WATER RATES AND RATE STRUCTURES IN OKLAHOMA

October 1981

By

Terri G. Sparks, Planning Assistant
OKLAHOMA WATER RESOURCES BOARD

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OKLAHOMA WATER RESOURCES BOARD

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IN OKLAHOMA

Background and Introduction

In the earlier history of the United States, charges for water service were flat rate charges, many times based on physical features of the customer's premises such as number of rooms and fixtures. Though various forms of flat rates are still utilized by communities, the introduction of water meters made possible the development of charges based upon the amount of water used. Subsequent water use technology paved the way for development of charges recognizing costs in proportion to the amount and characteristics of use.

Most water utilities are solely in the business of supplying water, with water sales being their most important source of receipts. Among utility systems, the division of revenues from the sale of water is allocated among water supply, treatment, distribution, administration and accounting, and debt service (example: see Appendix A, Table 1). Because of escalating costs, many water utilities in Oklahoma are discovering that production and distribution costs are exceeding the price charged for water and have turned to revising rates regularly to obtain increased revenue.

A successful water rate structure must be carefully constructed and analyzed and then reviewed regularly as a continuing program of any water utility -- a matter that is often overlooked by many water suppliers.

Rate structures are too often copied from other cities, and as long as gross revenues are more than expenses, nothing more is expected. A water utility sometimes justifies a rate increase because a neighboring utility is charging a higher price for water. Many times a water utility will find expenses rising faster than revenues and try to remedy the problem by simply increasing existing rates without first examining all factors involved, such as costs incurred versus prices charged, costs of providing service to customers during average load periods versus peak load periods, and benefits of continuing with the current rate structure versus adopting an alternative rate structure.

Many of the smaller water suppliers fail to recognize that efficient waterworks accounting and record maintenance can be invaluable tools for reviewing rate structures. Smaller cities sometimes neglect waterworks accounting and, consequently, know little of production costs, leading to loss of revenues and many complaints. A record of activities and pertinent events should be made an integral part of accounting procedures for use in analyzing historical trends.

With the rising costs involved in supplying water to customers, the need for water suppliers to adopt realistic rate structures and create a regular review program should be emphasized.

The principle goals in setting water rates are to obtain sufficient revenue to offset costs, to be equitable to all classes of users and to discourage waste. The rate charged for water should provide an annual return sufficient to maintain financial security for the water supplier. Rates should distribute the burden of water costs as equitably as possible among various classes of users -- residential, commercial and industrial -- according to the demands they place upon the system.

Information necessary to design a reasonable rate structure includes such items as: the money value of the utility; the cost of doing business, including all operation, maintenance and capital charges; and the volume of water that may be sold.

This report will furnish ideas for comparable rate schedules for each of the Oklahoma Water Resources Board's Planning Regions.

Over recent months, Oklahoma Water Resources Board staff compiled a survey of water rates currently utilized by many Oklahoma public water suppliers, based on information obtained from: personal interviews conducted with rural water officials prior to publication of the Board's Rural Water Systems in Oklahoma (1980); applications submitted to the Board for financial assistance; and a recent telephone survey to selected communities in Oklahoma. Preliminary to the development of the Oklahoma Water Resources Board's Oklahoma Comprehensive Water Plan, the planning guide for managing Oklahoma's water resources through the year 2040, the state was divided into eight planning regions composed of counties naturally grouped and demonstrating similarity of climate, hydrology, geography, economics and demography. The survey results in this report are delineated by planning region, with each planning region representing those counties as shown in Figure 1. It should be noted that the results obtained were from an informal survey, based solely on information as related to Board personnel, and therefore many communties could very well differentiate from the information presented here. However, the methodologies contained in the report should be applicable to most public water supply systems.

