

# WATER CONSERVATION PLAN OF THE ELDORADO AREA WATER & SANITATION DISTRICT (EAWSD)

---

REVISION: February 2015

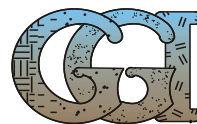


Don't be a drip...  
Save every drop!

## Prepared By:



**Eldorado Area Water  
And Sanitation District**  
1 Caliente Road, Suite F  
Santa Fe, NM 87508



**GLORIETA GEOSCIENCE, INC.**  
P.O. Box 5727 Santa Fe, NM 87502  
(505) 983-5446 Fax (505) 983-6482  
E-mail: [ggi@glorietageo.com](mailto:ggi@glorietageo.com)  
Web Address: [www.glorietageo.com](http://www.glorietageo.com)

## Table of Contents

<b>I. Purpose, Scope, Objective and Reason</b> .....	<b>1</b>
A. Plan Adoption and Implementation .....	1
B. Local Conditions of Service Area .....	1
i. Water Supply Overview .....	1
ii. Demographics .....	3
iii. Housing.....	3
iv. Climate: Temperature and Precipitation.....	3
v. Other Local Conditions.....	3
C. Amendments and Revisions .....	3
<b>II. Assessing Public Water Supplier Performance</b> .....	<b>4</b>
A. Data Results and Analysis: American Water Works Association Water Loss Control Committee Free Water Audit Software© Reporting Worksheet .....	4
i. Performance Indicators .....	4
a. Financial .....	4
b. Operational Efficiency .....	4
ii. Data Validity Score .....	5
iii. Priority Areas for Attention .....	5
B. Data Results and Analysis: New Mexico Office of the State Engineer Gallons per Capita per Day Calculator Table .....	5
i. Period of Study .....	5
ii. Average Size of Household .....	5
iii. Annual Single Family Residence GPCD .....	5
iv. Monthly Single Family Residence GPCD .....	6
v. Annual Multi-Family Residence GPCD .....	6
vi. Industrial, Commercial, Institutional and Other Metered .....	6
vii. Annual System Total GPCD .....	6
viii. Monthly System Total GPCD .....	7
<b>III. Public Involvement, Education and Outreach</b> .....	<b>7</b>
A. Current Education and Outreach, Continuing After Plan is Adopted .....	7

i. Public Information Program .....	7
ii. Outreach Program Activities .....	8
iii. In-school Educational Programs .....	9
<b>IV. Water Use and Unaccounted for Water .....</b>	<b>8</b>
<b>V. Water Conservation Goals .....</b>	<b>10</b>
A. Prioritized Goals .....	10
i. SFR Short Term (less than 5 years) Goals .....	10
ii. SFR Long Term Goals .....	10
iii. ICI Short Term (less than 5 years) Goals .....	10
iv. ICI Long Term Goals .....	10
v. System Short Term (less than 5 years) Goals .....	11
vi. System Long Term Goals .....	11
B. Evaluation of Goals .....	11
i. Evaluation of Goals for Residential Water Customers .....	11
a. Customer Leak Prevention and Repair .....	12
b. Supplemental Water .....	13
c. Individual Water Reuse and Gray Water Systems .....	13
d. Low-Water-Use Landscaping and Efficient Irrigation .....	14
e. Water-Efficient Fixtures and Appliances .....	14
ii. Evaluation of Goals for Commercial, Industrial and Institutional Customers .....	14
a. Water-Efficient Commercial and Industrial Water-Use Processes .....	14
b. Low-Water-Use Landscaping and Efficient Irrigation .....	15
c. Water-Efficient Fixtures and Appliances .....	15
iii. Evaluation of Goals for the Water Utility .....	15
a. Water Reuse Systems .....	16
b. Distribution System Leak Prevention and Repair .....	16
c. Dissemination of Information Regarding Water-Use Efficiency Measures .....	17
d. Low-Water-Use Landscaping and Efficient Irrigation .....	17
<b>VI. Best Management Practices .....</b>	<b>18</b>
<b>VII. Incentives to Implement Water Use Efficiency Techniques .....</b>	<b>19</b>

**VIII. Water-Rate Structures to Encourage Water-Use Efficiency .....19**  
**IX. Drought Management Plan .....20**  
**X. State and Regional Water Plans .....21**  
**XI. Changes in the Water Conservation Plan .....22**  
**XII. Program for Implementation .....22**

**APPENDICES**

**Appendix A: AWWA Audit Results**

**Appendix B: NMOSE GPCD Calculator Results**

**Appendix C: Phase II Water Rate Tier Structure and Water Surcharge Resolution No. 14-10-01**

**Appendix D: Water Restrictions and Alert Management Plan (WRAMP)**

## **I. Purpose, Scope, Objective and Reason**

The purpose of this Water Conservation Plan (“Plan”) is to provide general guidance for the implementation of water conservation measures by the District and for District programs to encourage water conservation by its water utility customers. The objective and reason of the plan is to ensure dedication to properly manage water resources with appropriate conservation measures to mitigate potential water shortages.

This Plan covers the policies, programs and activities of the District with regard to water conservation in the Eldorado area. The District has authority to regulate the use of water by its customers, both within and outside of the District’s boundaries. The District Board may, by resolution, adopt policies encouraging water conservation by its customers and imposing economic or other penalties on customers who fail to use water in a reasonable and conservative manner. However, the District lacks powers such as those of municipalities and counties to adopt ordinances of general applicability to all residents of the community. Therefore, the District’s formal water utility policies and procedures, strictly speaking, apply only to the District’s customers.

The District’s educational activities and outreach will provide information to the entire Eldorado community, including several hundred residents who receive their water supply from domestic wells. Consequently, this Water Conservation Plan provides for some educational and outreach programs addressed to the community as a whole.

### **A. Plan Adoption and Implementation**

This Plan has been adopted by the District’s Board of Directors (the “Board”), the entity that is responsible for general management and oversight of the District’s utility operations, and has been provided to the Utility Operator, the contractor retained by the Board to provide day-to-day operational management of the Eldorado water utility. This Plan will serve as guidance for implementation of specific conservation measures and programs by the Board, the Utility Operator, employees and volunteers of the District, and the District’s water customers.

