.9	4.9		
Separate Classes	4.9	4.9	4.9	4.9		
Weights Rated from 0 to 10 (10 most important)	5.8	4.1	4.6	3.9		

	Conservation					
Alternatives	**Average-Day Savings**	**Peak-Season Savings**	**Peak-Day Savings**	**Sustainability**		
One Class (Current)	4.9	3.9	3.9	3.9		
Separate Classes	4.9	6.9	6.9	6.9		
Weights Rated from 0 to 10 (10 most important)	4.8	4.5	5.9	5.6		

	Financial					
Alternatives	**Revenue Sufficiency**	**Revenue Stability**	**Rate Stability**	**Rate Predictability**	**Financial Risk**	
One Class (Current)	4.9	4.9	4.9	4.9	4.9	
Separate Classes	4.9	4.9	4.9	4.9	4.9	
Weights Rated from 0 to 10 (10 most important)	6.7	6.3	5.9	5.9	6.1	

Alternatives	**Weighted Average Score**
One Class (Current)	573
Separate Classes	628

Evaluations Based on Average Ratings
Threshold for Inclusion in Industrial Class

	Implementation					
Alternatives	**Administrative Burden**	**Public Understanding**	**Public and Political Acceptance**	**Risk of Implementation**	**Legal Defensibility**	**Policy Durability**
85 MG per Year (current)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
100 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
50 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Ratings	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

	Equity					
Alternatives	**Interclass**	**Intraclass**	**Inter-generational**	**Inside/ Outside City**	**Industry Standards**	
85 MG per Year (current)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
100 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
50 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Ratings	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

	Customer					
Alternatives	**Affordability**	**Economic Development**	**Rate Shock/ Volatility**	**Understand Bill**		
85 MG per Year (current)	[redacted]	[redacted]	[redacted]	[redacted]		
100 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]		
50 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]		
Ratings	[redacted]	[redacted]	[redacted]	[redacted]		

	Conservation					
Alternatives	**Average-Day Savings**	**Peak-Season Savings**	**Peak-Day Savings**	**Sustainability**		
85 MG per Year (current)	[redacted]	[redacted]	[redacted]	[redacted]		
100 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]		
50 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]		
Ratings	[redacted]	[redacted]	[redacted]	[redacted]		

	Financial					
Alternatives	**Revenue Sufficiency**	**Revenue Stability**	**Rate Stability**	**Rate Predictability**	**Financial Risk**	
85 MG per Year (current)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
100 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
50 MG per Year	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Ratings	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

Alternatives	**Weighted Average Score**
85 MG per Year (current)	[redacted]
100 MG per Year	[redacted]
50 MG per Year	[redacted]

Average Ratings
Threshold for Inclusion in Industrial Class

	Implementation					
Alternatives	Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
85 MG per Year (current)	5.9	4.9	4.9	4.9	4.9	4.9
100 MG per Year	5.9	4.9	4.9	4 9	4.9	4.9
50 MG per Year	4 9	4.9	4 9	4.9	4.9	4.0
Weights Rated from 0 to 10 (10 most important)	4.0	5.2	5.2	4.0	4.8	4.8

	Equity					
Alternatives	Interclass	Intraclass	Inter-generational	Inside/ Outside City	Industry Standards	
85 MG per Year (current)	4 9	4.9	4.9	4.9	4.9	
100 MG per Year	4.9	4 9	4.9	4.9	4.9	
50 MG per Year	4.9	4.9	4.9	4.9	4.9	
Weights Rated from 0 to 10 (10 most important)	5.3	4.9	4.1	3.6	4.0	

	Customer					
Alternatives	Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
85 MG per Year (current)	4.9	4.9	4.9	4 9		
100 MG per Year	4.9	4.9	4.9	4 9		
50 MG per Year	4 9	4.9	4.9	4.9		
Weights Rated from 0 to 10 (10 most important)	5 8	4.1	4.6	3.9		

	Conservation					
Alternatives	Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
85 MG per Year (current)	4.9	4.9	4.9	4.9		
100 MG per Year	4.9	4.9	4.9	4.9		
50 MG per Year	4.9	5.9	5 9	5.9		
Weights Rated from 0 to 10 (10 most important)	4.8	4.5	5.9	5.6		