Based on the survey of water rates and a brief analysis of rate structures, the information provided should help to establish a

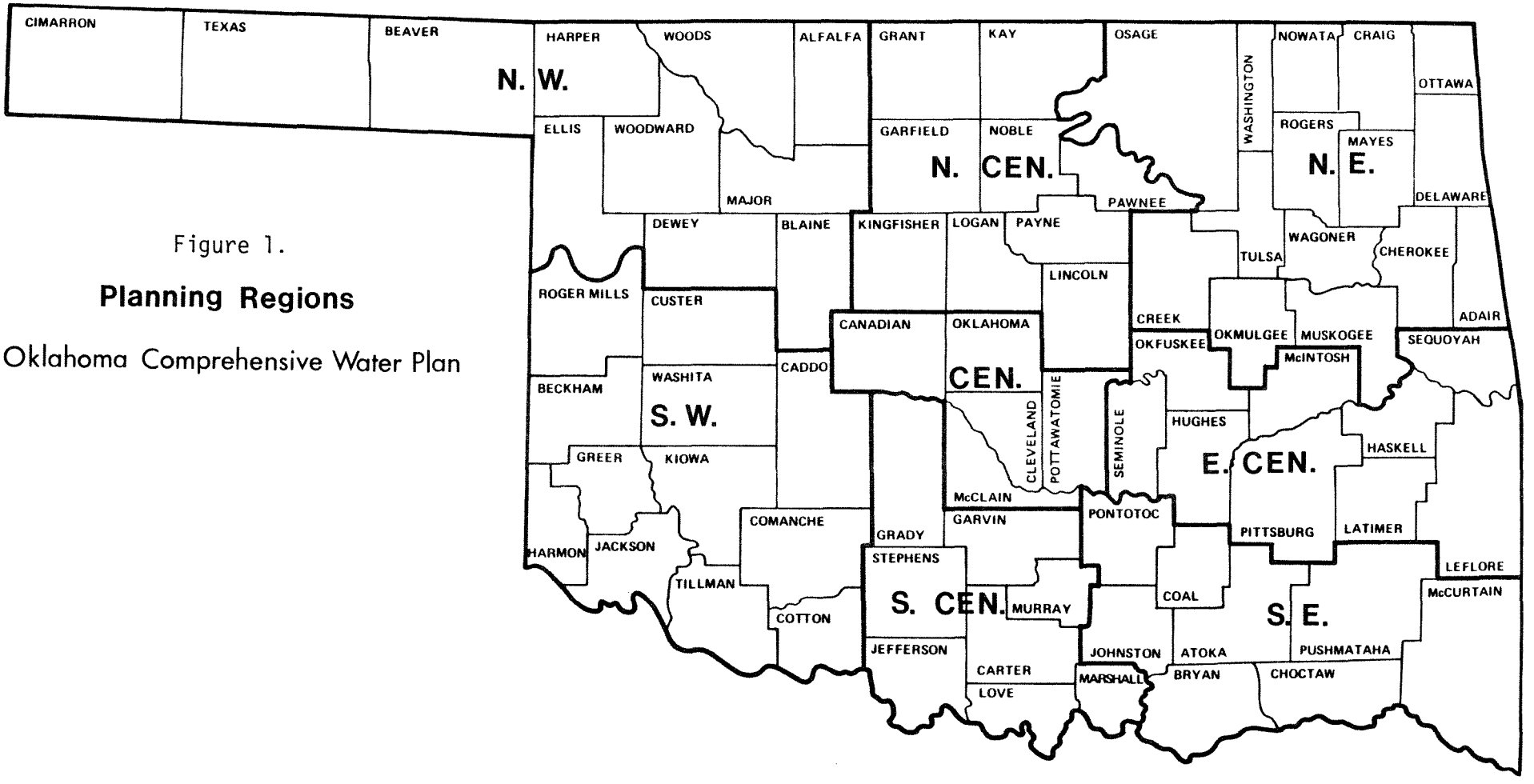

Figure 1.

Planning Regions

Oklahoma Comprehensive Water Plan

realistic price guide for water. The guide will provide the utility a means of recovering the various service costs associated with water, while remaining equitable to its customers. In addition, the report will discuss the various water rates in Oklahoma and alternative rate structures as a possible means to encourage water conservation. The information presented is limited to residential and commercial customers, since most industrial users have their own source of supply and recycle cooling or processing water.

Rate Structures in Oklahoma

Presently, there are four basic water rate structures utilized in Oklahoma. These include the flat rate, uniform rate, decreasing block rate, and the increasing block rate.

Flat Rate

The flat rate is calculated by dividing total operating and capital costs for a given time period by the number of customers. A fixed sum of money is charged for water services, regardless of the actual quantity of water consumed.

