

## CHAPTER 5

### WATER USE EFFICIENCY PROGRAM

A viable water use efficiency plan is a requirement of water system planning. Public awareness and participation are necessary for the City to develop an active and beneficial water use efficiency plan. The following chapter presents the City's Water Use Efficiency Program.

#### WATER USE EFFICIENCY PLANNING REQUIREMENTS

The Washington Legislature passed the Water Use Efficiency Act of 1989 (43.20.230 RCW) which directs the Department of Health (DOH) to develop procedures and guidelines relating to water use efficiency. In response to this mandate, the Department of Ecology (Ecology), the Washington Water Utilities Council, and DOH jointly published a document titled *Conservation Planning Requirements* (1994). In 2003, the Municipal Water Supply - Efficiency Requirements Act (Municipal Water Law) was passed and amended RCW 90.46 to require additional conservation measures. The Municipal Water Law, among other things, directed DOH to develop the Water Use Efficiency Rule (WUE Rule), which is outlined in the *Water Use Efficiency Guidebook* and became effective January 22, 2007. These documents provide guidelines and requirements regarding the development and implementation of conservation and efficiency programs for public water systems. Conservation and efficiency programs developed in compliance with these documents are required by DOH as part of water system planning documents and by Ecology as part of a public water system water right application. Conservation must be evaluated and implemented as an alternate source of supply before state agencies approve applications for new or expanded water rights.

As an extension to the *Conservation Planning Requirements*, the WUE Rule sets more stringent requirements for public water purveyors. The WUE Rule is comprised of three fundamental elements:

1. Planning requirements;
2. Distribution leakage standards; and
3. Goal setting and performance reporting.

This chapter provides a discussion of the requirements, and the impact the WUE Rule has on the City.

## **PAST CONSERVATION PROGRAMS**

The City adopted a conservation program in 2002 as part of its last Water System Plan. The key objectives of the revised plan were as follows:

- 5 percent conservation savings in per capita water consumption by 2011;
- Increase customer awareness of water use habits;
- Encourage a conservation ethic in customers;
- Respond to citizen concerns regarding effective resource use;
- Educate customers about conservation and water supply issues;
- Reduce system-wide per capita consumption;
- Protect natural resources; and
- Comply with state guidelines.

To meet these goals, the City implemented a variety of both supply and demand side measures, which are listed below:

- Public education and promotion;
- Customer assistance;
- Bill showing consumption history;
- Single-family/Multi-family kits; and
- Landscape management.

Many of these measures will continue to be implemented as part of the City's new WUE program, and are described in more detail further on in this Chapter.

## **EFFECTS OF PAST PROGRAMS**

The City saw record high production in 2003, using nearly 1 million gallons per day. Since then, production has continued to decline to 0.84 mgd in 2007, despite a rising population. The annual ERU value has also decreased since 2003. As described in Chapter 2, in 2008 the ERU value was 210 gpd/ERU. This represents a decrease of approximately 20 percent since 2003, when the ERU value was 266 gpd/ERU, with a total savings of over 72 million gallons.

The City has seen significant reductions in water production and use since the last conservation plan went into effect with the 2003 Plan and hopes to see continued reductions from their new WUE Plan.

## PLANNING REQUIREMENTS

Under the WUE Rule, water systems are required to implement planning methods to forecast future demands and determine necessary measures to reduce usage and demand. Elements of the planning requirements include:

- Data collection
- Demand forecasts
- Selection and evaluation of WUE measures

## DATA COLLECTION AND REPORTING

The WUE Rule requires regular collection of production and consumption data. Data must be reported in the City’s planning documents and annual performance report to DOH. Water use data will be used by the City for the following:

- Calculating leakage
- Forecasting demand for future water needs
- Identifying areas for more efficient water use
- Evaluating the success of the City’s WUE program
- Describing water supply characteristics
- Aiding in decision-making about water management

Table 5-1 summarizes the water use data collection requirements.

**TABLE 5-1**

### Summary of Water Use Data Collection

<b>Data Type</b>	<b>Includes</b>
Source of Supply Meter Data	Monthly and annual totals of water produced, purchased from another water system, and/or supplied to other water systems through interties
Service Meter Data	Total annual water consumed, annual water consumed by each customer class, and customer class seasonal variations.

