

WATER USE EFFICIENCY PROGRAM

EFFICIENCY PROGRAM

General

The water use efficiency rule was promulgated as part of the 2003 Municipal Water Law. The water use efficiency rule requires that small water systems (under 1,000 connections) prepare and implement a water use efficiency program no later than January 22, 2009. The District owns and operates three small water systems. These include Chelan Ridge (ID # 12350 U) Ollala Canyon (ID # 63408 1), and Dryden (ID # 20100 6). The District also provides contract operation services for the Chelan Falls system (ID # 12350 U). The water use efficiency program for each of these systems is provided herein.

Water Use Efficiency Measures

The water use efficiency rule requires that purveyors implement a specified number of water use efficiency measures, based on the number of connections served by the water system. The District is required to implement one water use efficiency measures for each of the small water systems.

There are two basic criteria that must be met to establish the eligibility of a measure. (1) The measure must focus on encouraging customers to use water efficiently, and (2) The measures must not be mandatory; i.e. must not be required by WAC 246-290.

Existing Program

Chelan County PUD's existing water use efficiency program consists of several water use efficiency measures. Many of these measures were first implemented between 2000 and 2002 for the District's Wenatchee water system (approx. 5,000 connections) and its small water systems. These measures, and their eligibility as water use efficiency measures are discussed below.

Conservation rates: Rates are one of the most important and effective water-use efficiency measures at Chelan County PUD. Rates are structured in tiers; as use increases, so do costs. 2008 monthly residential rates for the various water systems are as follows:

System	0-3,000 gallons	3,001-10,000 gallons	over 10,000 gallons	5/8" meter basic charge
Ollala Canyon	\$1.52 / 1,000	\$2.20 / 1,000	\$2.68 / 1,000	\$32.60
Dryden	\$0.81 / 1,000	\$1.12 / 1,000	\$1.52 / 1,000	\$22.05
Chelan Ridge	\$1.45 / 1,000	\$2.30 / 1,000	\$3.97 / 1,000	\$29.20*
Chelan Falls	\$0.42 / 1,000	\$0.53 / 1,000	\$0.79 / 1,000	\$20.00

*Chelan Ridge minimum meter size = 1-inch.

The conservation rate structure meets both eligibility criteria and is therefore a viable water use efficiency measure.

System-wide automated meter reading and individual meter monitoring: In a \$1.4 million upgrade, Chelan County PUD converted water meters to an automated meter reading (AMR) system in fall 2006. Water meters in Chelan Falls were subsequently upgraded in fall 2008. In the past, water consumption had been estimated for nearly all customers during the winter because snow made it hard to reach the underground vaults where water meters are located. Automated meter reading eliminated the need for estimates. The new meters are more accurate than the meters they replaced, some of which were 10 years old or older. Automated meter reading is improving the District's ability to detect leaks early. If an excessive amount of water flows through a meter, an alarm alerts system operators to a potential problem. The District mails customers a notice informing them of the potential leak, with a list of potential causes for the customers to investigate.

As part of the AMR conversion, the PUD purchased water meter monitors for customers' use. Customers can borrow or buy a monitor and track water use from inside their homes. The monitor attaches with a magnet to a customer's refrigerator (or any location in the home), and captures signals from the transmitter on the water meter. The monitor displays the current reading on the water meter and can display water use during intervals defined by the customer, such as for one day, or for when a lawn is being watered. The PUD supplies a worksheet to help consumers understand and compare their consumption.

Finally, the District also purchased data recorders as part of the AMR conversion. The data recorders can be programmed to record the customer's meter reading at defined intervals (every minute, hourly, etc.). The recorder can store over 20,000 data points. These recorders can be installed near the customer's meter to collect usage data. Software provided from the AMR vendor is used to extract and display the data in graphical format. The graph illustrates customer usage during the specific dates and times the recorder was installed. The data recorders can be an invaluable tool for educating customers about their water use.

The ability to detect and advise customers of leaks in their plumbing, the water meter monitors, and the water data recorders each meet both eligibility criteria and are therefore each viable water use efficiency measures. Therefore, installation and implementation of the AMR system fulfills three water use efficiency measures.