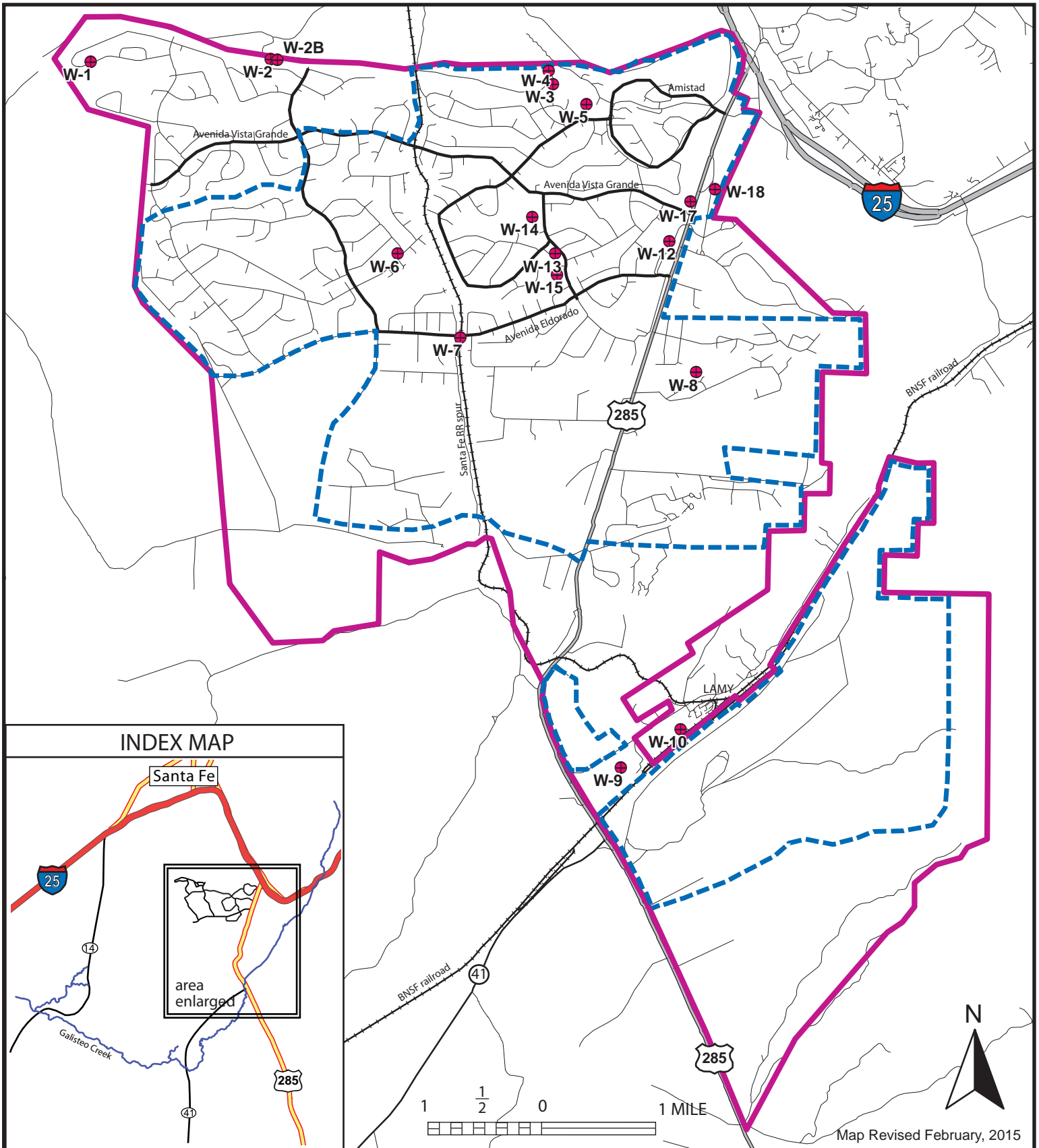
### **B. Local Conditions of Service Area**

#### ***i. Water Supply Overview***

The District provides water service to approximately 2,950 customers, 98% of which are residential users, in the unincorporated community of Eldorado and in adjacent areas of Santa Fe County (Figure 1).

The District’s total water production (diversion) currently is approximately 498 acre-feet per year (2014) with an average of 493 acre-feet per year for 2011 - 2014.

Consequently, the District is not a “covered entity” as that term is defined in NMSA 1978, Section 72143.2(A) (2003) that “diverts more than 500 acre-feet of water per year” and “are required to submit a conservation plan to OSE.” This Plan is developed in accordance with *New Mexico’s Water Conservation Planning Guide for Public Water*



Map Revised February, 2015

**Figure 1: EAWSD, the “District” water service area and well location map.**

- W-1 ⊕ EAWSD Wells (with well numbers)
- ▭ Boundary of EAWSD Service Area
- ▭ EAWSD District Boundary

EAWSD Conservation Plan, 2015



GLORIETA GEOSCIENCE, INC.

*Suppliers – Technical Report 53*, and a copy of the Plan will be submitted to the Office of the New Mexico State Engineer.

**ii. Demographics**

In the 2010 Census ([www.census.gov](http://www.census.gov)), the Eldorado area hosts a population of 6,130. The Eldorado area encompasses 20.81 square miles with an average of 294.6 persons per square mile.

**iii. Housing**

The Eldorado area consists only of single-family residences; multi-family complexes do not exist in the District and therefore will not be included in the New Mexico Office of the State Engineer Gallons per Capita per Day Calculator (NMOSE GPCD). The 2010 Census records a total of 3,100 housing units, of which 2,887 are occupied and 2,598 are owner occupied. The average persons per household is 2.1.

**iv. Climate: Temperature and Precipitation**

The Eldorado area is in a semi-arid environment, with an average precipitation of 12 inches per year. The District relies solely on ground water for its supply.

**v. Other Local Conditions**

Most of the wells are completed within formations of the Santa Fe Group or the Espinazo Volcanics; recharge is primarily mountain-front from the Sangre de Cristo Mountains. Two wells are completed within the alluvial system of Galisteo Creek, where recharge varies seasonally. The system can meet current demand, but growth of the system has been limited by an inability of the infrastructure to meet additional demand. Recent studies conducted by the District suggest that there is sufficient water availability in the aquifers, but the system is currently incapable of tapping the supply. Future demands must be met by additional wells or by importation of water.

**C. Amendments and Revisions**

This plan is a living document and the District anticipates that this Plan will be amended or revised periodically, taking into account changes in the District's water utility system and customer base, as well as changes in the technology and policy tools available for the encouragement of conservation. Any amendments or revisions to this Plan will be promptly filed in the office of the New Mexico State Engineer.

## II. Assessing Public Water Supplier Performance

### A. Data Results and Analysis: American Water Works Association (AWWA) Water Loss Control Committee (WLCC) Free Water Audit Software® Reporting Worksheet

Results of the AWWA Water Audit are in Appendix A of this Plan, and the Excel Worksheets are attached as a CD on the back cover page of this Plan.

#### i. Performance Indicators

##### a. Financial

Financial Performance Indicators revealed 10.6% of non-revenue water as a percent by volume of water supplied, and 11.8% of non-revenue water as percent by cost of operating system. The Annual cost of Apparent Losses, as defined by the AWWA to include all types of inaccuracies associated with customer metering, unauthorized consumption and systematic data handling errors, was calculated to be \$65,224; the Annual cost of Real Losses, as defined by the AWWA as physical losses from the pressurized system and storage tanks, were calculated to be \$163,020.

##### b. Operational Efficiency

System attributes calculate Apparent Losses of 3.656 million gallons/year (Mgal/year) and Real Losses of 10.002 Mgal/year with total Water Losses of 13.658 Mgal/year. Operational Efficiency Performance Indicators calculated Apparent Losses per service connection per day to be 3.45 gallons/connection/day and Real Losses per length of main per day as 210.79 gallons/mile/day. The Current Annual Real Losses (CARL) was calculated at 10.00 Mgal/year with an Infrastructure Leakage Index (ILI) of 0.32.