	Financial					
Alternatives	Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
85 MG per Year (current)	4.9	4.9	4.9	4 9	4.9	
100 MG per Year	4.9	4.9	4.9	4 9	4.9	
50 MG per Year	4.9	4.9	4.9	4.9	4.9	
Weights Rated from 0 to 10 (10 most important)	6.7	6.3	5.9	5.9	6.1	

Alternatives	Weighted Average Score
85 MG per Year (current)	597
100 MG per Year	597
50 MG per Year	605

Evaluations Based on Average Ratings
Creation of an Irrigation Class

Alternatives	Implementation: Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
No Irrigation Class (Current)	■■■■■■	■■■■■	■■■■	■■■■■■	■■■■■	■■■■
Implement Irrigation Class	■■■■	■■■■■	■■■■■■■	■■■■	■■■■■	■■■■■
Ratings	■■■■	■■■■■	■■■■■	■■■■	■■■■■	■■■■■

Alternatives	Equity: Interclass	Intraclass	Inter-generational	Inside/ Outside City	Industry Standards	
No Irrigation Class (Current)	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	
Implement Irrigation Class	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	
Ratings	■■■■■	■■■■■	■■■■	■■■■	■■■■	

Alternatives	Customer: Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
No Irrigation Class (Current)	■■■■■	■■■■■	■■■■■■■	■■■■■		
Implement Irrigation Class	■■■■■	■■■■■	■■■	■■■■■		
Ratings	■■■■■■	■■■■	■■■■■	■■■■		

Alternatives	Conservation: Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
No Irrigation Class (Current)	■■■■■	■■■■	■■■■	■■■■		
Implement Irrigation Class	■■■■■	■■■■■■■	■■■■■■■	■■■■■■■		
Ratings	■■■■■	■■■■	■■■■■■	■■■■■■		

Alternatives	Financial: Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
No Irrigation Class (Current)	■■■■■	■■■■■■■	■■■■■	■■■■■	■■■■■■■	
Implement Irrigation Class	■■■■■	■■■■	■■■■■	■■■■■	■■■■	
Ratings	■■■■■■■	■■■■■■	■■■■■■	■■■■■■	■■■■■■	

Alternatives	Weighted Average Score
No Irrigation Class (Current)	■■■■■■■■■■
Implement Irrigation Class	■■■■■■■■■■

Average Ratings
Creation of an Irrigation Class

Alternatives	Implementation: Administrative Burden	Public Understanding	Public and Political Acceptance	Risk of Implementation	Legal Defensibility	Policy Durability
No Irrigation Class (Current)	5.9	4.9	3.9	5.9	4.9	3.9
Implement Irrigation Class	3.9	4.9	6.9	3.9	4.9	4.9
Weights Rated from 0 to 10 (10 most important)	4.0	5.2	5.2	4.0	4.8	4.8

Alternatives	Equity: Interclass	Intraclass	Inter-generational	Inside/ Outside City	Industry Standards	
No Irrigation Class (Current)	4.9	4.9	4.9	4.9	4.9	
Implement Irrigation Class	4.9	4.9	4.9	4.9	4.9	
Weights Rated from 0 to 10 (10 most important)	5.3	4.9	4.1	3.6	4.0	

Alternatives	Customer: Affordability	Economic Development	Rate Shock/ Volatility	Understand Bill		
No Irrigation Class (Current)	4.9	4.9	6.9	4.9		
Implement Irrigation Class	4.9	4.9	2.9	4.9		
Weights Rated from 0 to 10 (10 most important)	5.8	4.1	4.6	3.9		

Alternatives	Conservation: Average-Day Savings	Peak-Season Savings	Peak-Day Savings	Sustainability		
No Irrigation Class (Current)	4.9	3.9	3.9	3.9		
Implement Irrigation Class	4.9	6.9	6.9	6.9		
Weights Rated from 0 to 10 (10 most important)	4.8	4.5	5.9	5.6		

Alternatives	Financial: Revenue Sufficiency	Revenue Stability	Rate Stability	Rate Predictability	Financial Risk	
No Irrigation Class (Current)	4.9	6.9	4.9	4.9	6.9	
Implement Irrigation Class	4.9	3.9	4.9	4.9	3.9	
Weights Rated from 0 to 10 (10 most important)	6.7	6.3	5.9	5.9	6.1	