Xeriscape: Chelan County PUD's peak water use occurs during the summer irrigation season. To reduce reliance on domestic water for landscape irrigation, the PUD promotes Xeriscape, or drought-tolerant landscaping. Programs include:

- Riverfront Demonstration Garden - In cooperation with Washington State University/Chelan County Master Gardeners, the District maintains a demonstration garden that consists of more than 50 different drought-tolerant plants and grasses. The garden is located along the popular Apple Capital Loop Trail which fronts the Columbia River.

- PUD Headquarters Xeriscape Garden – Customers visiting District headquarters in Wenatchee are treated to a small-scale garden with landscaping featuring 20 drought-tolerant plants and grasses.
- KPQ Home and Garden Show – Xeriscape and water conservation are the themes promoted by the PUD at the annual Home and Garden Show the second weekend in March. For the past four years the District has sponsored a popular, free presentation by gardening expert Ciscoe Morris of Seattle, with emphasis on drought-tolerant plantings.
- Workshops – The District sponsors at least one public workshop each year on various aspects of water conservation, including irrigation practices and Xeriscape.
- Web site – The PUD’s Web site includes extensive information on Xeriscape gardening, with full-color photos of 53 plants and grasses.

The xeriscaping program meets both eligibility criteria and is therefore a viable water use efficiency measure.

Quarterly newsletter and direct-mail outreach: Since April 2003, Chelan County PUD has published and mailed the quarterly Water Ways newsletter to water customers. The newsletter provides tips on how to conserve and informs customers about District programs. (To see a sample, visit <http://www.chelanpud.org/water-ways.html>.)

In July 2003, 970 letters were sent to third-tier (high consumption) water customers comparing their water use to that of the average PUD customer and advising them of conservation opportunities and assistance. The District also developed a “welcome letter” and water information packet that is now sent to all new water customers informing them of available services and conservation practices.

The District’s quarterly newsletter and direct mail outreach provides advanced consumer education to complement the general education required by the rule. For this reason, it shall be considered a viable water use efficiency measure.

Comprehensive Web site: The District’s Web site (<http://www.chelanpud.org/water-conservation.html>) includes detailed water conservation information on the following subjects:

- [Xeriscape](#)
- [Lawn Tips](#)
- [Outdoor Water Audit](#)
- [Natural Landscaping](#)
- [Hardscape](#)
- [Hot Tub and Pool Tips](#)
- [Water - Use it Wisely](#)
- [Indoor Water Conservation](#)
- [Water Trivia](#)
- [“Water Conservation A to Z”](#)
- [Water Conservation Links](#)

Note that the “Water - Use It Wisely” link directs consumers to a national Web site on water conservation. Chelan County PUD is a partner in the award-winning Water - Use It Wisely campaign, which gives the District access to professional marketing tools.

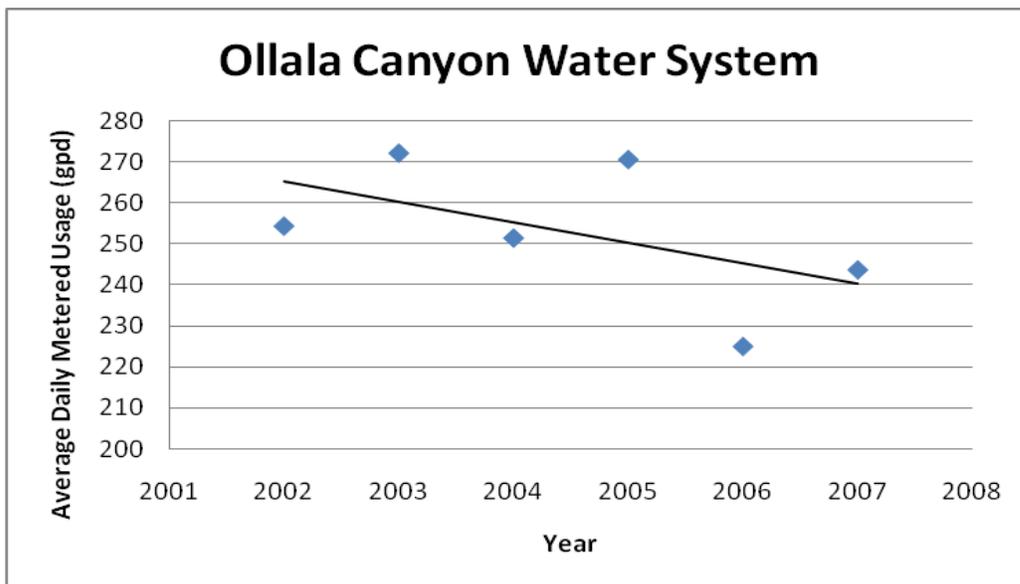
The District’s comprehensive website provides advanced consumer education to complement the general education required by the rule. For this reason, the District’s comprehensive web site is a viable water use efficiency measure.