This data is needed to meet the planning and performance reporting requirements and to check compliance with the distribution system leakage standard of the WUE Rule.

**DEMAND FORECAST**

Demand forecasting is an essential element of planning. It provides a basis for comparison for growth and usage, and also helps in scheduling system improvements. For the purposes of the WUE Rule, forecasting is used in goal setting and measuring the success of the WUE program.

Complete demand forecasts are provided in Chapter 2 of this plan. A summary is included in Table 5-2. These forecasts do not include anticipated reductions in use from conservation and efficient water use efforts.

**TABLE 5-2**

**Demand Forecast**

<b>Year</b>	<b>Projected Service Area Population</b>	<b>Projected Average Day Production (gpd)<sup>(1)</sup></b>	<b>Projected Peak Day Production (gpd)</b>	<b>Projected Peak Hour Production (gpm)</b>	<b>Projected ERUs<sup>(1)</sup></b>
2009	7,947	926,917	2,041,431	2,341	3,976
2015	9,305	1,085,400	2,390,473	2,741	4,656
2029/ Buildout	12,371	1,442,967	3,177,973	3,644	5,878

(1) Based on 233 gpd/ERU.

**Source Evaluation**

As discussed in Chapters 1 and 3 of this Plan, the City has a reliable source capacity of 2,020 gpm from six active groundwater wells. Current production rates are at or near the aquifer capacities, and operating at higher levels may cause permanent degradation of the aquifers. Conservation and efficient water use will help reduce overall demand, thus reducing stress on the aquifers and prolonging the need for an additional source.

**WUE MEASURES**

The WUE Rule requires the evaluation or implementation of water use efficiency measure to help meet the WUE goals. The *WUE Guidebook* states several measures that must be implemented or evaluated and provides a list of measures that can be counted as additional measures in the WUE Program. WAC 246-290-810 identifies the minimum number of water use efficiency measures that must be evaluated based on system size. The City serves between 2,500 and 9,999 customers and therefore must evaluate or implement six water use efficiency measures.

Additional discussion of the City’s measures is included later in this chapter.

## DISTRIBUTION SYSTEM LEAKAGE

The *Conservation Planning Requirements* set the maximum allowable amount of lost and unaccounted for water at 20 percent of total source production. The WUE Rule now requires that water distribution systems have a leakage rate less than 10 percent of finished water production based on a three-year rolling average. The City must meet the three-year rolling average requirement by July 1, 2010.

Distribution system leakage (DSL) for the City equals the difference between the treated supply volume and volume measured at the customers' meters plus any other credibly estimated usage. Since 2003, distribution system leakage has ranged from 2.9 to 46.1 MG, and has had a rate between 0.9 percent and 13.3 percent of total treated supply. Table 5-3 provides annual data of distribution system leakage from 2003 to 2008 and Figure 5-1 provides a graphical illustration of the data.