The Infrastructure Leakage Index should not be less than one because it is a quotient of CARL divided by Unavoidable Annual Real Losses (UARL). The UARL is a theoretical value representing the technical low limit of leakage which could be achieved if the best technology available was successfully applied to the distribution system. The UARL has not been proved valid for small systems, and will not calculate an ILI if:

$$((\text{length of mains, miles}) * 32) + \text{Number of Connections} < 3,000$$

The District has less than 3,000 service connections, and qualifies as a small system. However, the length of the mains are unusually large for a system with less than 3,000 service connections due to the large lot size of individual customers in the District. In the case of the District, Water Losses are calculated at 13.658 Mgal/year and the UARL is calculated at 31.19 Mgal/year. The difference between the volume of water produced by the District, 162.32 Mgal and water billed, 146.18 Mgal, is 16.14 Mgal,

which is almost half of the UARL calculated. The District has graded Volume from own sources as 8, or “100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/-6% accuracy” (see Appendix A).

**ii. Data Validity Score**

The Water Audit Data Validity Score is 72 out of 100.

**iii. Priority Areas for Attention**

The priority areas for attention as listed by the AWWA based on the information provided to the audit were 1.) Volume from own sources; 2.) Billed metered; and 3.) Customer metering inaccuracies.

**B. Data Results and Analysis: NMOSE Gallons per Capita per Day (GPCD) Calculator Table**

**i. Period of Study**

Complete data are available for 2011 thru 2014 and partial data are available for 2010 for Single Family Residence (SFR). Complete data are available for 2012 thru 2014 for ICI. Years with partial data were not included in the NMOSE GPCD. There are no Multi-Family Residences (MFRs) or industrial customers in the District. Results of the NMOSE GPCD are in Appendix B of this Plan, and the Excel Worksheets are attached as a CD on the back cover page of this Plan.

**ii. Average Size of Household**

The average household size on the 2010 Census is 2.1 persons per household.

**iii. Annual Single-Family Residential (SFR) GPCD**

Results from the NMOSE GPCD for SFR are listed in the Table below:

YEAR	ANNUAL SFR GPCD
2014	68.47
2013	69.85
2012	73.96
2011	71.53
2010	N/A
2009	N/A
2008	N/A

**iv. Monthly SFR GPCD**

Results from the NMOSE GPCD for SFR are listed in the Table below:

<b>Month</b>	<b>SFR GPCD</b>
January	52.55
February	49.78
March	49.24
April	68.26
May	80.98
June	90.05
July	89.25
August	92.77
September	80.89
October	65.78
November	47.22
December	52.14
<b>Year</b>	<b>2014</b>
<b>Peak/Ave</b>	<b>1.36</b>

**v. Annual Multi-Family Residential (MFR) GPCD**

There are no multi-family housing units in the District.

**vi. Industrial, Commercial, Institutional (ICI) and Other Metered**

Results from the NMOSE GPCD for ICI (2012-2014) are listed in the Table below:

<b>YEAR</b>	<b>ICI GPCD</b>
<b>2014</b>	<b>1.23</b>
<b>2013</b>	<b>1.01</b>
<b>2012</b>	<b>1.05</b>
<b>2011</b>	<b>N/A</b>
<b>2010</b>	<b>N/A</b>
<b>2009</b>	<b>N/A</b>
<b>2008</b>	<b>N/A</b>

**vii. Annual System Total GPCD**

Results from the NMOSE GPCD for SFR are listed in the Table below:

Year	SYSTEM TOTAL GPCD
2014	<b>50.36</b>
2013	<b>50.30</b>
2012	<b>43.76</b>
2011	<b>55.06</b>
2010	<b>NA</b>
2009	NA
2008	<b>NA</b>

**viii. Monthly System Total GPCD**

Results from the NMOSE GPCD for SFR (2014) are listed in the Table below:

	Single- Family Residential	Multi- Family Residential	ICI	Other Metered	Non- Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	52.55	No Data	0.87	0.00	2.93
FEB	49.78	No Data	1.36	0.00	5.76
MAR	49.24	No Data	1.57	0.00	9.44
APR	68.26	No Data	1.12	0.00	3.28
MAY	80.98	No Data	1.26	0.00	4.55
JUN	90.05	No Data	1.29	0.00	10.42
JUL	89.25	No Data	1.27	0.00	4.86
AUG	92.77	No Data	1.20	0.00	-5.78
SEP	80.89	No Data	1.49	0.00	4.86
OCT	65.78	No Data	1.36	0.00	3.75
NOV	47.22	No Data	0.94	0.00	9.00
DEC	52.14	No Data	0.97	0.00	3.66

**III. Public Involvement, Education, and Outreach**

**A. Current Education and Outreach, Continuing After Plan is Adopted**

**i. Public Information Program**

District staff is responsible for establishing and updating water conservation information for the benefit of the community, in conjunction with input from the District's COMMUNICATIONS AND PUBLIC RELATIONS (CPR) COMMITTEE and its CONSERVATION COMMITTEE. The District employs several methods of communication in an effort to

educate a wide spectrum of the community, whether or not they are customers of the water utility and/or derive their water from domestic wells or other sources. The predominant methods of communication are via the EAWSD website and *Water Notes*, the District's monthly newsletter. Other methods of communication consist of postings at strategically placed outdoor bulletin boards, a customer e-list service, notifications printed on or included with customer bills, informational brochures for new and existing customers, event-specific signage or posters, newspaper and radio announcements, and monthly Board meetings that are open to the public for attendance and comment. In addition, the District's Customer Service and Billing Department prominently displays an array of pertinent water conservation brochures and booklets produced by the New Mexico Office of the State Engineer and Santa Fe County, next to the bill pay counter.

District Board and staff members are often invited to serve as panel members for water conservation themed seminars sponsored by various community groups. The seminars are held in Eldorado at the Eldorado Community Improvement Association (ECIA) or La Tienda Performance Space or in nearby communities. Past topics have included (but are not limited to):

- Indoor and outdoor leak prevention and repair
- Various methods utilized by the District to foster water conservation in the community (i.e. tiered rate structure, installation of radio-read meters to improve accuracy of readings, implementation of water use restrictions on an as-needed basis, implementation of a water conservation surcharge (May-August) each year, for customers using 10,000+ gallons per month

In addition, handouts are made available at many community-sponsored events that cover topics such as:

- Seasonal maintenance tips for outdoor irrigation systems
- Seeking out alternative sources of water such as rainwater harvesting
- Repurposing collected water for irrigation of plants and landscaping
- Low-water use landscaping and xeriscaping
- What features to consider when purchasing low-water use appliances and plumbing fixtures for your home

## ***ii. Outreach Program Activities***

The community of Eldorado, as well as other organizations, schedules environmental fairs at various times of the year. The fairs or seminars are generally held at the ECIA, La Tienda Performance Space, the Eldorado Community School, the outdoor courtyard at the Agora Shopping Center, the Senior Center or the Vista Grande Public Library. The District is generally called upon to set up a display table with information

regarding water conservation. The table is staffed by a knowledgeable team comprised of EAWSD staff, Board members, operations technicians and/or CPR or Conservation Committee members.

### ***iii. In-School Educational Programs***

Each year, District staff is invited by the Eldorado Community School to make a presentation to elementary grades 3 through 8 regarding the importance of water conservation and ways that students can make a difference in protecting this important natural resource in their community. The presentation consists of readily comprehensible hands-on classroom activities and games that promote water conservation planning and strategies. Each grade is rotated through the presentation sequence every 45 minutes giving them ample opportunity to ask questions following an activity or game. At the end of each presentation, their teachers reinforce the conservation topics that have been presented by the District and encourage their students to view the KID'S CORNER page on EAWSD's website which features additional water conservation related facts, along with links to State and Federal websites that promote water conservation.

The District remains committed to being closely involved with any community or school event that provides an opportunity for water conservation education.

## **IV. Water Use and Unaccounted Water**

The District serves approximately 2,950 residential water customers, as well as about 50 commercial customers concentrated along the US 285 South Highway corridor. There are periodic applications for District water service from both residential and commercial developments.

In 2008, the District pumped 185.18 Mgal and delivered (metered) 149.45 Mgal which yielded a loss of 19%. In 2014, the District pumped 162.32 Mgal and delivered (metered) 142.23 Mgal. This yields a loss of 13%, which is not unusual with older systems, but represents an area in which substantial water conservation for the system may be obtained.

Primary areas of system-wide unaccounted water include:

- Infrastructure leaks
- Use of hydrants or filling of water trucks by fire department
- Flushing of system for maintenance or repair
- Illegal filling of water trucks
- Under-reporting or malfunctioning meters

Primary areas of customer water waste include:

- Leaks on customer property

- Inefficient use
- Overwatering of landscaping

Also, for planning purposes, Santa Fe County requires developers to determine a reasonable water budget for all proposed developments, including developments that incorporate structures other than single-family residences. The District takes these water budgets into account when determining the anticipated amount of water needed to supply new customers.

## **V. Water Conservation Goals**

Prioritized water conservation goals are listed and evaluated below. Goals are listed and evaluated in terms of residential, commercial and public authority, and for the water utility.

### **A. Prioritized Goals**

#### ***i. SFR Short Term (less than 5 years) Goals:***

- Achieve and maintain an average usage of no more than 60 GPCD.
- Use available communication tools, such as the District website and monthly publication “Water Notes”, for the dissemination of information regarding the water utility system and water programs to the District’s customers.
- Prevent customer leaks and encourage prompt repair.
- Encourage the use of water-efficient fixtures and appliances.
- Discourage planting of non-native vegetation.
- Encourage the use of efficient irrigation systems.
- Continue conversion to radio-read meters with the capability of producing hourly water usage charts for all customers.

#### ***ii. SFR Long Term Goals:***

- Encourage homeowners to install on-site gray water reuse systems for irrigation during spring and summer when water usage peaks.
- Encourage retrofitting homes with rain barrels or central cistern systems.

#### ***iii. ICI Short Term (less than 5 years) Goals:***

- Encourage the use of water-efficient fixtures and appliances.
- Discourage planting of non-native vegetation.
- Encourage the use of efficient irrigation systems.
- Prevent customer leaks, encourage prompt repair.
- Continue conversion to radio-read meters with the capability of producing hourly water usage charts for all customers.

#### ***iv. ICI Long Term Goals:***

- Ensure that projects and subdivisions incorporating such usage do not exceed, individually or in the aggregate, the water consumption guidelines presented to Santa Fe County and the District as a condition of project approval.

**v. *System Short Term (less than 5 years) Goals:***

- Improve system management within five years to achieve a data validity score of 80 or better.
- Reduce the average volume of unmetered water (annual physical losses) in the past four years (2011 – 2014) by 20% in the next four years (2015 – 2019).
- Maintain high construction standards for new water lines.
- Develop comprehensive leak detection program.
- Implement Pressure Zone Optimization Project designed to reduce operating pressures below 100 psi throughout the water system.
- Continue conversion to radio-read meters with the capability of producing hourly water usage charts for all customers.

**vi. *System Long Term Goals:***

- Replace the older or under-engineered parts of the system.
- Repair major leaks promptly when they are discovered.
- Replace all older meters with new radio-read meters.

**B. Evaluation of Goals**

**i. *Evaluation of Goals for Residential Water Customers***

The District’s conservation goal for residential water consumption is to achieve and maintain an average usage of no more than 60.00 GPCD; currently the GPCD (2014) is 68.47, as measured at the meter. The District believes that reduction in outdoor water usage during the summer months would cause SFR customers to achieve this goal. Winter months (October thru March) maintain a lower average GPCD of 52.79, which is estimated as the average indoor water usage. During the spring and summer months (April thru September) the GPCD increases to 83.70. Average indoor use was subtracted from the monthly GPCD to estimate outdoor usage during spring and summer months (2014):

Month	SFR GPCD	Outdoor SFR GPCD
April	68.26	15.47
May	80.98	28.19
June	90.05	37.26
July	89.25	36.46
August	92.77	39.98
September	80.89	28.10

The SRF GPCD for outdoor use from May through August averages at 30.91 GPCD, with a peak of almost 40 GPCD in August. This represents an area for water conservation. The District believes that this goal may partially be achieved with modifications to its tiered rate structure, which has been shown to be an effective water conservation method, particularly toward high-volume residential users. Education on water conservation will be directed to all users in the District. However, most District customers are already conservation-minded, and so additional water use reduction through education and individual conservation is limited. Encouraging homeowners to xeriscape their property and to install on-site gray water reuse systems for irrigation is anticipated to be the most effective to reduce usage in the spring and summer (details discussed below).

**a. Customer Leak Prevention and Repair**

Equipment failures and maintenance problems on the customer side of the meter are a significant cause of water loss from the utility system. Generally, water lost due to leaks and maintenance failures is wasted by discharge to the land surface followed by infiltration, or by direct infiltration from underground lines. Many leaks are discovered when the District’s utility operators notice a significant or sudden increase in a customer’s water usage, as measured at the meter. In such cases, customers often realize they have a leak when they receive their monthly bill or the utility operators will contact the customer to advise the customer of the apparent problem and suggest that remedial measures be taken. If it is apparent that there is a serious and ongoing loss of water on the customer side of the meter, and the customer is unavailable or fails to take action, the District will shut off water at the meter until the problem is repaired.

A particular problem that has repeatedly been experienced in the District is that, during the first freezing temperatures of late autumn or early winter, irrigation systems which have not been disconnected or drained may freeze and break. This is one example of a situation in which education can be of direct value. The District will place seasonal reminders for draining irrigation systems on the web site and in the Water Notes. Following the advice of a number of landscape professionals, the District does not recommend drip irrigation systems, due to their propensity to crack and leak, even with the best of maintenance.

Absent any dramatic increase in water usage, customer leaks may be ongoing, and in total may represent a significant waste of water, even if it is metered. Small leaks may add up to large water use over the course of a month. Experience with other water systems has shown that implementation of a tiered rate structure, such as that currently used by the District (see VII below), results in customers investigating their water use and executing repairs, even for minor leaks.

***b. Supplemental Water***

Santa Fe County has enacted an ordinance requiring all new construction to include roof catchment systems; the District will keep new customers informed of these requirements. Many homeowners have retrofitted their homes with rain barrels or central cistern systems. The District encourages such actions, but cannot provide financial assistance. For homeowners who may have difficulty installing roof catchment systems due to conflicts with their homeowners' association, the District can provide expert advice to help resolve such conflicts. The District can also recommend supportive installations such as rain chains and appropriate rain barrel designs.

The New Mexico Office of the State Engineer prohibits impoundment of runoff, either from a homeowner's property or in the arroyos. The District neither approves nor encourages such actions by our customers.

***c. Individual Water Reuse and Gray Water Systems***

Because of the high cost of water and the known limitations of the water supply, the District is aware that some of its residential customers have installed water reuse systems to provide non-potable water for irrigation on their property.

The District is not aware of any water reuse systems presently installed by customers in its service area that would supply water sufficiently purified to be used for potable water supply. To the extent such systems are available and affordable, the District will encourage their use by individual customers, subject to appropriate safeguards to ensure no possibility of cross-connection with the District's water supply system.

Some District customers, both residential and commercial, have installed water reuse systems to provide non-potable water, either as treated septic water or gray water, for on-site irrigation and other uses. The District has been provided information by some of the homeowners who have installed such systems, and the results have reportedly been quite satisfactory. The District intends to develop information from customers who have installed these systems and from the suppliers of them, and make that information available to its customers as part of the District's education efforts. The most critical component of a septic treatment system is an included maintenance contract, and District educational materials will emphasize this point.

**d. *Low-Water-Use Landscaping and Efficient Irrigation***

Eldorado is a relatively low-density development, with a minimum lot size of 1 acre, in a semi-arid area. Some subdivisions served by the District have larger minimum lot sizes, in some subdivisions as large as 12.5 acres. Consequently, very few if any residential customers of the District irrigate their entire building lot and many customers do very little outdoor irrigation, relying instead on native vegetation that is left undisturbed except in the immediate vicinity of the residence. However, there are some residential customers, identifiable by their high water usage, the seasonality of the usage, and simply by observing their property, who irrigate significant areas of non-native vegetation with high water consumption. The District does not encourage the planting of such non-native vegetation, but does not have authority specifically to prohibit such plantings.

**e. *Water-Efficient Fixtures and Appliances***

The District encourages the use of water-efficient fixtures and appliances, and will incorporate information regarding water-efficient fixtures and appliances in its educational materials, on its web site, and as articles in the monthly Water Notes newsletter that arrives with the water bills. Further, the District supports and encourages Santa Fe County building code requirements for water efficiency in construction, including low flow toilets and shower heads, water efficient appliances, and fire suppression sprinkler system.

**ii. *Evaluation of Goals for Commercial, Industrial and Institutional Customers***

Because of the variability among commercial and public authority customers, it is difficult to set a water consumption goal that would be reasonably applicable to all such water users. Therefore, the District's conservation goal for commercial and public authority users will be to ensure that projects and subdivisions incorporating such usage do not exceed, individually or in the aggregate, the water consumption guidelines presented to Santa Fe County and the District as a condition of project approval. In the event that a development exceeds the water usage set forth in its planning submittals, the District will work with the landowners and tenants to develop methodologies and procedures to reduce the water consumption and achieve the goals described when the development was approved.

**a. *Water-Efficient Commercial and Industrial Water-Use Processes***

Because of the relatively small number of commercial enterprises served by the District, it is unlikely that significant conservation advances can be achieved by directly addressing the water-use processes of existing commercial enterprises. However, the District will work cooperatively with individual commercial and public authority

customers, particularly relatively high water users such as schools and shopping centers, to encourage the use of best management practices for the conservation of water by those customers. The District also intends to cooperate with the County of Santa Fe in developing and enforcing appropriate standards for conservation of water by commercial and institutional water users, as well as ensuring all required roof catchment systems be properly installed and utilized.

***b. Low-Water-Use Landscaping and Efficient Irrigation***

At present, the District has no commercial customers with extensive plantings of non-native vegetation. However, it is possible that future applicants for commercial water service may seek to install larger areas of non-native plants. Santa Fe County imposes significant limitations on such plantings as a condition of site development approval by the County, and the District therefore believes that the County planning process will effectively require the use of drought-tolerant native or other xeric vegetation and efficient irrigation systems for new commercial development. The County also often requires landscaping as part of commercial permit approvals. The District intends to cooperate with the County in all permit requirements, applicable to all development, which will encourage conservation. However, if in any particular case the District is not confident that the County's planning process has effectively prevented excess water use, the District may impose its own limitations as a condition of providing water to a commercial development.

***c. Water-Efficient Fixtures and Appliances***

The District encourages the use of water-efficient fixtures and appliances, and will incorporate information regarding water-efficient fixtures and appliances in its educational materials, on its web site, and as articles in the monthly Water Notes newsletter that arrives with the water bills. Further, the District supports and encourages Santa Fe County building code requirements for water efficiency in construction, including low flow toilets and shower heads, water efficient appliances, and fire suppression sprinkler system.

***iii. Evaluation of Goals for the Water Utility***

The District's primary goal with regard to water conservation by the District itself is to reduce the volume of water which is pumped from the aquifer, specifically unmetered (that is, not delivered to a paying customer and thus lost for use). As previously noted, this includes water used for fire suppression, testing of hydrants, flushing of lines, and other unmetered losses.

A program developed in cooperation with the fire department to meter and/or reasonably gauge water flow during hydrant testing and flushing will provide data to gauge the unaccounted water in this area. Once volume estimates are compiled, the

District will further work with the fire department to implement a program to minimize the amount of water needed for proper hydrant testing and flushing.

The District estimates that about 2% of the water produced is used for meter testing and line flushing. A program similar to that conducted with the fire department will be implemented with Ch2M Hill OMI, the system operator, to produce data and a water minimization program for meter testing and line flushing.

Pertaining to the AWWA results, the District will address metering volume from own sources by identifying meters outside of a +/-3% accuracy and proposing a plan to replace such meters. The District will also address billed metered and customer metered inaccuracies by continuing the radio meter replacement plan discussed below.

**a. *Water Reuse Systems***

There is no community wastewater collection and treatment system in any of the area served by the District. All customers of the District, residential and commercial, rely on septic systems (occasionally in conjunction with water reuse systems required as a condition of development approval). The District is not aware of any present health hazards associated with the use of septic systems in Eldorado. The District at present has no reliable information on the extent, if any, to which discharge from septic systems eventually may reach the water table and replenish the aquifer.

The District has investigated the possibility of collecting wastewater for treatment either in a central treatment facility or in a number of localized treatment facilities (“pods”) serving smaller areas of the community. If such a collection and treatment system or systems were to be built, they would possibly allow for reinjection of treated water into the aquifer or (subject to applicable regulations and water quality standards) into the District’s water utility supply system, or for piping back to the residents treated effluent for outdoor water use. Such return water could be metered and a charge imposed to help pay for operation and maintenance. Because of its cost and economic feasibility, the District has no plans to develop such a system in the foreseeable future.

**b. *Distribution System Leak Prevention and Repair***

The District has adopted construction standards for new water lines and, particularly, for backfill of trenches. Over the long term, the District anticipates that these standards will result in improved integrity of the water distribution system and a reduction in leaks from the system.

Major leaks are repaired promptly when discovered. Any identified leaks in the infrastructure are also repaired on a priority basis. For example, a series of air relief valves in the southern portion of the system, which were under-sized and the cause of frequent leaks, have been replaced with properly-sized valves.

It is probable that there are existing minor leaks, especially from the older or under-engineered parts of the system. Therefore, an effective system-wide water conservation program must include a comprehensive leak detection program to identify those parts of the infrastructure in need of repair or replacement. All new infrastructure construction requires looping of distribution lines, where possible, for greater service reliability and to eliminate the need for flushing of dead-end lines.

The District has initiated a Pressure Zone Optimization Project, which has a goal of reducing system pressure throughout the District to below 100 psi. The District hopes and expects that this Project will reduce water loss from existing small leaks and help prevent future line breaks through reduced and even distribution of operating pressure.

A study of the water systems in Tucson and Phoenix has shown that older water meters under-record the actual water flow, creating a potentially significant misrepresentation of metered water use. In addition, older meters must be read visually, which requires substantially more staff time. The District installs radio-read meters on all new connections, and has embarked on a program, as funding permits, to replace older meters with new radio-read meters. The District is also investigating BEACON®, a new product by Badger Meter that would allow the homeowner to access a password protected website which tracks and displays hourly water use and provides customizable alerts if a meter suddenly experiences large flows.

***c. Dissemination of Information Regarding Water-Use Efficiency Measures***

The District has established both a Conservation and a Communications Committee. District staff, interested customers, and members of the District Board of Directors serve on both of these committees. These committees will work together to disseminate information regarding water conservation and related issues. Jointly, these committees will establish programs and use available communication tools, such as the District web site, for the dissemination of information regarding the water utility system and water programs to the District's customers.

***d. Low-Water-Use Landscaping and Efficient Irrigation***

As with low-flow interior fixtures, the District encourages the use of efficient irrigation systems by all of its customers. The District also has the authority to limit the times of outdoor water use. The District encourages xeriscape landscaping techniques, and the majority of the District's customers primarily landscape with the native vegetation. The District has dedicated a page on the website to xeriscape information, which includes links to several online sites with additional water-wise gardening information. Santa Fe County has enacted an ordinance requiring all new construction to include roof catchment systems. The District will keep new customers informed of these

requirements and encourage all homeowners to install roof catchment systems for irrigation purposes.

## **VI. Best Management Practices**

There are a number of simple procedures that any homeowner can undertake, in order to promote water conservation as a daily practice. These include:

- Water no more than three days a week.
- Water only in the early morning or late evening.
- Check water system for leaks.
- Wrap hot water pipes and water heaters with insulating material or install a hot water recirculation pump to reduce the time it takes for hot water to reach the tap.
- Check water requirements for various makes and models when considering purchasing any new appliances, and purchase water-saving brands.
- Use moisture meter to determine when houseplants need water.
- Flush toilets only when necessary and do not use toilets as trash receptacles.
- Reduce water level per flush by installing a water displacement device in toilet (such as a half-gallon jug filled with water), or replacing an older toilet with a low-water use toilet.
- When building or remodeling bathrooms, use low volume flush toilets.
- Install aerators on sink faucets.
- Install water-saving shower heads
- Take showers instead of baths; take short showers.
- Do not let water run while brushing teeth or other activities.
- Collect water from tap and shower while waiting for hot water and use for plants and pets.
- Sweep with a broom instead of a hose to clean paved surfaces.
- Use a pail of water, rather than a hose, when washing cars.
- Learn and fully utilize the principles of xeriscape and planting native vegetation.
- Use mulch and other techniques for treating the soil to reduce run-off and reduce the watering needs of the landscaping.

For new home construction, Santa Fe County has passed an ordinance requiring hot water recirculation pumps or instant hot water devices. The District supports and will encourage such measures.

Our ICI customers can also undertake simple Best Management Practices in order to promote water conservation as a daily practice. These include:

- Check water system for leaks.
- Replace all landscaping with xeriscape, native vegetation.
- Be sure water heater thermostat is not set too high.
- Use moisture meter to determine when indoor plants need water.
- Replace older toilets with a low-water use toilet and public restrooms sinks with automatic shut off faucets.

- Place signs in all public bathrooms reminding clientele and employees to be mindful of their water use.
- When building or remodeling bathrooms, use low volume flush toilets.
- Use mulch and other techniques for treating the soil to reduce run-off and reduce the watering needs of the landscaping.
- Utilize materials provided by the NMOSE such as A Water Conservation Guide for Commercial, Institutional, and Industrial Users, July 1999 and Restaurant Audit Kit to self-assess your business.

To improve the AWWA Water Audit validity score, the District plans to implement the following Best Management Practices:

- Continue to provide customers with Water Notes, the monthly newsletter informing all water district customers of the latest improvement projects and conservation methods.
- Replace all meters with radio meters to improve accuracy for water loss evaluation.
- Investigate water reuse options and funding opportunities.
- Review Emergency Action Plan for Drought Management yearly at board meetings.
- Develop and implement an irrigation management information system to improve irrigation efficiency at all public landscape irrigation sites.

## **VII. Incentives to Implement Water Use Efficiency Techniques**

The District currently does not offer incentives in the form of rebates to customers for implementing water-use efficiency techniques. The tiered rate structure, however, does reward customers with a lower price per unit of water for conservative water-use practices (Appendix C; Section VII). The District is interested in offering incentives for implementing water-use efficiency techniques, but charges for water service are already among the highest in the State of New Mexico, and the District lacks funding for development and implementation of incentive plans. The District will actively search for funding through State and Federal grants to reward customers for water-use efficiency through rebate programs.

## **VIII. Water-Rate Structures to Encourage Water-Use Efficiency**

The District's commodity charges for water service are among the highest in the State of New Mexico, and are expected to remain relatively high during the next ten years, because the District must cover the debt incurred to finance the \$12,000,000 cost of acquiring the water utility, as well as ongoing expenses for water utility improvement and maintenance. Another reason for the relatively high charges for water service is that the entire area served by the District is relatively sparsely developed, with a density approximately one-eighth that of a typical suburban area, so that there is a very large amount of infrastructure needed to serve a relatively modest number of customers. To the extent that demand for water may be economically elastic, the District believes that the cost of water may, at least in the short term, be one of the most effective tools for encouraging water conservation.

In 2007, the District submitted a request to the Public Regulatory Commission to increase water use rates and implement a tiered rate structure. A study of western US cities has demonstrated that a tiered rate structure is one of the most effective water conservation tools for a water system. In April, 2011 the first Phase II Rates became effective (Appendix C). In October 2013, the Board passed Resolution No. 14-10-01, Resolution to Establish a Water Conservation Surcharge (Appendix C). The resolution approved a water conservation surcharge in the form of a rate increase of 50% in each tier over 10,000 gallons per month for residential customers, and a rate increase of 50% to all usage in excess of 200% of the average monthly water use for that customer for the six month period which includes the previous October through April for commercial customers. The water conservation surcharge applies only during the months of May through August, when usage increases in both the residential and commercial sectors.

## **IX. Drought Management Plan**

The District has in place a Water Restrictions and Alert Management Plan (WRAMP), which includes three stages with increasing restrictions on water use:

- 1.) Stage 0: "Normal Stage," in effect at all times when the other stages are not in effect.
- 2.) Stage 1: "Guarded Conditions," in effect when there is a strong expectation that there will soon be insufficient precipitation to meet outdoor water usage and/or that the District occasionally may not be able to produce water at the same rate it is being consumed.
- 3.) Stage 2: "Severe Conditions," in effect when, for an extended period, the District cannot produce water at a rate to meet consumption or when water storage declines to dangerous levels and they cannot be restored to safe levels. Dangerous levels are determined when water storage falls to 60 percent of capacity. Stage 2 is lifted when water storage reaches 90 percent of capacity and stays above 75 percent for 30 days or the end of the billing cycle, whichever is greater.

Conservation measures are associated with each Water Alert Stage:

### Stage 0:

- Normal or typical conservation measures are to be practiced by all; see <http://www.eldoradowaterdistrict.com/conservation/index.php> for details.
- Water Conservation Surcharge is in effect during the months of May through August (see above, Appendix C).

### Stage 1:

- Water Alert Stage 1 signs posted at subdivision entrances, the Eldorado Community Center, and the Agora shopping center.
- Adhere to odd/even watering that restricts watering to three days per week.
- No watering of lawns.
- No outdoor watering between 9:00 a.m. and 6:00 p.m.

- No washing of outdoor hard surfaces or vehicles.
- Postpone new outdoor planting until Stage 1 is lifted.
- Turn off all decorative water devices.
- Do not add water from your home to swimming pools, spas, ponds, etc.
- Reduce watering of recreation fields.

Stage 2:

- Adhere to odd/even watering that restricts watering to one day per week.
- Adhere to Stage 1 restrictions.
- No water may be used for construction purposes.

The District can impose these or other restrictions as deemed appropriate in the event of conditions that appear to threaten the adequacy of the water supply. The District can also impose any or all of these limitations as mandatory conditions of water use during a serious drought such as that envisioned under Water Alert Stage 2. Enforcement and penalties for non-compliance are outlined in the WRAMP (Appendix D).

A full listing of water restrictions under Stage 1 and Stage 2 are posted on the District's web site and in Appendix D of this Plan. When a Stage alert is issued, the next issue of Water Notes will include the Stage restrictions.

## **X. State and Regional Water Plans**

The New Mexico State Water Plan was adopted by the New Mexico Interstate Stream Commission on December 17, 2003. The State Water Plan sets goals and priorities on a state-wide level, and proposes strategies for achieving those goals at the same state-wide level.

On a regional basis, the Jemez y Sangre Regional Water Plan, covering portions of Santa Fe, Rio Arriba, Los Alamos, and Sandoval counties, was adopted by the Jemez y Sangre Water Planning Council on March 24, 2003. Representatives of the District participate actively on the Jemez y Sangre Water Planning Council, and were active in the development of the Regional Water Plan. The Jemez y Sangre Regional Water Plan provides a great volume of data on actual and anticipated water use in the Jemez y Sangre region, and sets forth general goals and recommended policies for the use of water suppliers in the region. The District is in the North Galisteo Creek Sub-Basin as defined in the Jemez y Sangre Regional Water Plan. The District's water utility system also derives some of its water supply from wells located in the northern part of the South Galisteo Creek Sub-Basin as defined in the Regional Water Plan, and supplies water to some residential customers in that area as well.

Neither the State Water Plan nor the Regional Water Plan sets forth detailed goals or recommended actions at the level of the individual community or water utility. However, both plans, particularly the Regional Water Plan, describe many of the approaches that may be useful for the operators of small and medium-sized water utilities in meeting conservation goals. The District has reviewed both the State Water Plan and the Regional Water Plan. This Water Conservation Plan adopts some of the

recommendations made in those plans, and is entirely consistent with the general goals and policies set forth in them.

#### **XI. Changes in the Water Conservation Plan**

The District plans to review and revise this Water Conservation Plan at least once every five (5) years, or more often as necessary and appropriate. All revisions must receive approval of the Board.

#### **XII. Program for Implementation**

The plans and programs described in this Plan, to the extent they are not already in place, will be implemented as promptly as is reasonable and consistent with good practice and with the availability of funds.

## **Appendix A: AWWA Audit Results**

# AWWA Free Water Audit Software v5.0

American Water Works Association Copyright © 2014, All Rights Reserved.

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

## Please begin by providing the following information

Name of Contact Person:

Email Address:

Telephone | Ext.:

Name of City / Utility:

City/Town/Municipality:

State / Province:

Country:

Year:

Audit Preparation Date:

Volume Reporting Units:

PWSID / Other ID:

## The following guidance will help you complete the Audit

All audit data are entered on the [Reporting Worksheet](#)

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt:   Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

## The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

<p><b><u>Instructions</u></b></p> <p>The current sheet. Enter contact information and basic audit details (year, units etc)</p>	<p><b><u>Reporting Worksheet</u></b></p> <p>Enter the required data on this worksheet to calculate the water balance and data grading</p>	<p><b><u>Comments</u></b></p> <p>Enter comments to explain how values were calculated or to document data sources</p>	<p><b><u>Performance Indicators</u></b></p> <p>Review the performance indicators to evaluate the results of the audit</p>	<p><b><u>Water Balance</u></b></p> <p>The values entered in the Reporting Worksheet are used to populate the Water Balance</p>	<p><b><u>Dashboard</u></b></p> <p>A graphical summary of the water balance and Non-Revenue Water components</p>
<p><b><u>Grading Matrix</u></b></p> <p>Presents the possible grading options for each input component of the audit</p>	<p><b><u>Service Connection Diagram</u></b></p> <p>Diagrams depicting possible customer service connection line configurations</p>	<p><b><u>Definitions</u></b></p> <p>Use this sheet to understand the terms used in the audit process</p>	<p><b><u>Loss Control Planning</u></b></p> <p>Use this sheet to interpret the results of the audit validity score and performance indicators</p>	<p><b><u>Example Audits</u></b></p> <p>Reporting Worksheet and Performance Indicators examples are shown for two validated audits</p>	<p><b><u>Acknowledgements</u></b></p> <p>Acknowledgements for the AWWA Free Water Audit Software v5.0</p>

If you have questions or comments regarding the software please contact us via email at: [wic@awwa.org](mailto:wic@awwa.org)



# AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0  
American Water Works Association  
Copyright © 2014, All Rights Reserved.