Summary: The District’s existing water use efficiency program includes the following seven viable measures:

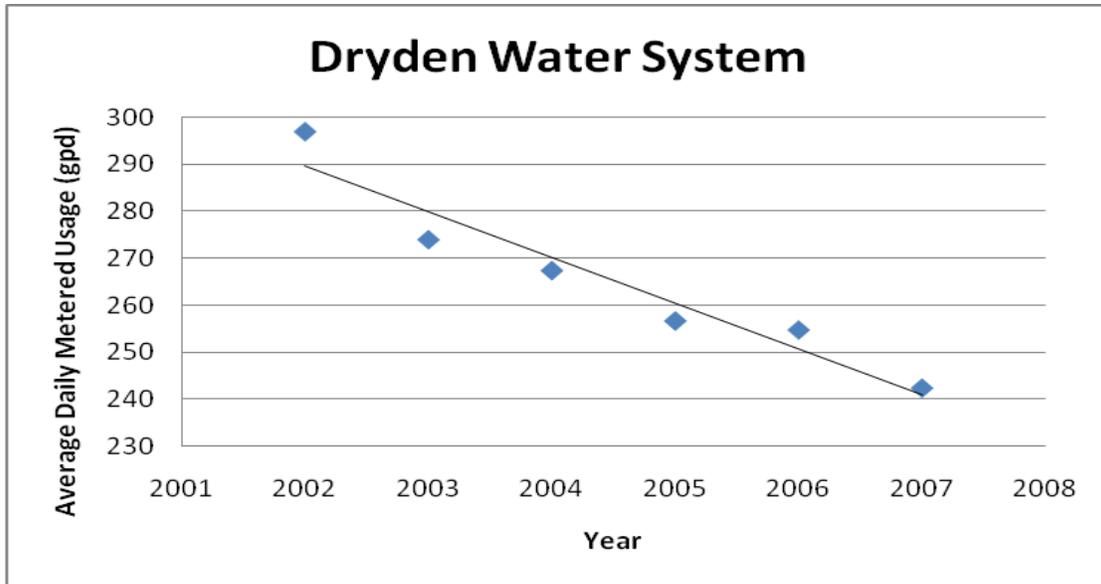
1. Conservation Rates
2. Customer leak detection and notification
3. Customer water meter monitoring
4. Customer water meter data recording and reporting
5. Xeriscaping program
6. Quarterly newsletter & direct mail outreach
7. Comprehensive website

Past Water Savings

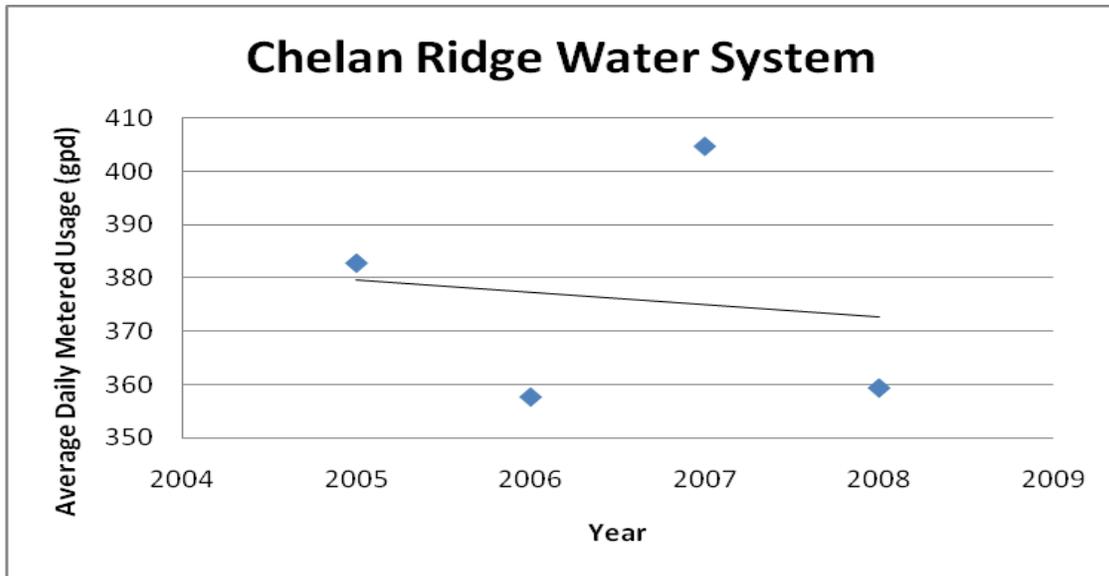
Past water savings was estimated by comparing water use before implementation of efficiency measures to water use today. The historical residential water use is illustrated for each of the water systems below.



