Ann Arbor Tap Water Hardness Study

www.a2gov.org **July 2008**

Why Consider Changing Water Hardness

As in many Midwestern communities, the City of Ann Arbor water has high levels of naturally occurring calcium and magnesium and is considered to be "hard" to "very hard" water. Based on feedback from customers as part of the Water System's 2006 Master Plan, the City is considering making modifications to its treatment process to reduce drinking water hardness from an annual average of 157 milligrams per liter (mg/L) to approximately 130 mg/L.

At both the Treatment Plant and in people's homes, lowering water hardness will reduce build up and scaling on pipes, a factor that could extend the life of home hot water heaters, household pipes and other water-using appliances. Lower water hardness also reduces the amount of soap needed for effective cleaning and the potential for less spots remaining on utensils, glassware and dishware.

Additional softening will also benefit Water Treatment Plant operations by reducing the amount of particles to be removed by the plant's filters.

It will also improve the ability to treat the Huron River source water.

However, the additional treatment required to further reduce the hardness will increase treatment costs.

The associated water quality and cost impacts necessitated obtaining customer input on the costs and benefits of any modifications.

IN March 2008, the city formed **a Water Softening Customer Advisory Committee to assess the taste, cost, operational and public health considerations of changes to the water treatment process.** The committee also helped the City staff engage larger groups of customers to inform their final recommendations.

The Customer Advisory Committee guided a public engagement process that included a review of water softening practices in 10 Midwest communities, a focus group with large volume customers to assess rate impacts, a focus group with public health professionals to assess water quality and health related issues, and a survey of 110 residential customers.

Customer Advisory Committee Membership

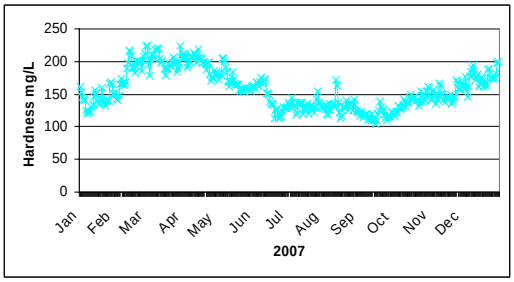
represented

Ann Arbor Township
Scio Township
Drain Commissioner
Residential Customers
Health Professional
Washtenaw County Public Health & Environmental Health
Plumbing Professionals
University of Michigan
Washtenaw Area Apartment Association
Ann Arbor *Chamber of Commerce*
Ann Arbor Public Schools

Category	Hardness mg/L
Soft	< 60
Moderately Hard	61 – 120
Hard	121 – 180
Very Hard	>180

Hardness is a measure of dissolved calcium and magnesium in water.
Source: United States Geological Survey

Ann Arbor Water Hardness Variations



Ann Arbor Tap Water Hardness Study

Analysis of Water Chemistry Changes

The Customer Advisory Committee sought to confirm that proposed changes to the water treatment process would not create individual or environmental health concerns. Since additional softening would be achieved through the use of sodium hydroxide, softer water will result in an increase in sodium from a current maximum of 70 milligram per liter (mg/L) to a proposed maximum of 120mg/L. **This increase in sodium is equivalent to 1/40 of a teaspoon of salt for each liter of tap water consumed. B**ecause tap water would continue to qualify as a "very low sodium" beverage (FDA), public health experts found this increase not to be of concern.

Additionally, the levels of calcium in tap water would be reduced from 65 mg/L to approximately 50 mg/L. **The proposed change would reduce calcium supplied by water from 10% of the recommended daily intake to 8% of the daily recommendation,** assuming an intake of 2 liters of water per day. Calcium has been shown to be a good support for cardiovascular and bone health. While some public health professionals preferred to minimize any reduction in calcium, they expressed no concerns with the proposed changes.

Based on national studies the proposed changes would not have an impact on aquatic or plant life.

Operational and Cost Considerations

In considering increased water softening, the Customer Advisory Committee reviewed possible impacts on processes within the Water Treatment Plant, on treatment processes that occur at the customers' sites ('point of use') and the potential for reduced soap usage for all city water customers.

The most significant benefits projected were in improved treatment efficiency for customers that perform 'point-of-use' treatment. Reducing seasonal variations in hardness will allow customers to fine tune their treatment processes to provide a more consistent final water quality.

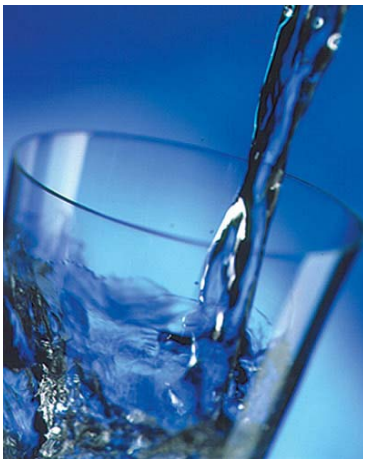
Benefits for the Water Treatment Plant include reduced filter loading and increased filter run time, potential increased life expectancy of distribution system water mains, and enhanced treatment flexibility.

The Citizen Advisory Committee understood the community's most significant concern to be the increase in treatment costs associated with reducing hardness.

While residential customers may be able to offset potential rate increases associated with increased softening by reducing their use of soaps, the Committee sees these individual behavioral changes as difficult to influence.

The proposed improvements would result in an average residential customer using 21 ccfs per quarter, experiencing a rate increase of approximately $9.30 per year or 4.6%. This projected rate increase is based on an annual increase in treatment costs of approximately $500,000 and a capital project to expand the chemical feed system at a one time cost of approximately $3 million.

Customer Advisory Committee Recommendations



- Provide a consistent level of water hardness throughout the year (target 130 mg/L)
- Include a project to expand the sodium hydroxide feed system at the Water Treatment Plant in the Water System Capital Improvements Plan.
- Support all customers with education about the proposed changes and the ways in which they can reduce business or home expenses to offset water rate increases.