Alternatives	Weighted Average Score
No Irrigation Class (Current)	603
Implement Irrigation Class	600

City of Austin
Issue Paper #4: Customer Classifications

SECTION

D

Monthly Demands of Large-Volume Customers

REDOAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

2908-083 / POR

D. Monthly Demands of Large-Volume Customers

Summary of Peaking Month to Average Month Factors by Industrial Customer

Historical Customers

Industrial Customers	2003	2004	2005	2006	Average Peak Factor
Applied Materials	1.54	1.34	2.20	1.56	1.66
Freescale	1.24	1.15	1.11	1.82	1.33
Samsung Austin Semiconduct	1.18	1.13	1.31	1.22	1.21
Sematech	1.12	1.14	1.23	1.46	1.24
Spansion	1.11	1.23	1.18	1.18	1.17
University Of Texas	1.33	1.26	1.34	1.53	1.37
Multilayer Tek L.P.	2.03	5.09	2.25	1.91	2.82
Hospira Inc	2.72	2.07	1.40	1.35	1.88
Tyco	1.25	1.24			1.25
Average	1.50	1.74	1.50	1.51	1.55
Standard Deviation	0.539	1.291	0.455	0.264	0.533

Existing Customers

Industrial Customers	2003	2004	2005	2006	Average Peak Factor
Applied Materials	1.54	1.34	2.20	1.56	1.66
Freescale	1.24	1.15	1.11	1.82	1.33
Samsung Austin Semiconduct	1.18	1.13	1.31	1.22	1.21
Sematech	1.12	1.14	1.23	1.46	1.24
Spansion	1.11	1.23	1.18	1.18	1.17
University Of Texas	1.33	1.26	1.34	1.53	1.37
Multilayer Tek L.P.					
Hospira Inc	2.72	2.07	1.40	1.35	1.88
Tyco					
Average	1.46	1.33	1.39	1.45	1.41
Standard Deviation	0.573	0.333	0.368	0.222	0.265