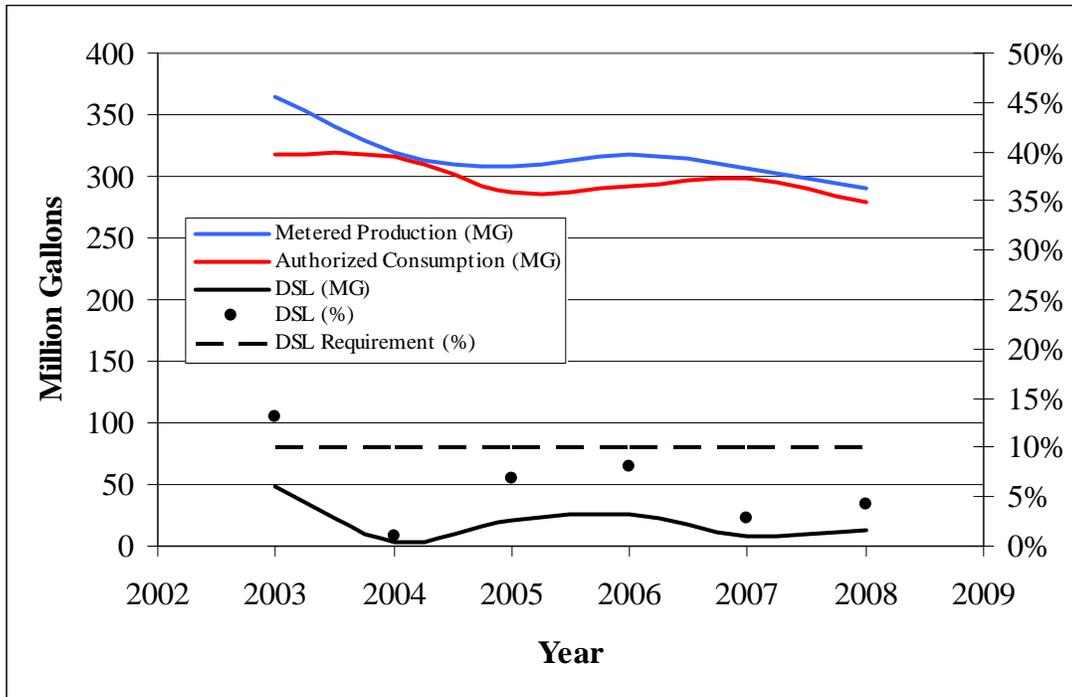
**TABLE 5-3**

### Distribution System Leakage Summary

Year	Metered Production (MG)	Authorized Consumption (MG)	Distribution System Leakage		
			MG	%	3-Year Rolling Average
2003	365.0	317.3	47.7	13.1%	11.4%
2004	318.8	315.9	2.9	0.9%	9.1%
2005	308.4	287.3	21.1	6.9%	6.9%
2006	318.3	292.4	25.9	8.1%	5.3%
2007	307.0	298.4	8.6	2.8%	5.9%
2008	290.6	278.4	12.1	4.2%	5.0%

**FIGURE 5-1**

**Distribution System Leakage Summary**



As shown in Table 5-3 and Figure 5-1, the City’s distribution system leakage rate has fluctuated since 2003, though has steadily decreased over the past few years. With a current 3-year rolling average of 5 percent, the City meets DOH requirements.

**GOAL SETTING AND WUE MEASURES**

Under the WUE Rule, the City must set water use efficiency goals and measure progress each year toward meeting these goals. Goals must include a measurable outcome, address water supply or demand characteristics, and include an implementation schedule. The City must also evaluate or implement efficiency measures to help meet these goals.

**GOALS**

The City plans to reduce its total water use in several ways. First, the City will maintain the current amount of distribution system leakage below 10 percent. Second, the City will promote efficient water use by its customers to reduce overall demand.

Goal No. 1 of the water use efficiency program is to continue to maintain the current average rate of DSL to meet DOH requirements. In 2008, the City lost only 4.2 percent of the water produced, bringing the three-year rolling average to 5 percent. The City

regularly monitors customer accounts for leaks and conducts distribution system leak detection surveys. City staff does not anticipate additional savings from these continued efforts.

Goal No. 2 of the water use efficiency program is to reduce the customer consumption by 0.5 percent per year through the year 2015, at which time the program and goals will be re-evaluated. The success of this goal will be measured in terms of consumption per ERU. Table 5-4 summarizes Goal No. 2.

**TABLE 5-4**

**ERU Reduction Goal Summary**

<b>Year</b>	<b>ERU Value (gpd/ERU)</b>
2009	233
2010	232
2011	231
2012	230
2013	229
2014	227
2015	226

Although the 2008 ERU value is 210 gpd/ERU, the values shown in Table 5-5 are based on the average ERU value from 2003 to 2008 as a conservative estimate. The ERU value is affected by many variables and is expected to fluctuate from year to year, although an overall decreasing trend is projected.

The City held a Public Forum on January 22, 2008 to establish and approve the supply side goal with Resolution 08-1739. The demand side goal will be established through public forum in conjunction with the approval of this Plan. Appendix L contains the 2008 WUE Program, Resolutions and other information regarding these events.

The City has also identified reducing summer demands as a potential future goal.

**EVALUATION OR IMPLEMENTATION OF WUE MEASURES**

The City serves between 2,500 and 9,999 customers and, therefore, must evaluate or implement six supplementary water use efficiency measures. The following sections describe both the mandatory and supplementary water use efficiency measures evaluated and indicate which have been or will be implemented by the City.

## **Mandatory Measures**

### Implement Source and Service Metering and Meter Calibration

Source meters have been installed at all active sources and are evaluated and calibrated every 3 years. In 2003 the original source meters at Well Nos. 3, 5, and 10 were replaced with new mag type source meters to properly track production and thereby increase the efficiency of the system. New meters were installed at the Corridor Wells when the facility was constructed in 2007. All service meters were calibrated in 2008.

All water users including all public and city facilities have individual service meters. Although the City has been metered on both the production and distribution side of the system for decades, many of the residential meters are over 20 years old. Older meters tend to wear out, which allows unregistered water to pass through the meter resulting in loss of consumption accuracy and loss of revenue. It is estimated that as much as 5 percent loss may occur in older meters. Meters are inspected regularly and replaced as necessary. Damaged or suspect meters are replaced as soon as they are discovered. In November 2005 the City began a meter replacement program, replacing older meters with new Automatic Meter Reading (AMR) meters. These radio-read meters increase the accuracy of the consumption recording and increase revenues. The City has already replaced almost 1,555 of the 2,724 meters in the system, which represents approximately 57 percent of all meters. The City hopes to have all remaining meters replaced by 2012.

### Implement Leak Detection and Water Accounting

The City's average DSL rate is approximately 6 percent over the past 6 years. It is expected that this rate will still fluctuate in the future though. As a member of the Water Cooperative of Pierce County, the City has partnered with eight other water purveyors to purchase 75 FCS Leak Detection Devices. The devices will be shared and used by all the utilities to identify leaks within their distribution systems.

Also, the City estimates that an old meter can account for up to 5 percent of DSL for a single customer. To prevent losses from old meters, the City has implemented a meter replacement program to replace these meters with AMRs.

The City billing staff also monitors customer usage for potential leaks. If usage is out of the normal range, the City notifies the customer and will reimburse them for half of the charge for the amount leaked if it is repaired.

### Implement Customer Education

Water conservation materials published by DOH and Ecology are made available to the public at City Hall and the Public Works building. These materials include lawn watering schedules, water conservation tips, and information on water saving devices for the home. Water conservation tips are also published on the City's web site.

### Evaluate Conservation Rate Structure

In early 2009 an ad-hoc committee discussed the adoption of an inclined block rate structure. The committee recommended adopting such a rate structure to City Council, but it was not acted upon. In summer of 2009, a conservation rate structure was again proposed and was accepted to be effective October 2009 with a second increase to occur in January 2010. The new inclined block rate structure is shown in Chapter 9, Financial Analysis.

### Evaluate Reclaimed Water Opportunities

The City does not have wastewater treatment facilities. Most of the City's wastewater flows through Pierce County Sewer Service Area to County wastewater treatment facilities, although several areas in the northern part of the City are served by Lakehaven or flows through Lakehaven's wastewater system to Pierce County facilities. As a result, any reclaimed program would need to be initiated by Pierce County or Lakehaven. If such a program was initiated, the City would evaluate their participation. The City has identified several potential areas that could utilize reclaimed water, including:

- Irrigation of public green spaces;
- Uses for commercial and industrial cooling water;
- Gravel washing and other processes;
- Non-potable uses in large commercial and industrial buildings;
- Groundwater recharge and storage of reclaimed water; and
- Grey water utilization programs for sub-surface irrigation.

It is anticipated that a reuse program would have significant cost for the City, which may be prohibitive.

A King County Reclaimed Water Evaluation form is included in Appendix L.

### **Supplementary Measures**

The City has been implementing many of the following measures since 2003, when a conservation plan was adopted as part of the WSP. Since these measures proved effective in reducing overall demand, the City will continue to implement all current measures.