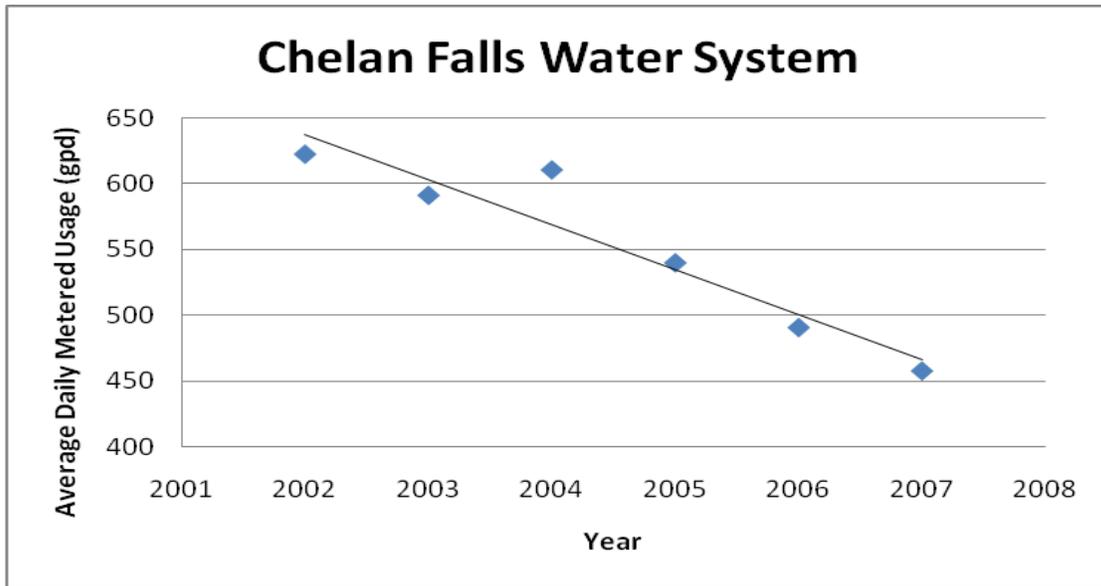
Ollala Canyon: The average consumption per residential connection decreased from about 270 gallons per capita-day (gpcd) to 240 gpcd, a 13 percent reduction. Total estimated water saved from 2002 through 2007 is 0.8 million gallons.



Dryden: The average consumption per residential connection decreased from about 300 gallons per capita-day (gpcd) to 245 gpcd, an 18 percent reduction. Total estimated water saved from 2002 through 2007 is 2.1 million gallons.



Chelan Ridge: The average consumption per residential connection has varied from about 360 gallons per capita-day (gpcd) to 405 gpcd. The trend suggests slightly reduced consumption since 2005. However, due to the variability in the data, it is not certain whether average water usage had lessened over time.



Chelan Falls: The average consumption per residential connection decreased from about 625 gallons per capita-day (gpcd) to 455 gpcd, a 27 percent reduction. Total estimated water saved from 2002 through 2007 is 8.9 million gallons.

