

# Public Utility District #1 of Clallam County Water Department

## Draft Water Use Efficiency (WUE) Goals: 2008

This document is published by Public Utility District #1 of Clallam County (the District) to notify the public of proposed initial water use efficiency (WUE) goals as mandated by the Municipal Water Law passed by the Washington State Legislature in 2003. These goals are designed to meet the standards set forth by the WUE rule [WAC 246-290]. The law requires that water systems over 1,000 customers meet these requirements. The Port Angeles Composite water system is the only system within the District that is currently subject to the 2008 requirement for water systems with over 1,000 customers. The District will begin implementing WUE measures in the Port Angeles Composite system in 2008 with the District's smaller water systems to follow in 2009.

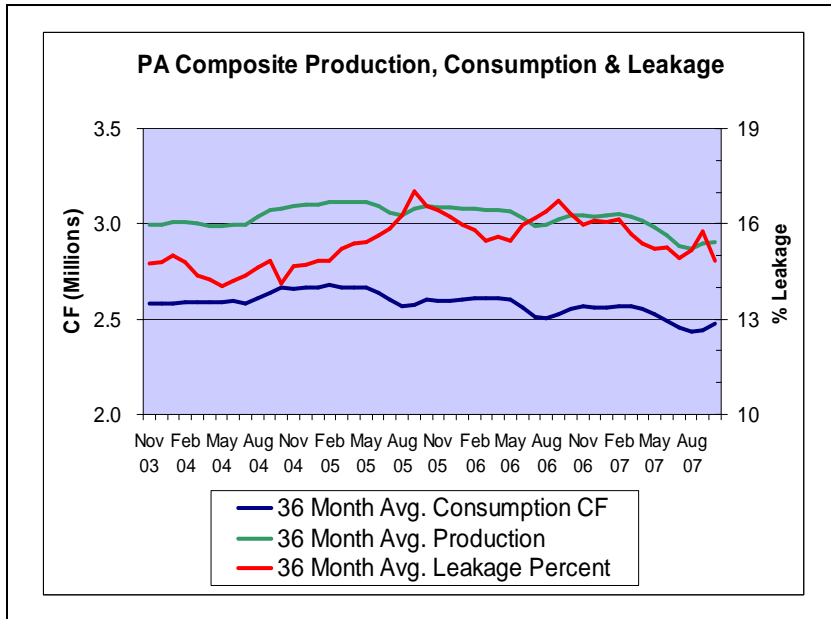
Public comment on these proposed initial WUE goals is encouraged and can be submitted via the website [www.clallampud.net](http://www.clallampud.net) before January 14, 2008. Comments may also be submitted at the regular weekly PUD Commissioners' meeting on January 14, 2008 at 1:30 PM in the District's boardroom in the Port Angeles office at 2431 East Highway 101. The meeting will include a presentation by District staff summarizing the goals and will include a public comment period.

The District makes publicly available the following information on proposed WUE initial goals:

- I. Existing WUE program:
  - a. Water saved by implementing current WUE measures Dec. 2000 to Present.
  - b. Current goals.
  - c. WUE measures currently implemented.
  - d. Evaluated WUE measures.
  - e. How customers are educated about current WUE methods.
  - f. Water consumption forecast given proposed WUE measures.
  - g. How Clallam PUD will evaluate the proposed WUE program.
  - h. Distribution leakage information.
  - i. Water loss control action plan.
- II. Previous annual performance plan.
- III. Water supply characteristics information.
- IV. Water demand forecasts information.
- V. Public comment.

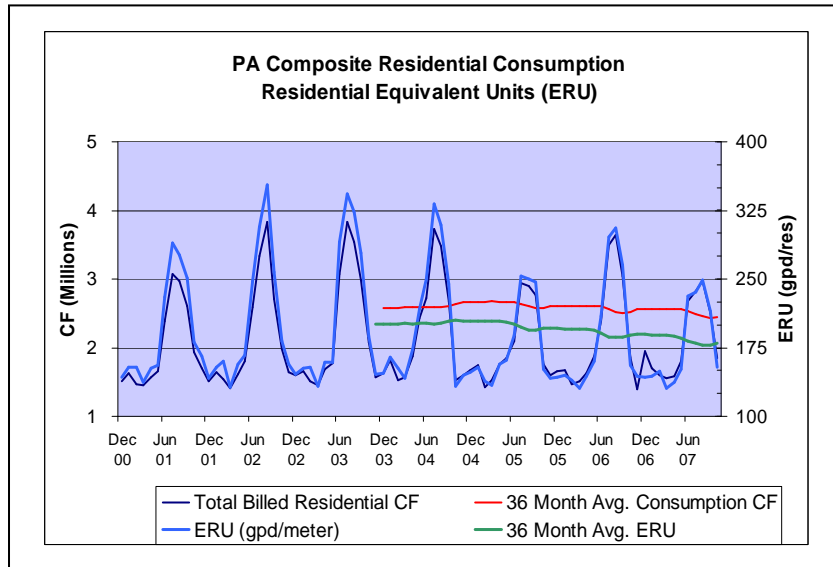
- I. Existing WUE program
  - a. Water saved by implementing current WUE measures Dec. 2000-Present  
The District has been evaluating unaccounted for water in our distribution system. Leakage in the system is indicated by these evaluations. Reducing leakage is referred to as a "supply-side" WUE measure. The water saved by implementing current supply-side measures is shown in the graph of Figure 1.

Figure 1. Using a three year rolling average, supply-side measures reduced the percent leakage from above 17% to below 15% from 2005 to 2007.



The District has been evaluating residential customer usage. Equivalent Residential Units (ERUs) are calculated by taking the average daily use for all of the residential customers in the Port Angeles Composite Water System. Reducing ERUs is referred to as a “demand-side” WUE measure. The water saved by implementing current demand-side measures is shown in the graph of Figure 2.

Figure 2. Demand-side savings: Water customers reduced their consumption of water from 200 to 180 gallons per day per customer, also known as ERU.



b. Current goals

Current policies and programs strive to make efficient use of water and continue to be committed to the development and implementation of future water conservation programs.

c. WUE measures currently implemented

**Current Conservation Plan Components:**

- Leak Detection Surveys – System leaks are identified and repaired.
- Demand Characteristics – Production and service meter data are analyzed to determine leakage, and when and how water customers consume water.
- Conservation Rate Structure – Water rates are designed to encourage water conservation.
- Historical Efficiency – Understanding past efficiency will help forecast demands and increase efficiency in the future.

**Current WUE Measures**

- Public Education
  - Energy & Water Conservation Program
  - Brochures
  - Community Events
- Technical Assistance
  - Water Consumption Report in Bills – Bills describe previous consumption allowing customers to gauge their own conservation efforts.
  - Conservation Advice in Bill Inserts – Information is sent along with bills with conservation information.

- Customer Leak Detection Assistance – If a customer thinks there may be a leak in their system, Clallam PUD will assist in finding it.
  - Notify Customers of Large Increases – Large increases in consumption may indicate an unnoticed leak.
- System Measures
  - Source & Service Meters – Water flow is tracked throughout the system to enable calculation of system leakage.
  - Managing Unaccounted Water – Water loss through leaks, theft, and some water system maintenance activities are not traceable. Accounting for more of the lost water assists in finding and fixing leaks and using water more efficiently.
  - Rapid Leak Response – When a leak is detected it is a priority for Water Department service crews to fix.
  - Meter Replacement Program – Over time, meters become less accurate. Every year, Clallam PUD identifies and replaces problem service meters, the meters that measure water use by each customer.
  - Leak Detection Program – Leak detection surveys are conducted annually to detect large and small leaks in the system and fix them in a cost effective manner.
- Incentives/Other Measures
  - Conservation Rates – The structure of the conservation rates encourages customers to lower their water consumption throughout the year; especially during the peak summer season.
  - Indoor/Outdoor Device Distribution – By upgrading customers’ water devices (shower heads, hose nozzles, toilets, etc.), water savings can be seen throughout the system.
  - Rebates on Conservation Devices – Customers who purchase eligible water and energy efficient devices can receive rebates through Clallam PUD.
  - Drought Response – In the event of a drought, Clallam PUD has a plan to conserve water through several stages of increasing use restrictions.

d. Evaluated WUE measures

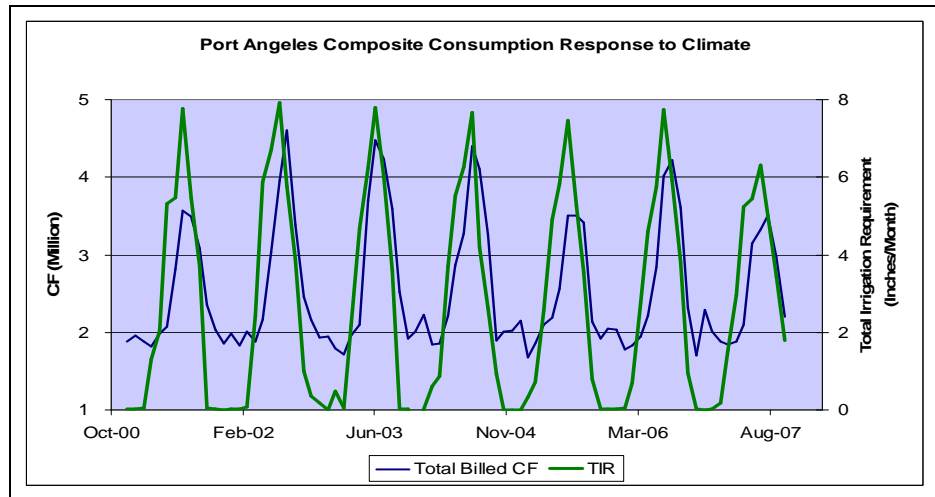
The combined effect of all current WUE measures has been evaluated. It is difficult to determine the effect of any single measure with currently available data and analytical tools. Any WUE evaluation needs to consider climate conditions and their effect on outdoor water use. In addition to meter data, temperature and rainfall data were collected and analyzed. The following evaluations were made to show the effectiveness of current supply- and demand-side measures.

Evaluations include:

- Total Irrigation Requirement – Climate’s influence on outdoor water use.
- Unaccounted for Water – Estimation of percent leakage in distribution system.
- Conservation Rates – Increase in rates with increasing use encourages conservation.
- ERU Trends – Residents are the largest consumers of water in the Port Angeles Composite water system. Their consumption trends show the effectiveness of WUE. ERU trends are used to forecast demands as shown in Section I-f.

**Consumption and Total Irrigation Requirement (TIR):**

Figure 3. Accounting for climate effects is important in analyzing water availability and water consumption by landscaping during the dry season.



Melting of fall and winter snow in the mountains and the spring and summer rainfall determine availability of water for use during the dry season. Climate also drives outdoor water use for irrigation including watering lawns and gardens during the growing season. High temperatures and low rainfall lead to high irrigation requirements for plants. The graph in Figure 3 reflects the relationship between climate variables and the total irrigation requirement (TIR) for a grass lawn over the last 7 years. The TIR reflects the mean monthly net consumptive use by grass lawns in the Port Angeles area. The total amount billed during the summer generally follows the TIR, except in low water availability years, such as in the drought summer of 2005. The District’s Drought Response Plan for the Fairview Water System resulted in much less lawn watering than the TIR in August, September and October of 2005.

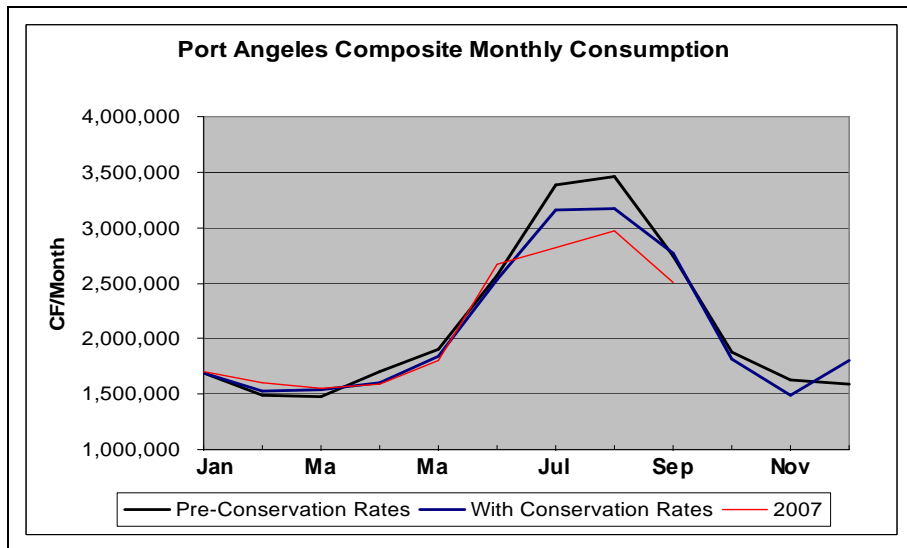
Table 1. Accounting for all water produced determines the amount of water that is lost to system leakage.

Port Angeles Composite Unaccounted Water (Thousand CF)								
	2000	2001	2002	2003	2004	2005	2006	3 YEAR AVERAGE
<b>TOTAL PRODUCED</b>	38,456	33,986	36,138	37,354	37,540	35,516	36,058	36,371
<b>AMOUNT SOLD</b>	31,885	28,909	31,392	31,980	31,969	29,057	30,819	30,615
<b>UNMETERED USE</b>	71	16	24	76	18	26	519	188
<b>% UNACCT. FOR</b>	17%	15%	13%	14%	15%	18%	13%	15%

Water meters are installed on all sources (i.e. wells and surface water diversions) and at service connections for all customers. Some water that is produced from the source is not accounted for by the service meters. Some of the water uses that are unmetered

include fire fighting, road maintenance, and water infrastructure maintenance. Unaccounted for water represents leakage. Leakage changes from year to year due to decay and repair or replacement of aging infrastructure and meters, possible new leaks in the expanding distribution system, theft, and storm events.

Figure 4. Implementation of conservation rates in August 2005 has shown to reduce water consumption.



Conservation rates were initially set in August 2005. The graph in Figure 4 shows pre- and post-conservation-rate mean monthly consumption. The consumption is shown to decrease after conservation rates were set. In 2007, the consumption appears to be the lowest since conservation rates were initially set.

These results over-estimate the effect of conservation rates because of the climate conditions since 2005. Drought responses were implemented during the summer and early fall of both 2005 and 2006. In 2007, the cool, wet summer contributed to reduced consumption for landscaping.

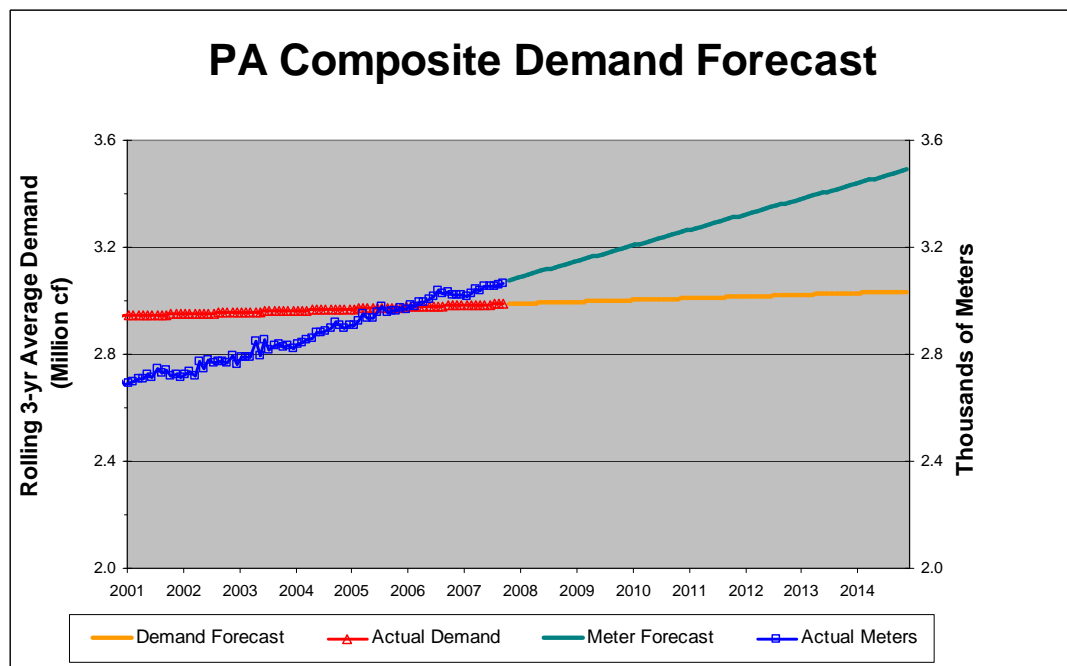
e. How customers are educated about current WUE methods

- Energy & Water Conservation Program – Water and energy saving devices as well as rebates are made available through Clallam PUD to reduce water and energy waste and consumption.
- Brochures – Informational brochures and packets with conservation/efficiency information are distributed in monthly billing statements and available at Clallam PUD offices.
- Community Events - Clallam PUD shares information at community events such as the Clallam County Fair.
- Water Consumption Report in Bills – Bills describe previous consumption allowing customers to gauge their own conservation efforts.

- Conservation Advice in Bill Inserts – Information is sent along with bills with conservation information.
- Customer Leak Detection Assistance – If a customer thinks there may be a leak in their system, Clallam PUD will assist in finding it.
- Notify Customers of Large Increases – Large increases in consumption may indicate an unnoticed leak.

f. Water consumption forecast given proposed WUE measures

Figure 5. Increasing population will expand the water system infrastructure, but demand will slowly increase.



Demand forecasts include current and future conservation efforts of a growing customer base. Forecasts are based on extending the trend over the past 6 years. The trend of increasing meters, but relatively flat demand growth is expected to continue over the next 6 years with the implementation of the proposed initial WUE goals. Climate will continue to affect the demand for water, but it is unclear how this effect will change in the future.

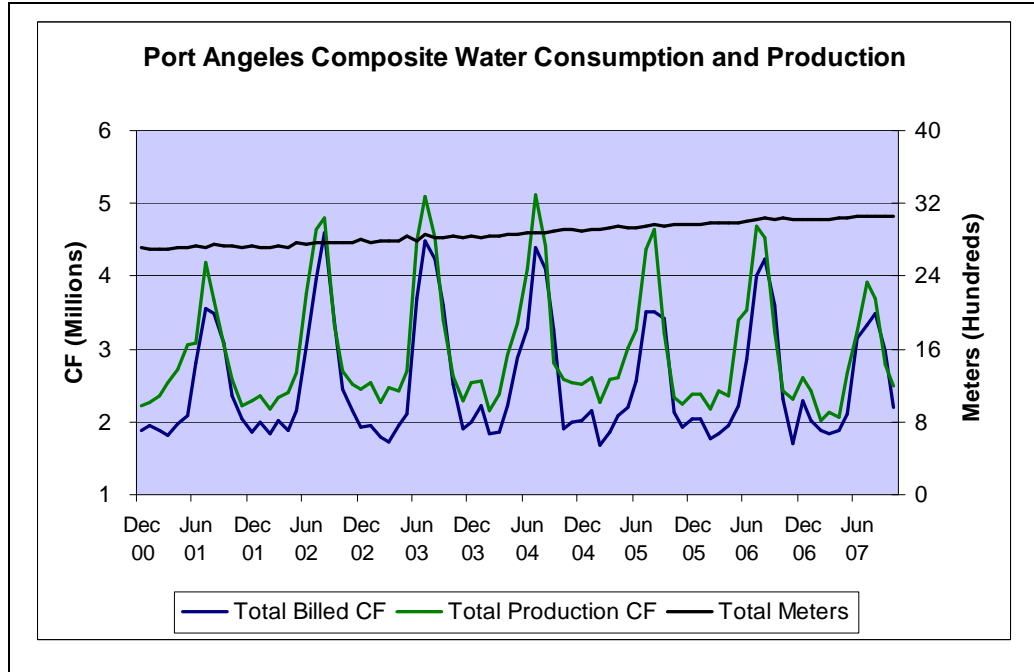
g. How Clallam PUD will evaluate the proposed WUE program  
 Water efficiency measures will continue to be evaluated to determine the effectiveness of the measures and to develop new ones.

System leakage – Reduction of leakage is a priority to meet WUE guidelines.

Cost Effectiveness – WUE programs must be cost effective to be responsible.

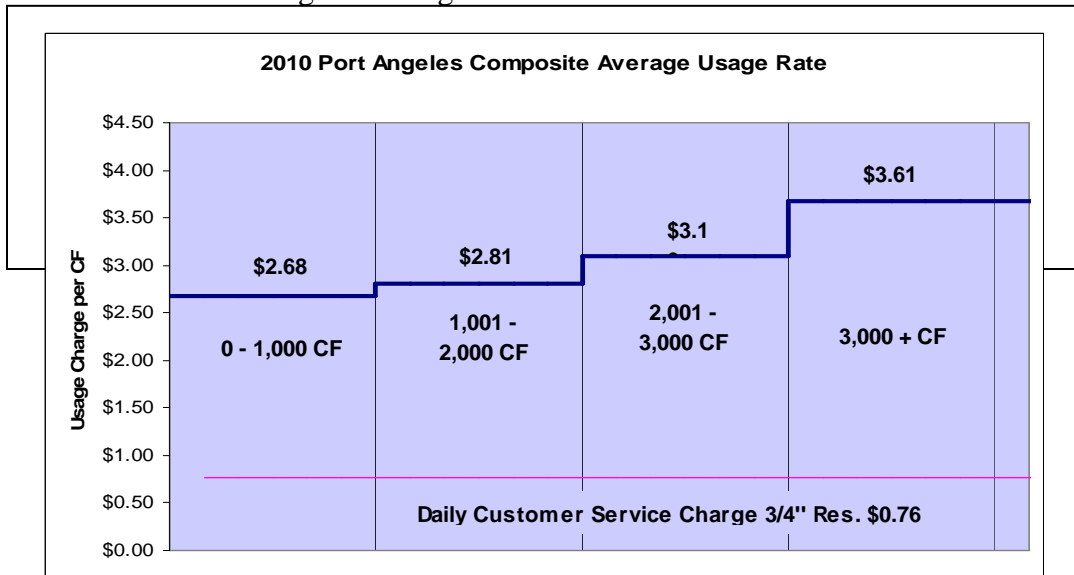
Meter data – Supply and customer meters yield data for usage and detecting leaks and will be a good indicator of WUE.

Figure 6. Monthly production and consumption data is available through monthly meter data. This tracks seasonal changes in water demand and the ability for Clallam PUD to meet the demands efficiently.



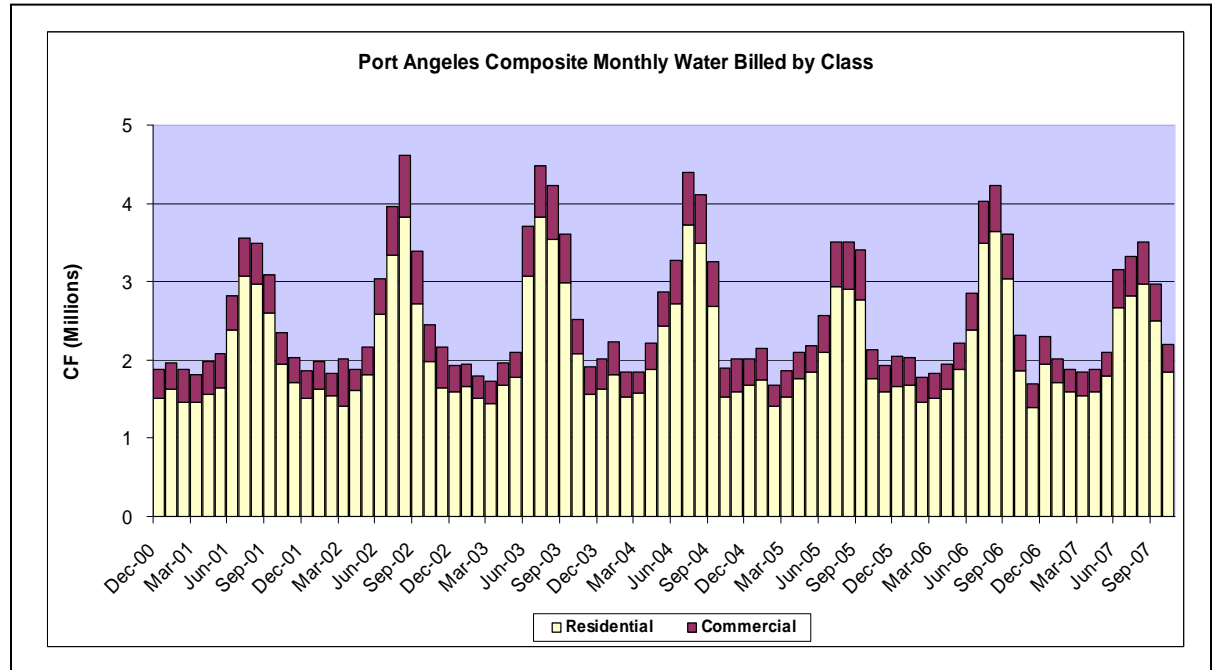
Cost of service and rate reviews – Changing customer usage patterns and water system operation and maintenance needs may require updating the rate structure.

Figure 7. Increasing residential water usage rates based on consumption, combined with a flat service charge encourage WUE.



Residential and commercial measures – Different customer classes use water differently and may need different WUE measures.

Figure 8. Most water consumption is by residential customers and fluctuates seasonally with irrigation. Commercial customer consumption is less variable throughout the year due to a difference in water needs.

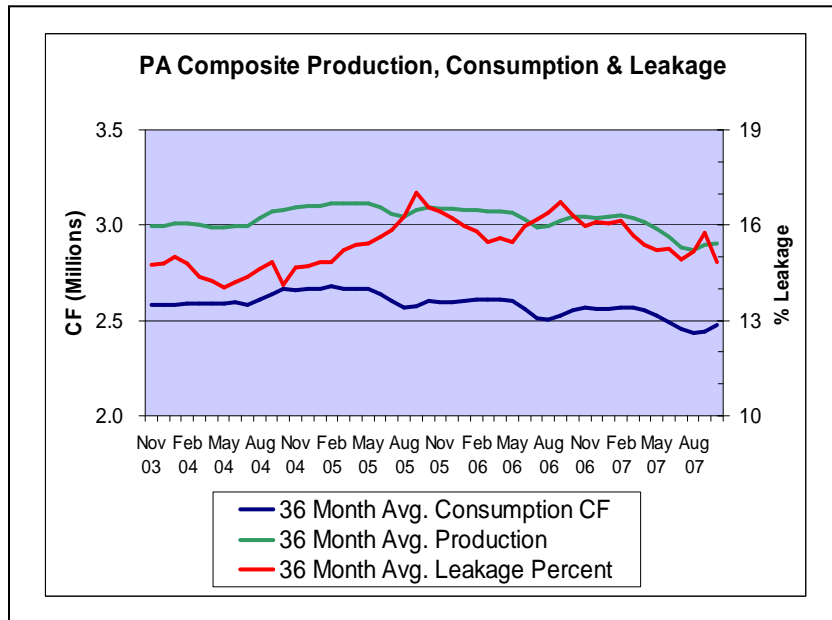


Reclamation Opportunities – Treated wastewater can be reused for non-potable uses.

- Opportunities Only Within Sewered Areas – Customers and areas that run exclusively on septic are not eligible for water reclamation. Generally, reclamation facilities need to be built in close proximity to the sewer facilities.
- Collaborate with City of Port Angeles – Combined efforts in sewered areas increase the potential for reclamation and use of treated water.
- Identify Publicly Acceptable Reuse – There are many alternatives for reclaimed water use, but the public needs to deem them acceptable for use to ensure a long lasting program.
- Estimate Quantity Available – After identifying reclaimed water uses, demands need to be determined.
- Morse Creek Summer Flow Augmentation – Increasing low summer flows in Morse Creek has environmental benefits.

h. Distribution leakage information

Figure 1 (Repeat). Using a three year rolling average, supply-side measures reduced the percent leakage from above 17% to below 15% from 2005 to 2007.



Changes in consumption and production are also weather dependent. See Figure 3 for the relationship between water consumption and climate conditions.

i. Cost effectiveness of potential WUE measures

Clallam PUD wants to achieve WUE goals in the most cost effective manner while reaping the maximum benefit.

- Meter Replacement – Replacing existing meters is costly in terms of labor and materials; however, approximately 5 percent of water loss may be due to old meters that under-report actual use.
- Meter Calibration - Clallam PUD currently does not have in-house meter calibration capability. Random service meter testing would be conducted to identify problem meter types and zones within the distribution system, and prioritize repair work. This testing and analysis system would reduce the cost of purchasing and installing new meters.
- Zone Metering – Installing more supply-side meters within the distribution system would improve leak detection; however, they are costly to install.
- Customer Education – Distribution of informational materials is relatively low cost, but it must be targeted to customers using more water than their class average.
- Demand Reduction Device – Supply and installation of demand reduction devices are a one time cost to Clallam PUD that yields WUE over extended periods of time.

Table 2. Summary of Device Costs – Water demand reduction devices can be installed in the home or commercial facilities to reduce indoor and outdoor consumption by customers.

**Water Consumption Reduction Devices - Residential and Commercial**

<b>Device Description</b>	<b>Cost</b>		<b>Device Life (yr)</b>	<b>End-Use Reduction</b>	
	<b>Product</b>	<b>Install</b>		<b>gal/cap/day</b>	<b>%</b>
<b>Bathroom</b>					
New Showerhead	\$10-35+	By user	5-10	2.4	
Shower Flow Restrictor	\$5.00	By user	10		21
Faucet Aerator	\$3.00	By user	5	1.6	21
<b>Toilets</b>					
6-Liter Toilets	\$65-250+	\$100-200	20-30	10.4	52
New Ballcock and Flapper Valve	\$10.00	\$25.00		5+	
Early Closure Device	\$5.00	\$15.00	5	2-4	
Water Displacement Device	\$2.00	\$10.00	5	2-3	
Dual Flush Toilets					
Composting Toilets	\$2,000.00	\$500.00	20+	20.1	
<b>Kitchen</b>					
Faucet Aerator	\$3.00	By user	5	.3	
Insulate Hot Water Pipes	\$25/100 ft	By user	10	2	
Efficient Dishwasher	\$500-800	\$200.00	10-15	.6	
<b>Laundry</b>					
Horizontal Axis Washing Machine	\$600-1,000	\$100.00	15-20	5.3	
<b>General Household</b>					
Pressure Reducer	\$90.00	\$200-400	20+	3-6	
Submetered Apartment Billing	\$50.00	\$200.00	20+		16
Household Leak Repair	Varies	Varies	~5	5	
Graywater Systems	\$100-2,000	\$200-500	10-50	10-50	
<b>Landscape</b>					
	\$15 for 20				
Drip Systems	plants	By user	10	Varies	
Micro-Spray Systems	25/20 sq. ft	By user	10	Varies	
Hose Timers	\$10.00 – \$40.00	By user	5-10	Varies	
Rain Sensor	\$30.00	\$100.00	10	Varies	
Trigger Shutoff Valves on Hoses	\$3-8	By user	10	Varies	
Irrigation System Moisture Sensors	\$30/valve	\$100.00	10	Varies	
Rainwater Tanks (250 gal)	\$1,000.00	\$4,000.00	20+	Varies	
ET Irrigation Controllers	\$200-500	\$100-300	10-15		18-22
Native Plants	Varies	Varies	5-20	Varies	
Mulch	\$1/ sq. ft.	By user	5	Varies	
<b>General Commercial</b>					
1.0 gal/flush Urinals	\$500.00	\$100-400	20+	3	
No-water Urinals	\$500.00	100-400	20+	3	100
Infrared Sensor Flush Control Urinal	\$700.00	100-100	20+	1	
Infrared Sensor Faucet	\$400.00	\$200.00	20+	.3	
Restaurant Low-Flow Spray Nozzles	\$60.00	\$120.00	10-15		25-50
X-ray water Recycling Units	\$2,400.00	\$100.00	10-15		95
6-Liter (Commercial) Toilets	300-450	100-200	20+	5.7	