### Bills Showing Consumption History

The City uses a billing process that shows consumption history on each customer's water bill. By being able to examine past water consumption histories, each customer can be more conscious of their water use patterns and actual increase in consumption and cost,

compared to the same month in the previous year. This can have significant positive effects on conservation efforts and directly involves the customer in the City's conservation campaign.

#### Customer Leak Detection

The City's billing department monitors customers' water bills for abnormally high water reads. When a read occurs that is outside the range of normal use, the customer is notified of a potential leak on their side of the water meter. In order to encourage leak repairs, the City credits 50 percent of the difference between normal consumption and the high consumption read once the leak is repaired. The credit is calculated using the previous year's billing for the same period. Since 2002, the City has detected customer leaks totaling almost 2 MG on average per year.

#### Water Sprinkler Gauges

The City provides free sprinkler gauges to its customers. The average lawn requires no more than 1 cubic inch of water per week to remain green during the dry summer months. The gauges allow customers to better monitor lawn watering usage, resulting in more efficient lawn watering. In 2009, the City purchased 200 gauges to distribute to its customers.

#### Water Line Looping

The City has adopted utility standards that attempt to create loops within water lines whenever possible in order to promote better supply and a more flexible system. This technique also promotes water savings by reducing the need for flushing dead end water lines, which may not see proper circulation during normal use.

#### Hydrant Metering

As a new measure beginning in 2008, the City has implemented a metering policy for hydrant flushing. Through this program, the City has already tracked more than 230,000 gallons of water flowed from hydrants for construction purposes and City use. The City tracks fire department use separately. This effort will assist the City with tracking DSL.

#### Summary of Supplemental Measures

Based on their number of connections, the City must implement or evaluate six measures. The City has chosen to implement all measures listed above. Table 5-5 provides a summary of measures.

**TABLE 5-5**

**Water Use Efficiency Measures**

<b>Measures for Implementation</b>	<b>Customer Classes Affected</b>
Bill Showing Consumption History	3
Conservation Rate Structure	3
Customer Leak Detection	3
Hydrant Metering	1
Water Line Looping	1
Water Sprinkler Gauges	1
<b>Total Measures Counted</b>	<b>12</b>

The City will evaluate the effectiveness of these measures by examining water use records, including seasonal use and distribution system leakage. Additionally, it is anticipated that only the water sprinkler gauges will require additional funding, so the City will maintain records of how many are distributed and at what cost to determine if it is an effective measure.

**TARGET WATER SAVINGS PROJECTIONS**

Table 5-6 compares the average day demand with and without water use efficiency savings. The water use efficiency savings projections include a decrease in the ERU value of 0.5 percent per year and a constant rate of distribution system leakage of 5 percent. At the end of the 6-year planning period (2015), these water use efficiency measures will account for an average savings of 15,390 gpd, or 17.2 acre-ft/yr.

**TABLE 5-6**

**Projected Water Use Efficiency Savings**

<b>Year</b>	<b>Number of ERUs</b>	<b>Total Average Day Production w/o WUE</b>		<b>Total Average Day Production w/WUE</b>		<b>Cumulative WUE Savings</b>	
		<b>(gpd)</b>	<b>(ac-ft)</b>	<b>(gpd)</b>	<b>(ac-ft)</b>	<b>(gpd)</b>	<b>(ac-ft)</b>
2009	3,776	926,917	1,038	926,917	1,038	0	0
2010	3,851	945,455	1,059	940,728	1,054	4,727	5.3
2011	3,928	964,364	1,080	954,745	1,070	9,620	10.8
2012	4,046	993,295	1,113	978,470	1,096	14,825	16.6
2013	4,167	1,023,094	1,146	1,002,785	1,123	20,309	22.8
2014	4,292	1,053,787	1,180	1,027,704	1,151	26,083	29.2
2015	4,421	1,085,400	1,216	1,053,243	1,180	32,158	36.0
<b>Average</b>						<b>15,389</b>	<b>17.2</b>

## **PERFORMANCE REPORTING**

The City must report water use efficiency goals progress annually. The annual report must include:

- Total source production
- Distribution system leakage in percentage and volume
- Goal description, schedule, and progress toward meeting goals

The latest annual report is included in Appendix L.