Water Use Efficiency Goals

Chelan County PUD has selected a water use efficiency goal for each system that includes a measurable outcome in terms of water production or consumption. The selection of these goals considered the water system’s forecasted demand and water supply characteristics. Goals for each system are:

Ollala Canyon: Maintain the 3-year residential average day demand less than 250 gallons per connection per day.

Dryden: Maintain the 3-year residential average day demand less than 260 gallons per connection per day. Also, reduce distribution system leakage from 30 percent to less than 20 percent by the end of 2015.

Chelan Ridge: Maintain the 3-year residential average day demand less than 400 gallons per connection per day.

Chelan Falls: Maintain the 3-year residential average day demand less than 500 gallons per connection per day.

The goals for each system are intended to maintain consumption at the current relatively low levels. Average day demand for Ollala Canyon and Dryden (currently about 250 gpd per connection) has been reduced considerably since water efficiency measures were put into place. Many of these customers use separate irrigation systems, so potable water is used primarily indoors.

The Chelan Falls and Chelan Ridge systems do not use separate irrigation systems. As a result, the average day demand for these systems is somewhat higher. The current average day demand for Chelan Ridge and Chelan Falls is approximately 400 gpd per connection and 500 gpd per connection, respectively.

Using the rationale provided in the Washington State Department of Health’s Water System Design Manual (Equation 5-1) A typical average day demand for these communities would be 1,000 gpd per connection. In comparison, the current average day demand for these systems is between 25 percent and 50 percent of typical values. No further reduction in water consumption is considered necessary at this time.

New Water Use Efficiency Measures

New water use efficiency measures are discussed below. The symbols in brackets () indicate the water use category supported by the respective measure (I = indoor; O = outdoor; ICI = industrial/commercial/institutional; A = all)

Meter Tracking and Calibration (A): This measure will establish a program to test and/or calibrate water meters on a regular basis. The District has not historically tracked the performance of its water meters. While planning the AMR system, the District discovered approximately 400 meters that were more than 25 years old. Several were over 40 years old. A random sample of these were tested and found to be registering approximately 30 percent of actual water flow.

The District will develop and implement a program to test and calibrate or replace water meters. A potential testing/replacement schedule would be as follows:

<u>Meter Size</u>	<u>Testing/Replacement Criteria</u>
5/8"	15 years or 2,500,000 gallons
1"	15 years or 3,250,000 gallons
1 ½"	10 years or 5,600,000 gallons
2" & larger	10 years or 10,400,000 gallons

The District’s customer information system can query meter data and provide a list of meters that need to be tested and calibrated. The District’s existing staff will complete the work. Costs to implement this measure will be covered by the District’s existing O&M budget. Increased revenue generated by accurate meters is anticipated to exceed costs to implement this measure.

Existing Water Use Efficiency Measures

The District will continue to update and implement the following water use efficiency measures discussed previously. The symbols in brackets () indicate the water use category supported by the respective measure (I = indoor; O = outdoor; ICI = industrial/commercial/institutional, A = all)

1. Conservation Rates (I.O)

2. Customer leak detection and notification (A)
3. Customer water meter monitoring (A)
4. Customer water meter data recording and reporting (A)
5. Xeriscaping program (O)
6. Quarterly newsletter & direct mail outreach (A)
7. Comprehensive website (A)

These measures will be administered by the District's Conservation & Customer Services group. The group estimates \$6,500 is required per year to maintain these measures. This amount will continue to be included in the District's annual budget.

Evaluation

The small cost to administer the existing water use efficiency measures is extremely small relative to the water utility's annual budget.

The new measure to implement a meter tracking and calibration program will be completed by District staff using existing software. There will be no cost to implement this measure.

The importance of conservation cannot be overstated. Reducing water consumption will extend the life of infrastructure from the source to the reservoir. The District believes the qualitative benefits to society outweigh the costs of any conservation measure outlined here. Chelan PUD serves a rapidly growing area with increasing demands for utilities and services. Conservation of resources helps preserve a quality of life in the county that includes safe drinking water and water for agriculture, power generation and fish.

The marginal cost to produce water is currently unknown. It is anticipated the cost per customer to add source capacity is very high.

Schedule and Budget

The new measures were implemented in 2008 as part of the water use efficiency program for the District's Wenatchee water system. Anticipated ongoing cost to maintain the existing measures is \$6,500. These costs will be included in the District's annual budget.

Consumer Education

Chelan County PUD uses a variety of communication tools to inform customers of water-conservation practices and options. Methods include:

1. Print advertising (usually May of each year)
2. Radio advertising (usually May of each year)
3. Direct mail (letters and bill stuffers, approx. 3 times per year)
4. A quarterly conservation newsletter
5. Lobby signage (usually May of each year)
6. Comprehensive Web site (ongoing)
7. Public presentations and workshops (usually May and/or October)

Projected Water Savings

Water saved due to implementation of the water use efficiency measures will maintain consumption at current, relatively low levels. It is anticipated that maintaining accurate water meters will reduce the calculated value for distribution system leakage. However, no true water savings (i.e. reduction in demand) will result from meter maintenance.

Ollala Canyon: Implementation of water efficiency measures has resulted in a 13 percent decrease in residential average day demand. This reduction is projected to save approximately 312,000 gallons per year.

Dryden: Implementation of water efficiency measures has resulted in an 18 percent decrease in residential average day demand. This reduction is projected to save approximately 780,000 gallons per year.

Chelan Ridge: Data collected in future years will be used to estimate projected water savings for the Chelan Ridge system.

Chelan Falls: Implementation of water efficiency measures has resulted in a 27 percent decrease in residential average day demand. This reduction is projected to save approximately 5.3 million gallons per year.

Program Evaluation

This water use efficiency program will be evaluated in the annual water use efficiency report prepared for each system. It is anticipated that progress will be made each year. The program will be reevaluated annually and modified, if needed, to meet the selected water use efficiency goals.

Distribution System Leakage

Distribution system leakage was determined using the formula identified in Chapter 246-290-820 WAC. Values were calculated for 2007 only following installation of new water meters. Prior to 2007, old, inaccurate meters and estimated reads over the winter months introduced error into the DSL calculation.

Calculated 2007 leakage for each system is summarized below.

System	2007 Distribution System Leakage
Ollala Canyon	<1%
Dryden	30%
Chelan Ridge	18%
Chelan Falls	18%

With the exception of Dryden, all systems meet the 20 percent maximum allowed leakage standard. A water loss control action plan for the Dryden system is discussed below.

WATER LOSS CONTROL ACTION PLAN

General

Chapter 246-290-820 WAC requires that water systems serving less than 500 connections, and with greater than 20 percent distribution system leakage prepare a water loss control action plan. The calculated leakage for Dryden in 2007 was 30 percent. This plan evaluates the data used to calculate leakage and establishes the methods, schedule and budget to reduce leakage to 20 percent or less.

Data Accuracy and Collection

The leakage calculation is based on the formula provided in Chapter 246-290-820 WAC as follows:

$$DSL = [(TP-AC)/(TP)] \times 100$$

Where: DSL = percent distribution system leakage
TP = total water produced and purchased
AC = authorized consumption

Total water produced is obtained from the source meter located in the Dryden pump house.

Authorized consumption includes:

1. Metered water sales from residential, commercial, industrial and interdepartmental accounts. These quantities are obtained from the District's billing system.
2. Hydrant meter sales. These quantities are obtained from the District's billing system.
3. Estimated water used in the District's flushing program.
4. Estimated water used for construction. This volume is calculated based on newly installed water main volume, newly constructed reservoir volume (filling, flushing), etc.
5. Estimated water flowed from hydrants by the local fire districts.
6. Estimated water used in fire fighting. The District estimates this amount by observing pumping rates and reservoir drawdown rates obtained from its telemetry system during the time of the fire(s). Water used in the hours or days following the major fire event for cleanup is estimated.

The following example from 2007 illustrates a typical DSL calculation:

Authorized Consumption:

Metered water sales	4,790,600 gal
Hydrant meter sales	225,700 gal
Flushing program	10,000 gal

Construction water	0 gal
Fire Dept. flushing	20,000 gal
Fire fighting	0 gal

AC (2007) 5,046,300 gal

TP (2007) 7,153,800 gal

$$DSL = [(7.153-5.046)/7.153] \times 100 = 30 \text{ percent}$$

The estimated quantities do not substantially impact the DSL calculation. Increasing or decreasing these estimates by 50 percent impacts the DSL calculation approximately 0.2 percent.