City of Austin
Issue Paper #4: Customer Classifications

SECTION

E

Water Sales to Large-Volume Customers

REDOAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

Figure E-1

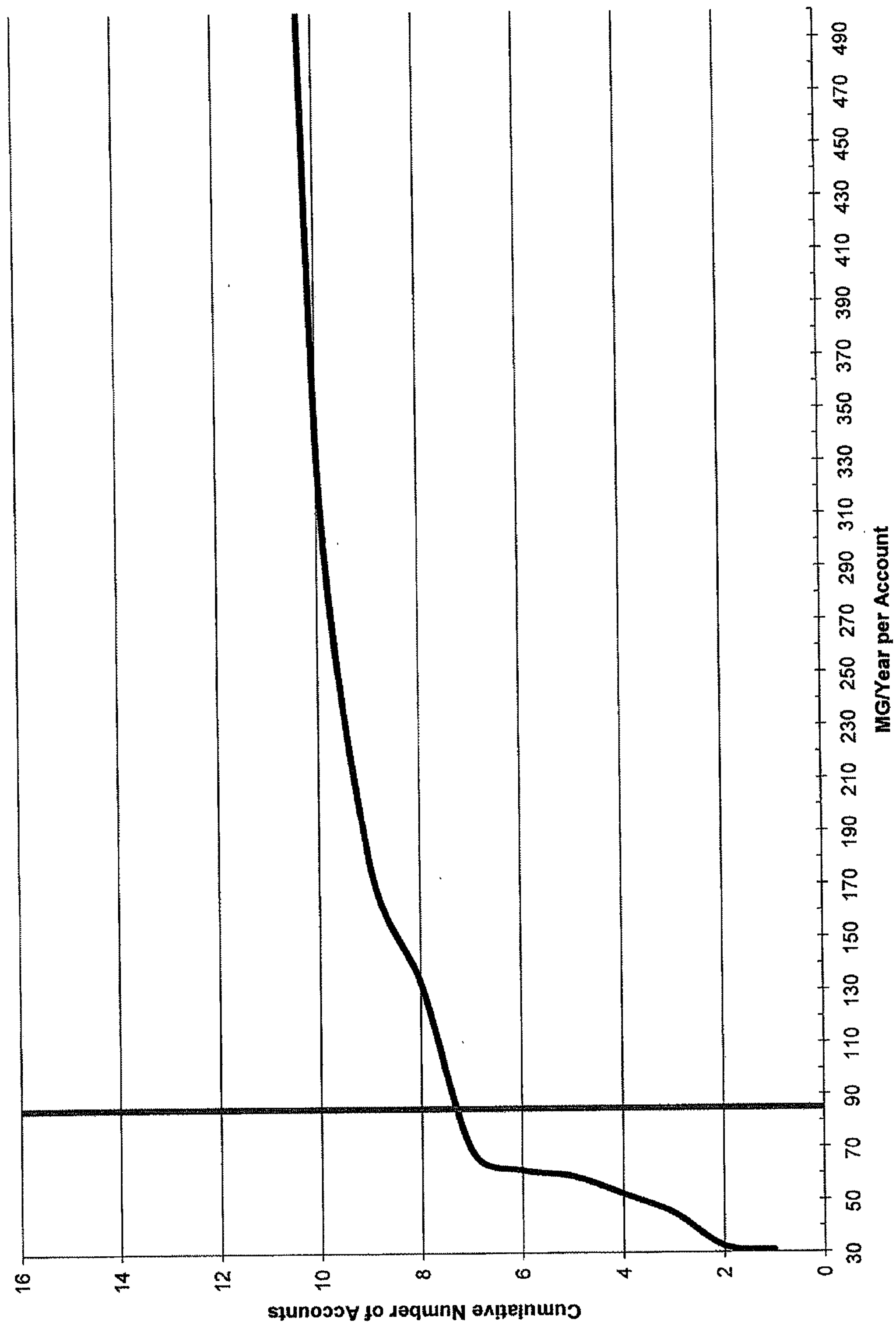

Cumulative Number of Accounts
0
2
4
6
8
10
12
14
16
MG/Year per Account
30
50
70
90
110
130
150
170
190
210
230
250
270
290
310
330
350
370
390
410
430
450
470
490

Table E-1
Consumption by Accounts Exceeding 30 MG per Year

Name	Acct	Year	Annual Sales (MG)
HOSPIRA INC	5349380	2006	30,906
SPANSION	399665	2006	32,374
UNIVERSITY OF TEXAS	538297	2003	32,523
APPLIED MATERIALS	256619	2005	33,713
SPANSION	399665	2005	34,026
APPLIED MATERIALS	4228955	2005	41,066
UNIVERSITY OF TEXAS	844845	2003	44,502
UNIVERSITY OF TEXAS	844845	2004	44,553
TYCO	4554746	2006	45,040
UNIVERSITY OF TEXAS	538297	2005	47,120
APPLIED MATERIALS	4228955	2006	52,273
UNIVERSITY OF TEXAS	844845	2005	54,853
UNIVERSITY OF TEXAS	844845	2006	59,103
UNIVERSITY OF TEXAS	538297	2006	61,500
UNIVERSITY OF TEXAS	597820	2006	68,965
UNIVERSITY OF TEXAS	597820	2004	70,504
UNIVERSITY OF TEXAS	597820	2005	78,020
UNIVERSITY OF TEXAS	597820	2003	79,295
HOSPIRA INC	589815	2003	83,499
HOSPIRA INC	589815	2004	93,409
HOSPIRA INC	589815	2005	97,138
TYCO	4554746	2005	99,173
FREESCALE	15137	2003	127,404
UNIVERSITY OF TEXAS	768753	2006	133,390
TYCO	4554746	2003	134,954
UNIVERSITY OF TEXAS	768753	2005	137,569
FREESCALE	588235	2004	153,376
TYCO	4554746	2004	153,706
UNIVERSITY OF TEXAS	768753	2004	154,639
UNIVERSITY OF TEXAS	768753	2003	155,015
SEMATECH	360836	2006	178,822
SEMATECH	360836	2003	195,718
SEMATECH	360836	2004	203,396
SEMATECH	360836	2005	206,640
FREESCALE	4910316	2004	219,708
FREESCALE	4910316	2006	339,474
FREESCALE	4910316	2005	348,400
FREESCALE	588235	2003	375,409
UNIVERSITY OF TEXAS	561507	2005	895,365
UNIVERSITY OF TEXAS	561507	2006	962,307
SAMSUNG AUSTIN SEMICONDUCT	171562	2003	963,564
SAMSUNG AUSTIN SEMICONDUCT	171562	2004	1,040,862
SAMSUNG AUSTIN SEMICONDUCT	171562	2005	1,057,598
SPANSION	281322	2006	1,116,734
SPANSION	281322	2005	1,186,724
SPANSION	281322	2004	1,299,924
SAMSUNG AUSTIN SEMICONDUCT	171562	2006	1,397,454
FREESCALE	4910303	2004	1,469,740
SPANSION	281322	2003	1,534,934
UNIVERSITY OF TEXAS	561507	2004	1,670,427
FREESCALE	4910303	2006	1,877,140
FREESCALE	4910303	2005	2,005,888
UNIVERSITY OF TEXAS	561507	2003	2,041,587