Source: American Water Works Association, Manual of Water Supply Practices: M52, 2006

- Asset Management System – A new geographic information system (GIS) could improve management of the water system infrastructure. Development and operation of a GIS-based asset management system to manage and keep an inventory of the aging water infrastructure would result in a net savings. It has been shown to save 5-15% of the capital improvement costs for the water system, and reduce the need for expensive emergency repair work and provide better water service.
- Infrastructure Replacement – The aging infrastructure must be replaced over time with better materials. An asset management system will decrease these costs with a priority replacement schedule and maximize the life of the infrastructure.
- Capital Project Deferral – Reduced consumption places less demand on the system and extends the life of the infrastructure. Conserved water replaces the need for new infrastructure such as larger mains and new reservoirs. Water conservation would result in lower rate increases in the future.

j. Draft WUE goals

The following goals are proposed to be adopted by District Commissioners in January 2008.

- Complete meter upgrades by 2017 (WUE Rule deadline for new meter installation).
- Reduce leakage from 15% to 10% by 2020.
- Supply Side Measures – Washington State requires that The District take mandatory measures as well as additional measures to meet the leakage standards.
  - Mandatory
    - Production and Service Meter Calibration
    - Service Meter Replacement
  - Additional
    - Asset Management
    - Continue Leak Detection
    - Report/Account for All Authorized Uses
    - Zone Metering
- Demand Side Measures
  - Conservation Rate Restructure
  - Conservation Device Rebates
  - Customer Education

**Six Additional Measures**

Per WUE Rule guidelines, six additional measures are required, the purposes of which are primarily demand-side. Each of these measures will be implemented at the residential and commercial customer level.

- Focus on Customer Demand Efficiencies
- Review Conservation Rate Structures
- Institute Reclaimed Water (if cost effective)
- Identify Customer Leaks
- Continue Customer Education
- Drought Response

k. Water loss control action plan

**To be completed within 6 years of implementation:**

- Calibrate Production Meters
- Replace 50 % Service Meters
- Install Zone Meters
- Implement Asset Management Program
- Publicize Customer Education and Rebate Program
- Evaluate Supply- and Demand-Side Effectiveness
- Specify Supply- and Demand-Side Goals

II. Previous annual performance plan

The main component for gauging performance is the amount of unaccounted for water. Improvements can be seen by more accurate measurement of unmetered water by the fire department, contractors, road maintenance, and system operation and maintenance.

III. Water supply characteristics information

Table 3. Description of water sources within the PA Composite.

Source Name	Source Type	Capacity (gpd)	Comments
Morse Creek	Surface Water	1,000,000	Treatment Plant Capacity. Diversion allowed @ flows >25cfs
Bluff Well	Groundwater	504,000	Limited by salt water intrusion
Township Line Wells	Groundwater	28,800	No. 1 and No. 2
Elwha River	Surface Water	864,000	Purchased from City of PA
<b>TOTAL</b>		2,396,800	

IV. Water demand forecasts information

See Section I(f) above.

V. Public Comment

Public comment on these proposed initial WUE goals is encouraged and can be submitted via the website before January 14, 2008. Please submit your comments via the online comment page within the Clallam PUD website at [www.clallampud.net](http://www.clallampud.net) or contact Tom Martin, Water and Wastewater Systems Assistant Superintendent at [tomm@clallampud.net](mailto:tomm@clallampud.net) or 360-565-3449.

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