The District’s customer water meters have been a past source of error. The District completed an automated meter reading project for Dryden in 2006, which included replacement of all of its meters. The District is certain the new meters are not a source of error in the DSL calculation

Hydrant meters are inspected and tested annually.

Control Methods

Methods anticipated to reduce DSL are listed and discussed below.

Data Collection and Analysis: Continue to collect customer meter data and hydrant meter data. Obtain estimates of water used for fire fighting and hydrant flushing.

Visual Audit: Visit each water meter chamber, combination air valve, flushing hydrant, fire hydrant and main line valve and check for visual leaks. Repair any leaks found.

Leak Detection: In the event no leaks are discovered as part of the visual audit, contract with a leak detection company to find buried leaks. Repair any leaks found. It must be noted that removing a continuous leak or combination of leaks equal to 1.5 gpm will bring the system into compliance with the 20% DSL requirement.

Feasibility Report: In the event the above control methods do not reduce DSL below 20 percent, the District will prepare a feasibility report. The feasibility report will evaluate the cost to perform further leak detection and make repairs to reduce leakage. The report will identify any technical or economic concerns which may affect the system’s ability to comply with the distribution leakage standard as per Chapter 246-290-820(4)(d) WAC.

Implementation Schedule & Budget

The implementation schedule for each control method is listed below.

Data Collection & Analysis: 2008-ongoing. Will be completed by District staff. No additional budget is required.

Visual Audit & Repairs: 2009. Will be completed by District staff within existing O&M budget

Leak Detection & Repairs: 2010. An additional \$10,000 will be budget for contract leak detection and underground repairs.

Feasibility Report: 2015. Will be completed by District staff. No additional budget is required.

SOURCE WATER

Ollala Canyon

The Ollala Canyon water system is supplied from one spring captured by a collection box. The collection box diverts the water into a wet well. Water is pumped from the wet well to a reservoir. Excess water overflows the wet well into a pond, and flows down the canyon. Chlorine is injected at the pumphouse to provide disinfection.

Dryden

The Dryden water system is a groundwater source tapped in a well field with two sources drilled approximately 55 feet deep. This groundwater source is located on the west side of town, approximately 200 feet from the Wenatchee River. This well field has excellent water quality and quantity. The capacity of each well is 85 gpm. Chlorine is injected at the wellhouse to provide disinfection.

Chelan Ridge

The Chelan Ridge water system is a groundwater source with one well drilled approximately 120 feet deep. This groundwater source is located at Lake Chelan State Park, approximately 200 feet from Lake Chelan. The well pump capacity is 350 gallons per minute. Chlorine is injected at the wellhouse to provide disinfection.

Chelan Falls

The Chelan Falls water system is a groundwater source with two wells drilled approximately 85 feet deep. This groundwater source is located on the north side of town, adjacent to the “old” Beebe Park. The capacity of Well No. 1 and Well No. 2 is 190 gpm and 160 gpm, respectively. Chlorine is injected at the wellhouse to provide disinfection.

Water quality consistently meets primary drinking water standards, as summarized below.

Water Quality Analysis

SUBSTANCE	HIGHEST LEVEL ALLOWED (MCL*)	OLLALA CANYON	DRYDEN	CHELAN RIDGE	CHELAN FALLS	POTENTIAL SOURCES
Barium (ppm)	2	0.83	0.035	0.006	0.043	Erosion of natural deposits
Fluoride (ppm)	4	0.2	0.07	0.36	0.15	Erosion of natural deposits; discharge from fertilizer and aluminum factories
Nitrate (ppm)	10	0.90	1.95	None	0.77	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Chloride (ppm)	250	3.2	3.4	None	1.6	Variable and dependent on chemical composition of water
Sulfate (ppm)	250	64.1	7.5	4.4	35.9	Erosion of natural deposits; mine drainage wastes
Conductivity (umhos/cm 25 deg.)	700	699	260	113	252	Presence of ions; on their total concentration, mobility and on the temperature of measurement
Total Dissolved Solid (ppm)	500	396	140	108	160	Matter suspended or dissolved in water
Hardness (mg/l)	Not regulated	297	114	44.1	106	High concentration of calcium and magnesium ions.
Total Trihalomethanes (TTHM)	80	19.3	2.3	3.5	1.0	By-products of drinking water chlorination
Total Haloacetic acid (HAA5)	60	9.1	3.9	6.2	0.53	By-products of drinking water chlorination

Water Rights

Ollala Canyon: Under water right # S3-00974P, the District is authorized to withdraw 161.6 gpm and 73.4 acre-ft per year from the spring source. Currently, the spring source supplies approximately 50 gpm. According to 2007 source meter data, 7.4 acre feet were pumped into the distribution system. Based on this analysis, the existing water right is adequate for this system.

Dryden: Under water right # G4-27929C, the District is authorized to withdraw 150 gpm and 74 acre-ft per year from the wells. Currently, one well discharging 85 gpm can adequately supply the system. According to 2007 source meter data, 22 acre feet were pumped into the distribution system. Based on this analysis, the existing water right is adequate for this system.

Chelan Ridge: Under water right # S3-00974P, the District is authorized to withdraw 161.6 gpm and 73.4 acre-ft per year from the spring source. Currently, the spring source supplies approximately 50 gpm. According to 2007 source meter data, 7.4 acre feet were pumped into the distribution system. Based on this analysis, the existing water right is adequate for this system.

Chelan Falls: Under water right # G4-27862, the Water District is authorized to withdraw 470 gpm and 300 acre-ft per year from the two wells. Currently, one well discharging 190 gpm can adequately supply the system. According to 2007 source meter data, 105 acre feet were pumped into the distribution system. Based on this analysis, the existing water right is adequate for this system.

Reliability Analysis

Ollala Canyon: Clean water from the spring source flows by gravity into the clear well below the pump house. A single pump transfers this water to the concrete drinking water storage tank. The pump capacity (30 gpm) far exceeds the maximum daily demand of the system. The District maintains a spare pump that can be installed in approximately ½ day in the event the installed pump fails. In the event of a extended power outage, the single pump can be powered by a 5 kW portable gasoline powered generator.

Dryden: The wellhouse consists of two wells, each with a capacity of approximately 85 gpm. One well is capable of supplying the maximum daily demand of the system. The second well and pump is available for redundancy. The well house is provided with an auxiliary power connection and transfer switch. In the event of an extended power outage, the wells can be powered by the District's portable diesel generator.

Chelan Ridge: The single well has a capacity of approximately 350 gpm, and is capable of supplying the maximum daily demand of the system. The District has budgeted purchase of a new pump and motor that will be stored in the District's warehouse, In the event of a pump or motor failure, the Distict will contract with a local well

driller/outfitter to perform the necessary repairs. The storage reservoir will provide several days water to customers while repairs are made.

Chelan Falls: The system is supplied by two wells. Well No. 1 has a capacity of approximately 190 gpm and Well No. 2 has a capacity of approximately 160 gpm. Well No. 2 is capable of supplying the maximum day demands. Thus one well is available for redundancy. The well house is provided with an auxiliary power connection and transfer switch. In the event of an extended power outage, the wells can be powered by the District's portable diesel generator.

RECLAIMED / NON-POTABLE WATER ANALYSIS

Reuse of reclaimed water is administered by the Washington departments of Health and Ecology through the Water Reclamation and Reuse Standards (September 1997). Reclaimed water is wastewater treated to varying levels based on the intended use. The treatment levels range from Class A to Class D with Class A being the highest quality.

Typical uses of reclaimed water include irrigation, impoundments, groundwater recharge by surface percolation, commercial and industrial uses, and stream flow augmentation. The required level of treatment for each reclaimed water use is based primarily on the risk of human exposure to pathogenic microorganisms.

Opportunities for reuse of reclaimed water within the service areas of these small water systems are very limited. The capital and ongoing costs to reclaim water from domestic sewage are very high, particularly for small systems. Many customers in the Dryden and Ollala Canyon service areas are currently provided irrigation water from separate irrigation systems. There is no potential source of reclaimed water within a reasonable distance of the Chelan Ridge system. The City of Chelan operates a wastewater treatment plant about one mile north of Chelan Falls. However, the City has no plans to produce reclaimed water from this facility.