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REDDAK CONSULTING
A DIVISION OF MALCOLM PIRNIE

Issue Paper #5
Rate Design

Subject: Rate Design

Date: February 28, 2008

Introduction

One of the final steps in the rate setting process is the development of a rate structure or structures that meets the objectives of the Austin Water Utility (AWU) and the community it serves. Utilities throughout the industry have adopted and use several rate structures. Each of these structures varies in its ability to meet the objectives of AWU and its citizens. Regardless, an important consideration in designing rates is to ensure that the rate structure recovers the cost of service while meeting the utility's objectives.

As with prior issue papers, this issue paper examines the options available to AWU and evaluates each option's ability to meet the criteria established by the executive team. This issue paper describes the rate design process, rate components, and alternative rate structures. Also, specific policy questions are addressed.

Overview of Rate Design Process

Rate Design Goals and Objectives

One of the first requirements in developing a rate design is to understand the utility's goals and objectives. The City Council identified water conservation as a priority when passing its resolution on August 24, 2006 with a goal of reducing peak-day water use by 1 percent per year for 10 years. The City's Water Conservation Task Force developed a summary of proposed strategies to meet this goal, some of which can be addressed through the rate design process. These strategies included:

- Establishing an additional residential tier for water use exceeding 25,000 gallons per month;
- Establishing commercial irrigation rates comparable to the highest residential tiers;
- Developing water budget rates for commercial customers; and
- Implementing conservation rate structures for wholesale customers.

Other objectives considered in rate design may include:

- Ensuring the equitability of the rates so that customers with higher use during the utility's peak season pay a proportionate share of their costs;
- Mitigating the impact that weather-related fluctuations in revenues have on the utility's financial health;
- Maintaining the affordability of water for customers with limited ability to pay;

- Providing a meaningful bill with a rate structure that is understandable to the customer; and
- Maintaining the overall acceptance of the rate structure for the community.

Many of these objectives fall outside the technical arena and are necessarily public policy questions that must be answered by community leaders. This issue paper discusses the recommendations of the Water Conservation Task Force.

Rate Components

There are two basic components found in most rate structures: a fixed charge and a variable charge. These components are found in both water and wastewater rate structures. The difference between the two components and their use in rates is described below followed by a discussion of the alternative structures currently in use.

Fixed Charges

The AWWA M1 Manual and WEF Manual of Practice No. 27 categorize fixed charges into service or customer charges, meter charges, and minimum charges. These are defined as follows:

1. Service or customer charge – Typically recovers meter reading, billing, and other customer-related costs that can be applied equally to all customers and are not a function of use.

2. Meter charge – A fixed fee that increases with water meter size.

3. Minimum charge – A fixed fee that includes some allotment of water or wastewater use.

Service or customer charges are relatively easy to calculate and therefore easy to explain to customers. These charges recover the costs that a utility incurs to measure water use, perform the billing process, and provide customer services, etc. These costs generally do not vary with the amount of water consumed; rather these costs tend to vary with the number of bills processed.

Meter charges require allocating costs based on meter size, and are slightly more complex. Even though wastewater is normally not metered directly, meter charges can be used in wastewater rate design. Some water utilities share the cost of meter reading and maintenance with the customer's wastewater provider. This sharing may be appropriate in circumstances where wastewater bills are based in part on water consumption records derived from water meters.

Additionally, some utilities include other components in the meter charges such as: