



# BLACK & VEATCH

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August 30, 2004

City Commission  
City of Lawrence, Kansas  
6 East 6<sup>th</sup> Street  
Lawrence, Kansas 66044

Dear Commissioners:

In response to your request during the Commission meeting on August 10, 2004, we have prepared additional residential water rate alternatives for your consideration. We have also included in this letter additional information to clarify portions of our report and information concerning the water rate structures of comparable Kansas utilities. Each of these subjects is discussed individually below.

## **Cost of Service versus Conservation Based Rate Structure**

The water rates presented in our report are not principally designed to reduce residential water consumption like those rates that have been developed to meet conservation goals in other water utilities. Some utilities with limited water resources have implemented conservation based rates as part of a comprehensive conservation program designed to actively reduce water consumption. For example, Hays, Kansas implemented a conservation program that included conservation based rates, educational materials and regulatory requirements because it was forced to reduce water consumption due to limited water resources. The City of Lawrence has significant water resources and while prudent use of water resources is an objective of the water utility, it does not presently need to implement an aggressive conservation program targeted at reducing water usage. (See attached B&V memo from Jeff Henson and Mike Orth)

**The proposed water rates presented in our report are based on cost of service principles that are designed to recover costs more equitably from those users that exert the greatest peak demands on the City's water system. These users are typically residential customers with larger lots and automated sprinkling systems. Therefore, by effectively splitting the residential customer class into the two categories of moderate irrigators**

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**and more intensive irrigators, the more intensive irrigators can be charged a higher rate that better represents the demands they actually place on the system.**

If a declining block rate structure is properly designed, each customer class will pay its proportionate share of system costs. **In Lawrence, about 3 percent of the residential customers use enough water to exceed the 20 thousand gallon (Mg) allowance designed for the residential customer class.** This results in about 12 percent of total residential water volume or about 5.5 percent of total water sales volume being billed at a rate that is \$0.60/Mg lower than the intended residential rate because the lower rate is designed for commercial customers that typically place lower demands on the water system. **Therefore, the existing declining block rate structure actually sends a price signal to the highest residential peak users of the system to use more water due to the declining average price of water.** The uniform and two-step water rate options for residential customers eliminates this potentially perceived “quantity discount” pricing signal.

We do not believe that the magnitude of the proposed 2009 residential rate differential between the lower priced first block and the higher priced second block is large enough by itself to significantly lower water consumption in Lawrence. This belief is based on the assumption that those who have a significant investment in their landscaping and are inclined to irrigate will continue to do so as long as the rate differential does not become excessive.

### **Additional Alternatives**

Meetings were held with senior City management and water utility staff to discuss **additional water rate alternatives**. A meeting was also held with senior staff and the President/CEO of the Lawrence Chamber of Commerce to discuss his concerns regarding conservation based rates. Based on these meetings, additional alternatives were selected and analyses of these alternatives were conducted to show the impact of each alternative rate on representative single family residential customers served by 5/8-inch water meters.

#### **Table 1 – Typical Residential 2005 Bills**

Table 1 shows **five alternative rates** for 2005 as if the City would immediately adopt such rates in 2005 instead of the planned phase-in of similar increased charges in the future. This allows a direct comparison of the full impact of each set of alternative rates to the City’s existing rates. **The first alternative continues the existing declining block rate structure, but like all other alternatives, replaces the existing system of minimum charges with a system of service charges.** The uniform charge alternative (Alternative 2) is identical to the 2005 rates proposed in the report. The uniform residential volume charge is slightly lower than the first block rate of the 2005 declining block rate structure because the higher use residential customers are no longer subsidized by the lower volume residential users.

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Our report takes a three prong residential rate conversion approach to **(1) eliminate the subsidy provided by the existing declining block rate structure to the high volume residential customers, (2) increase all rates due to price inflation, and (3) gradually lower the water usage applicable to the first block of a potential inverted block rate structure for residential customers from the existing 20 Mg level, which is not changed through 2007, to 15 Mg in 2008, and finally to 10 Mg in 2009.** To simplify the transition towards inverted block rates and to provide a smoother transition for customers with water use within the 15 to 20 Mg blocks and the 10 to 15 Mg blocks, the proposed breakpoint for the increased residential volume charge has been set at 10 Mg for each of the three inverted residential rates (Alternatives 3, 4, and 5).

The first inverted rate structure (Alternative 3) reduces the uniform residential volume charge by only \$0.02/Mg for the first rate block, but has an \$0.08/Mg impact on users that use more than 10 Mg per month. This alternative could be immediately adopted in 2005 or serve as the first inverted block transition rate in 2006 since it does not significantly increase the water bills of high volume users above the uniform volume charges (Alternative 2). Alternative 4 shows what the middle transition inverted block rates would be if immediately adopted in 2005, and the rates indicated for Alternative 5 show the targeted inverted block rates as if they were immediately adopted in 2005 instead of phased-in over a period of years. The rate designed for the first 10 Mg of Alternative 5 is based on demand factors that are representative of residential customers that adhere to moderate irrigation practices. The rate for usage over 10 Mg under Alternative 5 is based on the resulting demand factors required to derive the average single family residential demand factors that have been historically assigned to this class. Therefore, the volume rates for the two residential rate blocks are designed using identical cost of service considerations as with all other water rates, with the exception that differential demand factors are used for the two separate subgroups within the residential class instead of average class demand factors.

#### **Table 2 – Residential Typical 2005 Water bills**

Table 2 shows the monthly water bills under existing water rates and under each of the five alternative water rates. The relative percentage of the number of 5/8-inch water bills issued for each usage level is also presented to show the general distribution of water bills. This information is also shown in graphic form at the bottom of Table 2. About 88 percent of the 5/8-inch bills issued in 2003 were for water usage less than the proposed 10 Mg breakpoint. Therefore, if the City adopts an inverted block rate structure for single family residential customers, the higher charge would only be applied to about 12 percent of the bills for customers served by 5/8-inch water meters or about 13 percent of the bills for all residential customers. About 96 percent of all single family residential customers are served by 5/8-inch water meters. The largest water meter used by a residential customer is two inches.

This table shows that the alternative rates generally benefit the lower water volume residential customers by requiring the higher volume residential users to pay a more

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proportionate share of their costs. Customers that use less than about 25 Mg under the uniform charge alternative (Alternative 2), about 20 Mg under Alternative 3, 14 Mg under Alternative 4, and 13 Mg under Alternative 5 will pay less than the amount that would be charged if the City were to retain a declining block rate structure (Alternative 1). Table 2 also shows the final proposed impact on high volume residential users at 2005 cost levels if the City were to immediately adopt the inverted block rates set at the targeted demand factors (Alternative 5) instead of gradually phasing-in inflated versions of these rates over time as proposed.

**Table 3 – Comparison of 2005 Residential Water Rates with Existing Water Rates**

Table 3 compares typical bills under alternative rates with bills under existing rates and presents the results as percentage increases. Generally, the higher the alternative number, the more favorable it is to lower volume users and the less favorable it is to higher volume users.

**Other Regional Water Rate Structures**

Water rates for five Kansas water utilities were reviewed for comparison purposes. These utilities include WaterOne of Johnson County, Olathe, Wichita, Hays, and Topeka. The first four water utilities currently levy water rates that have conservation components and Topeka charges a uniform rate by customer class similar to those proposed for Lawrence in 2005.

**Water One**

WaterOne has a system of “peak management rates” that are designed to slow the increase in peak demands of their customers. The utility has two volume charges that are applicable to all customer classes. The first block rate is equal to \$2.44/Mg and is applied to each residential customer’s actual water usage up to 125 percent of their average water consumption established during the previous winter period. The next block rate of \$3.24/Mg is applied to each customer’s actual water usage that exceeds 125 percent of the customers previous winter average. Therefore, a customer that averages 4 Mg per month during the winter would be charged \$2.44 for the first 5 (4 x 1.25) Mg of water usage per month during the summer and \$3.24/Mg for all summer usage over 5 Mg. In addition to the differential volume charges, residential customers are required to pay a \$13.10 service charge on a bimonthly billing basis to cover meter reading and billing costs, meter maintenance, and public fire protection costs.

**Olathe, Kansas**

Olathe imposes a \$3.04 per month service charge combined with a four block inverted block rate structure where the blocks are measured in hundred cubic feet (Ccf). An equivalent volume charge of \$2.59/Mg is applied to all usage less than 7.5 Mg (10 Ccf), \$3.29/Mg for usage between 7.5 and 18.7 Mg (25 Ccf), \$4.18/Mg for usage between 18.7 and 374 Mg (500 Ccf), and \$4.99/Mg for usage greater than 374 Mg.

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**Wichita, Kansas**

Wichita has an inverted rate block structure that is applicable to all customer classes. Average water usage billed during the months of December, January, February, and March are used to establish the average winter consumption (AWC) of each customer. Usage through 110 percent of AWC is billed at a rate of \$0.74/Mg. However, the AWC for all meters one inch and smaller are assigned an AWC of 6 Mg. Therefore, the first block rate would generally apply to the first 6.6 Mg of residential water usage. Metered consumption between 111 and 310 percent of AWC is billed at \$2.66/Mg and usage greater than 310 percent of AWC is billed at the rate of \$4.00/Mg. Inside city customers also pay monthly service charges based on their meter size with a charge of \$5.26 applicable to customers served by 5/8-inch water meters.

**Hays, Kansas**

Hays charges its residential customers served by a 5/8-inch water meter a \$9.18 per month minimum charge that includes 0.75 Mg of water usage. Water usage during the preceding winter months of January, February, and March are used to establish a usage level to apply to the first tier rate for the next 12-month period. The existing first tier rate is levied on a per hundred cubic foot basis that is the equivalent of \$2.14/Mg. All usage above the winter usage level is applied to the “conservation tier” which is twice the tier one rate or \$4.28/Mg.

**Topeka, Kansas**

Topeka switched from a declining block rate to a system of uniform volume charges by customer class in 1992 because some customers perceived the rate structure as giving quantity discounts to large volume users. The City currently charges a \$7.97 minimum charge that includes a 1.5 Mg water usage allowance and a uniform single family residential charge of \$2.48/Mg for all usage over 1.5 Mg. These rates are scheduled to increase to \$8.29 and \$2.74/Mg on January 1, 2005 and to \$8.59 and \$3.00/Mg on January 2006 if annually approved by the City Council

**Rate Review Summary**

Based on this limited review of regional water rates, the rates proposed for Lawrence are reasonable and consistent with rate structures applied by other Kansas water utilities. None of the utilities surveyed are currently using a declining block rate structure and four of the five utilities have implemented inverted residential water rates to encourage the efficient use of water. **Table 4 presents a comparison of typical bills of the five water utilities** with those proposed for Lawrence under the 2005 uniform volume charges (Alternative 2) and the targeted inverted block rates (Alternative 5). As indicated by this table, the proposed Alternative 2 rates for 2005 are lower than all of the existing rates imposed by the surveyed utilities except Wichita, which has a very low initial block rate. The targeted inverted block rates under Alternative 5 are comparable to the 2004 rates currently being applied by the four utilities that have adopted inverted block rates.

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**Revenue at Risk**

Revenue for all water utilities is partially dependent on weather conditions. The revenue component that is most susceptible to weather patterns is the water used for irrigation purposes, which is primarily attributable to the residential customer class. In Lawrence, the portion of projected 2005 water sales revenue attributable to the large lawn irrigators is estimated to be about 10 percent of total water sales revenue under a uniform volume charge system. By establishing a higher rate for this volume, as proposed in our report, the amount of revenue at risk due to wet or cool weather conditions will be increased to about 13 percent of total water sales revenue. If the City increases the last block of the proposed residential rates above the targeted value presented in the rate report to purposely reduce water consumption, the amount of revenue at risk due to mild weather conditions will increase.

**Conclusion**

**The proposed 2005 uniform water charge for residential customers will eliminate the subsidy presently provided to high volume residential users by the lower volume residential users and is an important first step toward water rates that achieve better equity among the residential users.** The transition residential water rates proposed in our report adjust both the rate block applicable to residential customers and price structure. This two tiered conversion can be simplified by initially setting the breakpoint between the two residential rate blocks at the targeted value of 10 Mg and only adjusting future rate levels. It is anticipated that if the City selects the proposed inverted rate block structure, most of the future cost increases will be absorbed by the second residential block rate with the first block rate held constant or moderately decreasing over time.

Very truly yours,

BLACK &amp; VEATCH CORPORATION



Keith D. Barber  
Senior Consultant

KB

Enclosure[s]

cc: Mike Wilgen  
Debbie Van Saun  
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Chris Stewart

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**Table 1**  
**Alternative 2005 Inside City Water Charges**

|                                    | Existing | Declining<br>Block<br>Alt. 1 | Uniform by<br>Class<br>Alt. 2 | Inverted Residential Rates |        |        |
|------------------------------------|----------|------------------------------|-------------------------------|----------------------------|--------|--------|
|                                    |          |                              |                               | Alt. 3                     | Alt. 4 | Alt. 5 |
|                                    | \$       | \$                           | \$                            | \$                         | \$     | \$     |
| <b>Volume Charge - \$1,000/gal</b> |          |                              |                               |                            |        |        |
| First 2,000 gallons                | Minimum  | 2.69                         |                               |                            |        |        |
| Next 18,000 gallons                | 2.52     | 2.69                         |                               |                            |        |        |
| Next 480,000 gallons               | 1.92     | 1.95                         |                               |                            |        |        |
| Over 500,000 gallons               | 1.78     | 1.80                         |                               |                            |        |        |
| <b>Residential</b>                 |          |                              |                               |                            |        |        |
| First 10,000 gallons               |          |                              | 2.67                          | 2.65                       | 2.55   | 2.44   |
| Over 10,000 gallons                |          |                              | 2.67                          | 2.75                       | 3.15   | 3.59   |
| Multifamily                        |          |                              | 2.31                          | 2.31                       | 2.31   | 2.31   |
| Commercial                         |          |                              | 2.05                          | 2.05                       | 2.05   | 2.05   |
| Industrial                         |          |                              | 1.88                          | 1.88                       | 1.88   | 1.88   |
| <b>Mg - 1,000 gallons</b>          |          |                              |                               |                            |        |        |
| <b>Service Charge - \$/month</b>   |          |                              |                               |                            |        |        |
| 5/8" & 3/4"                        | 6.55     | 1.95                         | 1.95                          | 1.95                       | 1.95   | 1.95   |
| 1"                                 | 8.90     | 2.35                         | 2.35                          | 2.35                       | 2.35   | 2.35   |
| 1 1/2"                             | 9.70     | 2.80                         | 2.80                          | 2.80                       | 2.80   | 2.80   |
| 2"                                 | 12.30    | 3.90                         | 3.90                          | 3.90                       | 3.90   | 3.90   |
| 3"                                 | 31.00    | 12.00                        | 12.00                         | 12.00                      | 12.00  | 12.00  |
| 4"                                 | 39.00    | 15.00                        | 15.00                         | 15.00                      | 15.00  | 15.00  |
| 6"                                 | 58.00    | 22.00                        | 22.00                         | 22.00                      | 22.00  | 22.00  |
| 8"                                 | 79.00    | 30.00                        | 30.00                         | 30.00                      | 30.00  | 30.00  |
| 10"                                | 96.00    | 39.00                        | 39.00                         | 39.00                      | 39.00  | 39.00  |
| 12"                                | 120.00   | 46.00                        | 46.00                         | 46.00                      | 46.00  | 46.00  |

Alt. 1 - Continues the existing declining block water rate structure.

Alt. 2 - Uniform volume charge for each customer class. **Recommended 2005 rates.**

Alt. 3 - Initial phase-in of inverted block rates for residential customers.

Alt. 4 - Middle transition of residential rates to an inverted block rate structure.

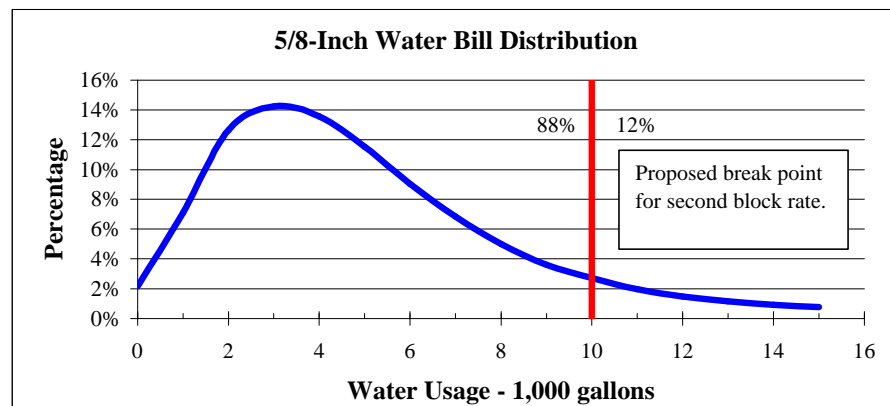
Alt. 5 - Full transition of residential rates to an inverted block rate structure.

Note: All alternatives are at 2005 revenue levels and assume that the current minimum charges are replaced by a schedule of service charges.

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**Table 2**  
**Typical 2005 Residential Water Bills**

| Usage<br>Mg | 5/8" Bills<br>Stopping in<br>Block | Existing<br>\$ | Declining<br>Block<br>Alt. 1<br>\$ | Uniform<br>by Class<br>Alt. 2<br>\$ | Inverted Residential Rates |              |              |
|-------------|------------------------------------|----------------|------------------------------------|-------------------------------------|----------------------------|--------------|--------------|
|             |                                    |                |                                    |                                     | Alt. 3<br>\$               | Alt. 4<br>\$ | Alt. 5<br>\$ |
| 0           | 2.16%                              | 6.55           | 1.95                               | 1.95                                | 1.95                       | 1.95         | 1.95         |
| 1           | 7.10%                              | 6.55           | 4.64                               | 4.62                                | 4.60                       | 4.50         | 4.39         |
| 2           | 12.66%                             | 6.55           | 7.33                               | 7.29                                | 7.25                       | 7.05         | 6.83         |
| 3           | 14.24%                             | 9.07           | 10.02                              | 9.96                                | 9.90                       | 9.60         | 9.27         |
| 4           | 13.57%                             | 11.59          | 12.71                              | 12.63                               | 12.55                      | 12.15        | 11.71        |
| 5           | 11.53%                             | 14.11          | 15.40                              | 15.30                               | 15.20                      | 14.70        | 14.15        |
| 6           | 9.03%                              | 16.63          | 18.09                              | 17.97                               | 17.85                      | 17.25        | 16.59        |
| 7           | 6.86%                              | 19.15          | 20.78                              | 20.64                               | 20.50                      | 19.80        | 19.03        |
| 8           | 5.00%                              | 21.67          | 23.47                              | 23.31                               | 23.15                      | 22.35        | 21.47        |
| 9           | 3.62%                              | 24.19          | 26.16                              | 25.98                               | 25.80                      | 24.90        | 23.91        |
| 10          | 2.72%                              | 26.71          | 28.85                              | 28.65                               | 28.45                      | 27.45        | 26.35        |
| 11          | 1.97%                              | 29.23          | 31.54                              | 31.32                               | 31.20                      | 30.60        | 29.94        |
| 12          | 1.48%                              | 31.75          | 34.23                              | 33.99                               | 33.95                      | 33.75        | 33.53        |
| 13          | 1.15%                              | 34.27          | 36.92                              | 36.66                               | 36.70                      | 36.90        | 37.12        |
| 14          | 0.91%                              | 36.79          | 39.61                              | 39.33                               | 39.45                      | 40.05        | 40.71        |
| 15          | 0.76%                              | 39.31          | 42.30                              | 42.00                               | 42.20                      | 43.20        | 44.30        |
| 20          | 2.25%                              | 51.91          | 55.75                              | 55.35                               | 55.95                      | 58.95        | 62.25        |
| 25          | 1.11%                              | 61.51          | 65.50                              | 68.70                               | 69.70                      | 74.70        | 80.20        |
| 30          | 0.60%                              | 71.11          | 75.25                              | 82.05                               | 83.45                      | 90.45        | 98.15        |
| 40          | 0.65%                              | 90.31          | 94.75                              | 108.75                              | 110.95                     | 121.95       | 134.05       |
| 50          | 0.32%                              | 109.51         | 114.25                             | 135.45                              | 138.45                     | 153.45       | 169.95       |
| 60          | 0.10%                              | 128.71         | 133.75                             | 162.15                              | 165.95                     | 184.95       | 205.85       |
| 70          | 0.07%                              | 147.91         | 153.25                             | 188.85                              | 193.45                     | 216.45       | 241.75       |
| 80          | 0.05%                              | 167.11         | 172.75                             | 215.55                              | 220.95                     | 247.95       | 277.65       |
| 90          | 0.02%                              | 186.31         | 192.25                             | 242.25                              | 248.45                     | 279.45       | 313.55       |
| 100         | 0.05%                              | 205.51         | 211.75                             | 268.95                              | 275.95                     | 310.95       | 349.45       |
| 150         | 0.02%                              | 301.51         | 309.25                             | 402.45                              | 413.45                     | 468.45       | 528.95       |
| 200         | 0.00%                              | 397.51         | 406.75                             | 535.95                              | 550.95                     | 625.95       | 708.45       |



Mg - 1,000 gallons



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**Table 3**  
**Comparison of 2005 Alternative Residential**  
**Water Rates with Existing Water Rates**

| Usage<br>Mg | % Bills<br>Stopping in<br>Block | Declining<br>Block<br>Alt. 1 | Uniform<br>by Class<br>Alt. 2 | Inverted Residential Rates |        |        |
|-------------|---------------------------------|------------------------------|-------------------------------|----------------------------|--------|--------|
|             |                                 |                              |                               | Alt. 3                     | Alt. 4 | Alt. 5 |
| 0           | 2.16%                           | -70.2%                       | -70.2%                        | -70.2%                     | -70.2% | -70.2% |
| 1           | 7.10%                           | -29.2%                       | -29.5%                        | -29.8%                     | -31.3% | -33.0% |
| 2           | 12.66%                          | 11.9%                        | 11.3%                         | 10.7%                      | 7.6%   | 4.3%   |
| 3           | 14.24%                          | 10.5%                        | 9.8%                          | 9.2%                       | 5.8%   | 2.2%   |
| 4           | 13.57%                          | 9.7%                         | 9.0%                          | 8.3%                       | 4.8%   | 1.0%   |
| 5           | 11.53%                          | 9.1%                         | 8.4%                          | 7.7%                       | 4.2%   | 0.3%   |
| 6           | 9.03%                           | 8.8%                         | 8.1%                          | 7.3%                       | 3.7%   | -0.2%  |
| 7           | 6.86%                           | 8.5%                         | 7.8%                          | 7.0%                       | 3.4%   | -0.6%  |
| 8           | 5.00%                           | 8.3%                         | 7.6%                          | 6.8%                       | 3.1%   | -0.9%  |
| 9           | 3.62%                           | 8.1%                         | 7.4%                          | 6.7%                       | 2.9%   | -1.2%  |
| 10          | 2.72%                           | 8.0%                         | 7.3%                          | 6.5%                       | 2.8%   | -1.3%  |
| 15          | 0.76%                           | 7.6%                         | 6.8%                          | 7.4%                       | 9.9%   | 12.7%  |
| 20          | 2.25%                           | 7.4%                         | 6.6%                          | 7.8%                       | 13.6%  | 19.9%  |
| 25          | 1.11%                           | 6.5%                         | 11.7%                         | 13.3%                      | 21.4%  | 30.4%  |
| 30          | 0.60%                           | 5.8%                         | 15.4%                         | 17.4%                      | 27.2%  | 38.0%  |
| 40          | 0.65%                           | 4.9%                         | 20.4%                         | 22.9%                      | 35.0%  | 48.4%  |
| 50          | 0.32%                           | 4.3%                         | 23.7%                         | 26.4%                      | 40.1%  | 55.2%  |
| 60          | 0.10%                           | 3.9%                         | 26.0%                         | 28.9%                      | 43.7%  | 59.9%  |
| 70          | 0.07%                           | 3.6%                         | 27.7%                         | 30.8%                      | 46.3%  | 63.4%  |
| 80          | 0.05%                           | 3.4%                         | 29.0%                         | 32.2%                      | 48.4%  | 66.1%  |
| 90          | 0.02%                           | 3.2%                         | 30.0%                         | 33.4%                      | 50.0%  | 68.3%  |
| 100         | 0.05%                           | 3.0%                         | 30.9%                         | 34.3%                      | 51.3%  | 70.0%  |
| 150         | 0.02%                           | 2.6%                         | 33.5%                         | 37.1%                      | 55.4%  | 75.4%  |
| 200         | 0.00%                           | 2.3%                         | 34.8%                         | 38.6%                      | 57.5%  | 78.2%  |