This method is usually found in unmetered areas, often varies according to the size of the line, and is used mainly because of its simplicity and easy application and administration. Major objections to the use of a flat rate by a water utility are that it often leads to excessive and wasteful use of water and does not provide a fair and equitable method for distributing the cost of water supplied according to quantity used.

The flat rate structure is utilized by about 4 percent of the rural water systems and 9 percent of the municipal systems included in our survey.

Uniform Rate

The uniform rate is determined by dividing the total quantity of water produced into the total operating and annual capital costs needed to supply that quantity. A constant price per unit of water is charged, regardless of the quantity used. In other words, each unit of water costs the same. A uniform rate can be justified if increasing service does not significantly affect unit costs given present capacity, and in turn, unit costs are not significantly altered as the water utility expands capacity.

This rate structure is used by about 37 percent of the municipalities and 21 percent of the rural water systems in this survey.

Decreasing Block Rate

The decreasing block rate is the most commonly used rate structure in Oklahoma. Customers are charged a different rate for specified amounts ("blocks") of water, with the price per block decreasing as the quantity of water use increases.

This method subsidizes the larger users at the expense of the smaller users, and is often used to attract industry to an area. This system is based upon the premise that it costs less to service larger users rather than small users, which often proves to be an unrealistic conclusion. The structure provides no incentive to reduce unnessary waste of water and may, to some extent, encourage it by providing very low rates for large quantities of water.

The decreasing block rate is used by about 52 percent of the municipalities and 75 percent of the rural water systems in the survey.

Increasing Block Rate

The increasing block rate charges a different rate for specified blocks of water. A certain amount is charged for the initial block, with the price per unit increasing as the quantity of water use increases. This structure can be justified economically if both increased utilization rates and capacity expansion cause unit costs to increase. This method also encourages conservation by giving the consumer an economic incentive to do so.

This method is rarely used in Oklahoma, with about 2 percent of the municipalities and less than one percent of the rural water systems surveyed utilizing this structure.

Summary of Water Rates

Appendix B, Tables 2 and 3 give a summation by Planning Regions of the number of water utilities surveyed and an approximate number of persons served by each of the four rate structures.

Appendix D, Tables 4 and 5, estimates what an average family can expect to pay for rural water and municipal water service, respectively, according to the source and type of rate structure utilized. These average monthly costs were derived from rate schedules obtained during the survey; and are based on an average family of 2.6 persons using 150 gallons per person per day, or approximately 12,000 gallons per family for an average month of 30 days.

Customers served by municipal systems generally pay less than those served by rural water systems, primarily due to the more expansive distribution systems required to serve rural communities.

Customers that are served by a water utility which purchases from another utility generally pay the highest price for water regardless of

the amount used. The purchasing utility must pay the regular rate that the vendor charges their customers, plus an added charge must be collected by the purchasing utility to cover operation and maintenance cost of their distribution facilities.

As one would expect, sources of water supplies vary across the state. Due to a lack of available stream water, ground water development is greatest in the western part of the state and is the major water supply source for irrigation, municipal, and industrial purposes. Ground water supplies 61 percent of the total water use reported in Oklahoma, is typically of relatively good quality requiring only moderate treatment, provides 80 percent of the state's irrigation needs, and meets the municipal needs of approximately 300 communities. Surface water in the west, where available, is generally of lesser quality and requires a higher degree of treatment to meet public water standards. In contrast, eastern Oklahoma utilizes an abundant supply of surface water in which the quality is most often good, requiring only moderate treatment.

In most cases, however, the source of water supply and/or locality of the system itself could not be isolated as being the most significant factors in what a utility charges for water, as is shown by the lack of correlation in these variables in Tables 4 and 5. Each water supplier has a set of unique independent variables which are possible determinants of the price charged for water. Such determinants include, but are not limited to, the cost of supplying water, debt service expenses, the magnitude of the service area, the number of customers, type of water treatment, how the system was financed and capital assets owned by the system, etc.

All Oklahoma water rate structures (except the flat rate) have incorporated a charge for the initial block (or quantity) of water used, generally the first 1,000 to 3,000 gallons. This initial charge is traditionally used to cover operation and maintenance cost, annual requirements for replacements, minor extensions of service, and minor improvements. Provisions for major improvements are usually funded by sales tax, through the revenue obtained by the sale of bonds, and from federal or state funding programs.

Alternative Rate Structures and Water Conservation

Increases in per capita consumption and population are creating demands that exceed the capacities of existing supply and/or distribution facilities for many water systems, expecially during the peak load summer months. Every year a number of Oklahoma communities and rural water districts ration, while many others engage in contingency planning to prepare for such emergencies. Most rate schedules currently in use do not provide the capital required to expand and operate facilities to meet increasing demands, thus conservation becomes mandatory for many systems.

Water conservation is an effective and efficient means of solving various water supply problems. A program to promote conservation of water can have many benefits for the customer as well as for the water utility. Water conservation practices can help a system over a short-term shortage, may eliminate or postpone the need to expand existing facilities or develop new sources and can also reduce the operating costs while aiding a system through a water supply emergency.

Pricing, or changing the water rates to encourage users to conserve to save money, is a cost effective program which can earn extra revenues

even as consumption drops and is, therefore, a logical consideration if lack of revenues is a problem. Pricing is a mandatory program that encourages conservation through higher costs to the consumer. Generally, as the price for a product goes up, the demand for that product goes down. This economic relationship holds true for water--as the price for water increases, it is logical to assume that users will reduce their use.

If a utility chooses a pricing program, a new water rate will have to be designed. Usually a change in both price level (price per unit of water) and price structure (price level variations according to the quantity used or time of use) are necessary. The price level is the most important part. The new price must be high enough to encourage the needed use reduction, must cover the total cost of service, and minimize adverse impacts.

A major concern of most utilities is that when a rate structure to reduce water consumption is considered, an undesirable reduction in revenues will occur. Water suppliers basically depend upon a stable and predictable budgeting process for efficient operation. Therefore, skillful advance planning must be initiated prior to adopting a new water rate for pricing, which could well consist of the following steps: Express your percentage reduction goal numerically; estimate how much water use will drop after the price goes up; determine percent of change in price needed to achieve the goal; determine what the new revenues will be as a result of the new price level; and compare the new revenues with your costs, remembering that variable costs will drop as water use drops. If the revenues are too low, you may need a higher price; if the revenues are too high, you may need a lower price.

The rate structures discussed below essentially require the consumer to absorb the increased costs required to meet higher demands, while simultaneously encouraging water conservation.

The summer surcharge system seasonally raises the minimum rate during the summer months (March through October) to meet the increased demand, which is usually highest during these months of the year. Other efforts include a service charge based upon the meter size, which increases the minimum rate and remains in effect all year. Metering insures system efficiency by accurately accounting for all water used. An excess use charge would require a significantly higher price level for all water used above average, usually determined by winter use.

The lifeline rate provides a certain amount of water for essential needs at rates that will benefit the low and moderate income user. Rates are increased at the discretion of the water utility above the "lifeline" amount. This method is best for reducing the average use per customer.

A marginal cost pricing structure considers the facilities required to meet the average daily demand, the maximum daily demand, and some allowances for projected growth in the service area. A rate structure is developed that would require the users who contribute to peak loads to pay for the additional facilities required.

The sliding scale system utilizes a price level per unit for all water used, with increases based on average daily consumption. This method is best used for reducing the average (and sometimes peak) use. A daily peak load method, instrumental in reducing peak usage, institutes a higher price level during hours of peak use (i.e. 6 a.m. to 6 p.m.).

The most conservationally oriented rate structure is the increasing block rate. This method charges a different rate for specified amounts ("blocks") of water, with a certain amount being charged for the initial block and the rate increasing for each succeeding block. This system reduces the average (and sometimes peak) use and is very effective in encouraging water conservation.

Another conservation-oriented structure is that of tax incentives. Communities and rural water districts could give tax credits or bill reductions when users have implemented other conservation devices. (i.e. flow restrictors, water displacement bags). This method offers an incentive for voluntary conservation practices and is most effective in reducing either peak or average use.

From the standpoint of conservation, the key to an effective water pricing policy is to make it clear to the user that he/she can save money by minimizing water use. Therefore, the increase in water costs (for quantities above the reasonable minimum required) must be great enough to become a factor in a customer's operating expenses. Pricing systems offer an opportunity to increase the awareness of the relationship between the quantity used and the cost.

There will, of course, be a certain amount of public opposition to a proposed rate increase. Efforts should be made to estimate the response of the users to the new price and inform the public of the need for such changes as well as the rationale for the proposed rate schedule.