Mg - 1,000 gallons

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**Table 4**  
**Typical Residential Water Bill Comparison**

| Usage | Lawrence<br>Alt. 2 | Topeka | WaterOne (a) | Olathe | Wichita | Hays (a) | Lawrence<br>Alt. 5 |
|-------|--------------------|--------|--------------|--------|---------|----------|--------------------|
| Mg    | \$                 | \$     | \$           | \$     | \$      | \$       | \$                 |
| 0     | 1.95               | 8.29   | 6.55         | 3.04   | 5.26    | 9.18     | 1.95               |
| 1     | 4.62               | 8.29   | 8.99         | 5.63   | 6.00    | 9.72     | 4.39               |
| 2     | 7.29               | 9.66   | 11.43        | 8.22   | 6.74    | 11.86    | 6.83               |
| 3     | 9.96               | 12.40  | 13.87        | 10.81  | 7.48    | 14.00    | 9.27               |
| 4     | 12.63              | 15.14  | 16.31        | 13.40  | 8.22    | 16.14    | 11.71              |
| 5     | 15.30              | 17.88  | 18.75        | 15.99  | 8.96    | 20.42    | 14.15              |
| 6     | 17.97              | 20.62  | 21.99        | 18.58  | 9.70    | 24.70    | 16.59              |
| 7     | 20.64              | 23.36  | 25.23        | 21.17  | 11.21   | 28.98    | 19.03              |
| 8     | 23.31              | 26.10  | 28.47        | 24.11  | 13.87   | 33.26    | 21.47              |
| 9     | 25.98              | 28.84  | 31.71        | 27.40  | 16.53   | 37.54    | 23.91              |
| 10    | 28.65              | 31.58  | 34.95        | 30.69  | 19.19   | 41.82    | 26.35              |
| 11    | 31.32              | 34.32  | 38.19        | 33.98  | 21.85   | 46.10    | 29.94              |
| 12    | 33.99              | 37.06  | 41.43        | 37.27  | 24.51   | 50.38    | 33.53              |
| 13    | 36.66              | 39.80  | 44.67        | 40.56  | 27.17   | 54.66    | 37.12              |
| 14    | 39.33              | 42.54  | 47.91        | 43.85  | 29.83   | 58.94    | 40.71              |
| 15    | 42.00              | 45.28  | 51.15        | 47.14  | 32.49   | 63.22    | 44.30              |
| 20    | 55.35              | 58.98  | 67.35        | 64.75  | 47.66   | 84.62    | 62.25              |
| 25    | 68.70              | 72.68  | 83.55        | 85.65  | 67.66   | 106.02   | 80.20              |
| 30    | 82.05              | 86.38  | 99.75        | 106.55 | 87.66   | 127.42   | 98.15              |
| 40    | 108.75             | 113.78 | 132.15       | 148.35 | 127.66  | 170.22   | 134.05             |
| 50    | 135.45             | 141.18 | 164.55       | 190.15 | 167.66  | 213.02   | 169.95             |
| 60    | 162.15             | 168.58 | 196.95       | 231.95 | 207.66  | 255.82   | 205.85             |
| 70    | 188.85             | 195.98 | 229.35       | 273.75 | 247.66  | 298.62   | 241.75             |
| 80    | 215.55             | 223.38 | 261.75       | 315.55 | 287.66  | 341.42   | 277.65             |
| 90    | 242.25             | 250.78 | 294.15       | 357.35 | 327.66  | 384.22   | 313.55             |
| 100   | 268.95             | 278.18 | 326.55       | 399.15 | 367.66  | 427.02   | 349.45             |
| 150   | 402.45             | 415.18 | 488.55       | 608.15 | 567.66  | 641.02   | 528.95             |
| 200   | 535.95             | 552.18 | 650.55       | 817.15 | 767.66  | 855.02   | 708.45             |

(a) Assumes typical winter water usage is 4,000 gallons per month.