Water utilities that have implemented new rate structures found that raising water rates has had little or negligible effect on overall consumption. It must be noted that only a few water utilities have

attempted to implement a conservation-oriented rate structure, thus the results cannot be fully evaluated. Several reasons have been offered for this minimal response, and are discussed in the following paragraphs.

As per capita income increases, water consumption increases. More water-using appliances (dishwashers, garbage disposals, etc.) are found in the home as income rises, which actually have more effect on total consumption than the number of persons living in the home. There is more discretionary income available to be devoted to lawns, shrubs, and trees (all big water users) as the low cost of water becomes a relatively smaller portion of the total family budget.

Low income families are generally less affected by rate increases because they use the minimum amount needed. Most existing rate structures, and the proposed conservation-oriented structures, charge a reasonable rate for a quantity of water sufficient for essential needs.

Despite this rather paradoxical trend, it is only logical to assume that at some level a rate increase will be sufficient to encourage users to reduce, if not eliminate, unnecessary use and waste of water.

Concluding Remarks

In Oklahoma's public water systems, consumer demands exemplify dramatic seasonal variation, with the peak demand occurring within the summer months. Consumption during this time requires the greatest use of facilities (treatment plants, pumping stations, lines, etc.) in relation to other periods in the year. Consumers have made decisions on underpriced (peak) water, and have thus increased their consumption beyond the marginal point where the cost and the value of output are in balance.

Any water rate has the ability to recover the total cost of service if the price level is high enough. It is important that only one price hike be necessary within a short period, otherwise the utility may be faced with tremendous opposition, making another rate hike virtually certain to be an uphill battle.

It seems worthwhile to note that regardless of how a new rate structure is designed, there is likely to be some opposition. Educational programs explaining the need for the rate increase will help to buffer the negative responses. This type of program could also explain ways to conserve (as a means for keeping bills low) as well as establish a means for developing consumer confidence.

A new water rate structure, if handled correctly, can meet the principle goals of providing water utilities with needed revenues to meet increasing production and distribution costs, as well as being equitable to all consumers and discouraging waste.

In order to develop a realistic and equitable water rate structure, the Oklahoma Water Resources Board encourages each water supplier to adopt a carefully planned rate review program, aimed at assessing both short- and long-term needs, based on the unique circumstances characteristic of the utility's operations and the community served.

Any water utility official wishing technical assistance in reviewing their current water rate structure or desiring further information on water rate planning in general may contact:

Oklahoma Water Resources Board
Planning and Development Division
P.O. Box 53585
Oklahoma City, OK 73152
PH: (405) 271-2555

A P P E N D I X A

TABLE 1

Allocation of Water Revenues Among Cost of

Water Production and Distribution*

Category	Cost/1000 Gallons	Percent of Total
Supply	0.121	19
Treatment	0.123	19
Distribution	0.174	27
Administration & Accounting	0.048	7
Debt Service	0.184	28

*Average of cost allocations for Cities of Midwest City, Edmond, Oklahoma City and Stigler as of March 1981.

A P P E N D I X B

TABLE 2

SURVEY SUMMARY

RURAL WATER SYSTEMS

Rate Structures

Planning Region	Decreasing Block		Uniform Rate		Increasing Block		Flat Rate	
	Systems Surveyed	Population Served	Systems Surveyed	Population Served	Systems Surveyed	Population Served	Systems Surveyed	Population Served
Northeast	53	81,721	20	34,881	0	-----	2	705
East Central	33	49,344	9	9,537	1	1,100	2	1,390
Southeast	29	37,202	9	17,432	0	-----	1	608
North Central	26	21,666	4	3,693	0	-----	1	280
Central	11	13,546	1	780	0	-----	1	627
South Central	28	49,240	8	8,235	1	3,850	0	-----
Northwest	13	6,712	1	1,000	0	-----	1	1,300
Southwest	26	29,953	10	7,406	0	-----	3	1,550
Total	219	289,384	62	82,964	2	4,950	11	6,960
% of total in Survey	74.5	75.4	21.1	21.6	0.7	1.3	3.7	1.7

TABLE 3

SURVEY SUMMARY

MUNICIPAL SYSTEMS

Rate Structures

Planning Region	Decreasing Block		Uniform Rate		Increasing Block		Flat Rate	
	Systems Surveyed	Population Served	Systems Surveyed	Population Served	Systems Surveyed	Population Served	Systems Surveyed	Population Served
Northeast	7	422,230	0	-------	0	------	1	2,185
East Central	9	41,877	6	7,847	0	------	1	305
Southeast	3	21,403	8	33,195	1	350	4	1,517
North Central	7	76,610	3	9,294	0	------	1	632
Central	7	472,949	4	155,713	1	28,424	0	----
South Central	9	67,587	6	38,651	0	------	0	----
Northwest	2	9,049	2	3,549	0	------	1	405
Southwest	3	92,411	4	11,286	0	------	0	----
Total	47	1,204,116	33	259,535	2	28,774	8	5,044
% of total in Survey	52.2	80.4	36.7	17.3	2.2	1.9	8.9	0.4

A P P E N D I X C

TABLE 4

AVERAGE MONTHLY COSTS PER FAMILY*

RURAL WATER SYSTEMS SURVEYED

PLANNING REGION Source	Rate Structure: Decreasing Block	Uniform Rate	Increasing Block	Flat Rate
NORTHEAST				
Ground water	$17.50	$22.40	$-----	$13.00
Stream water	18.44	19.13	-----	-----
Purchase	20.30	19.30	-----	5.00
EAST CENTRAL				
Ground water	$17.50	$25.00	$-----	$ 6.20
Stream water	16.58	-----	-----	-----
Purchase	18.63	16.00	45.00	5.00
SOUTHEAST				
Ground water	$15.09	$19.50	$-----	$10.00
Stream water	18.47	17.65	-----	-----
Purchase	19.93	23.00	-----	-----
NORTH CENTRAL				
Ground water	$19.61	$ 9.00	$-----	$ 5.00
Stream water	20.57	23.50	-----	-----
Purchase	21.70	18.25	-----	-----
CENTRAL				
Ground water	$17.39	$19.50	$-----	$ 8.00
Purchase	14.89	-----	-----	-----
SOUTH CENTRAL				
Ground water	$16.20	$15.75	$-----	$-----
Stream water	18.39	13.30	10.30	-----
Purchase	24.00	20.72	-----	-----
Ground & Surface	-----	23.00	-----	-----
NORTHWEST				
Ground water	$14.88	$15.50	$-----	$10.00
Purchase	26.02	-----	-----	-----
SOUTHWEST				
Ground water	$20.13	$14.96	$-----	$ 7.67
Stream water	19.90	-----	-----	-----
Purchase	20.62	28.29	-----	-----

* Based on an average family of 2.6 persons using approximately 150 gallons per person per day.

TABLE 5

AVERAGE MONTHLY COSTS PER FAMILY*

MUNICIPAL WATER SYSTEMS SURVEYED

PLANNING REGION Source	Rate Structure Decreasing Block	 Uniform Rate	 Increasing Block	 Flat Rate
NORTHEAST				
Ground water	$19.33	$-----	$-----	$12.00
Stream water	11.95	-----	-----	-----
EAST CENTRAL				
Ground water	$11.50	$-----	$-----	$-----
Stream water	12.83	12.60	-----	5.00
Purchase	16.23	15.08	-----	-----
SOUTHEAST				
Ground water	$11.50	$16.26	$21.00	$ 8.25
Stream water	-----	11.03	-----	-----
Purchase	15.30	-----	-----	-----
Ground and Stream	15.10	-----	-----	-----
NORTH CENTRAL				
Ground water	$17.88	$14.90	$-----	$ 6.50
Stream water	11.80	8.80	-----	-----
CENTRAL				
Ground water	$12.33	$10.70	$-----	$-----
Stream water	10.09	-----	-----	-----
Purchase	21.79	-----	-----	-----
Ground & Stream	-----	11.57	14.05	-----
SOUTH CENTRAL				
Ground water	$12.62	$18.17	$-----	$-----
Stream water	11.60	19.00	-----	-----
Purchase	-----	13.33	-----	-----
NORTHWEST				
Ground water	$ 8.60	$11.50	$-----	$ 4.50
SOUTHWEST				
Ground water	$ 9.10	$13.90	$-----	$-----
Stream water	14.77	6.20	-----	-----

* Based on an average family of 2.6 persons using approximately 150 gallons per person per day.

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