?	Click to access definition
+	Click to add a comment

Water Audit Report for: **Eldorado Area Water and Sanitation District (EAWSD)**  
 Reporting Year: **2014**      **1/2014 - 12/2014**

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

**All volumes to be entered as: MILLION GALLONS (US) PER YEAR**

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

### WATER SUPPLIED

----- Enter grading in column 'E' and 'J' ----->

Volume from own sources:	+	?	8	162.320	MG/Yr
Water imported:	+	?	n/a	0.000	MG/Yr
Water exported:	+	?	n/a	0.000	MG/Yr

### Master Meter and Supply Error Adjustments

Pcnt:	+	?	8	2.00%	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
Value:	+	?			<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
	+	?			<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr

Enter negative % or value for under-registration  
 Enter positive % or value for over-registration

**WATER SUPPLIED:** 159.137 MG/Yr

### AUTHORIZED CONSUMPTION

Billed metered:	+	?	7	142.229	MG/Yr
Billed unmetered:	+	?	n/a	0.000	MG/Yr
Unbilled metered:	+	?	n/a	0.000	MG/Yr
Unbilled unmetered:	+	?	7	3.250	MG/Yr

Unbilled Unmetered volume entered is greater than the recommended default value

**AUTHORIZED CONSUMPTION:** 145.479 MG/Yr

Click here: ?  
for help using option buttons below

Pcnt:	<input type="radio"/>	<input checked="" type="radio"/>	3.250	MG/Yr
-------	-----------------------	----------------------------------	-------	-------

Use buttons to select percentage of water supplied  
OR value

Pcnt:	0.25%	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
-------	-------	----------------------------------	-----------------------	--	-------

Value:	2.00%	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr
	0.25%	<input checked="" type="radio"/>	<input type="radio"/>		MG/Yr

### WATER LOSSES (Water Supplied - Authorized Consumption)

13.658 MG/Yr

#### Apparent Losses

Unauthorized consumption: 0.398 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+	?	6	2.903	MG/Yr
Systematic data handling errors:	+	?		0.356	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

**Apparent Losses:** 3.656 MG/Yr

#### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 10.002 MG/Yr

**WATER LOSSES:** 13.658 MG/Yr

### NON-REVENUE WATER

**NON-REVENUE WATER:** 16.908 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

Length of mains:	+	?	9	130.0	miles
Number of <u>active AND inactive</u> service connections:	+	?	10	2,907	
Service connection density:	?			22	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 10 75.0 psi

### COST DATA

Total annual cost of operating water system:	+	?	7	\$2,382,460	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	7	\$17.84	\$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+	?	7	\$16,298.36	\$/Million gallons <input type="checkbox"/> Use Customer Retail Unit Cost to value real losses

### WATER AUDIT DATA VALIDITY SCORE:

\*\*\* YOUR SCORE IS: 72 out of 100 \*\*\*

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

### PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies



## AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

Water Audit Report for: Eldorado Area Water and Sanitation District (EAWSD)  
 Reporting Year: 2014 1/2014 - 12/2014

\*\*\* YOUR WATER AUDIT DATA VALIDITY SCORE IS: 72 out of 100 \*\*\*

### System Attributes:

	Apparent Losses:	3.656	MG/Yr
+	Real Losses:	10.002	MG/Yr
=	<b>Water Losses:</b>	<b>13.658</b>	MG/Yr

? Unavoidable Annual Real Losses (UARL): 31.19 MG/Yr

Annual cost of Apparent Losses: \$65,224

Annual cost of Real Losses: \$163,020 Valued at **Variable Production Cost**  
 Return to Reporting Worksheet to change this assumption

### Performance Indicators:

Financial: { Non-revenue water as percent by volume of Water Supplied: 10.6%  
 Non-revenue water as percent by cost of operating system: 11.8% Real Losses valued at Variable Production Cost

Operational Efficiency: { Apparent Losses per service connection per day: 3.45 gallons/connection/day  
 Real Losses per service connection per day: N/A gallons/connection/day  
 Real Losses per length of main per day\*: 210.79 gallons/mile/day  
 Real Losses per service connection per day per psi pressure: N/A gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): 10.00 million gallons/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]: 0.32

\* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



# AWWA Free Water Audit Software: User Comments

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

<b>General Comment:</b>	
Audit Item	Comment
<a href="#">Volume from own sources:</a>	
<a href="#">Vol. from own sources: Master meter error adjustment:</a>	The degree of inaccuracy assigned to the Master meter error adjustment is 2% of unaccounted for water. A 10% difference exists between water supplied and water billed. The District estimates that 2% of that water is used for meter testing and line flushing (3.25 Mgal). 4% of the remaining unaccounted for water is assumed to be "leaks" in the system, and 4% was assumed to be meter inaccuracies, split evenly between customer meters and the utilities meters.
<a href="#">Water imported:</a>	
<a href="#">Water imported: master meter error adjustment:</a>	
<a href="#">Water exported:</a>	
<a href="#">Water exported: master meter error adjustment:</a>	
<a href="#">Billed metered:</a>	
<a href="#">Billed unmetered:</a>	
<a href="#">Unbilled metered:</a>	

Audit Item	Comment
<a href="#">Unbilled unmetered:</a>	District estimates that 2% of water produced goes to meter testing and line flushing.
<a href="#">Unauthorized consumption:</a>	
<a href="#">Customer metering inaccuracies:</a>	
<a href="#">Systematic data handling errors:</a>	
<a href="#">Length of mains:</a>	130 miles
<a href="#">Number of active AND inactive service connections:</a>	
<a href="#">Average length of customer service line:</a>	
<a href="#">Average operating pressure:</a>	From EAWSD model: 75 psi is average operating pressure.
<a href="#">Total annual cost of operating water system:</a>	Total annual operating expenses for 2014 were \$2,088,672. If bond interest and administrative costs are added, the total is \$2,382,460.
<a href="#">Customer retail unit cost (applied to Apparent Losses):</a>	
<a href="#">Variable production cost (applied to Real Losses):</a>	



# AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

Water Audit Report for:	Eldorado Area Water and Sanitation District (EAWSD)	
Reporting Year:	2014	1/2014 - 12/2014
Data Validity Score:	72	

		Water Exported <i>0.000</i>	Billed Water Exported			Revenue Water <b>0.000</b>
Own Sources (Adjusted for known errors)			Authorized Consumption  <b>145.479</b>	Billed Authorized Consumption  <b>142.229</b>	Billed Metered Consumption (water exported is removed)  <b>142.229</b>	Revenue Water  <b>142.229</b>
				Unbilled Authorized Consumption  <b>3.250</b>	Billed Unmetered Consumption  <b>0.000</b>	Non-Revenue Water (NRW)
Water Imported	System Input <b>159.137</b>	Water Supplied  <b>159.137</b>	Water Losses  <b>13.658</b>	Apparent Losses  <b>3.656</b>	Unbilled Metered Consumption  <b>0.000</b>	<b>16.908</b>
				Real Losses  <b>10.002</b>	Unbilled Unmetered Consumption  <b>3.250</b>	
					Unauthorized Consumption  <b>0.398</b>	
					Customer Metering Inaccuracies  <b>2.903</b>	
				Systematic Data Handling Errors  <b>0.356</b>		
				Leakage on Transmission and/or Distribution Mains <i>Not broken down</i>		
				Leakage and Overflows at Utility's Storage Tanks <i>Not broken down</i>		
				Leakage on Service Connections <i>Not broken down</i>		



# AWWA Free Water Audit Software: Dashboard

WAS v5.0

American Water Works Association.  
Copyright © 2014, All Rights Reserved.

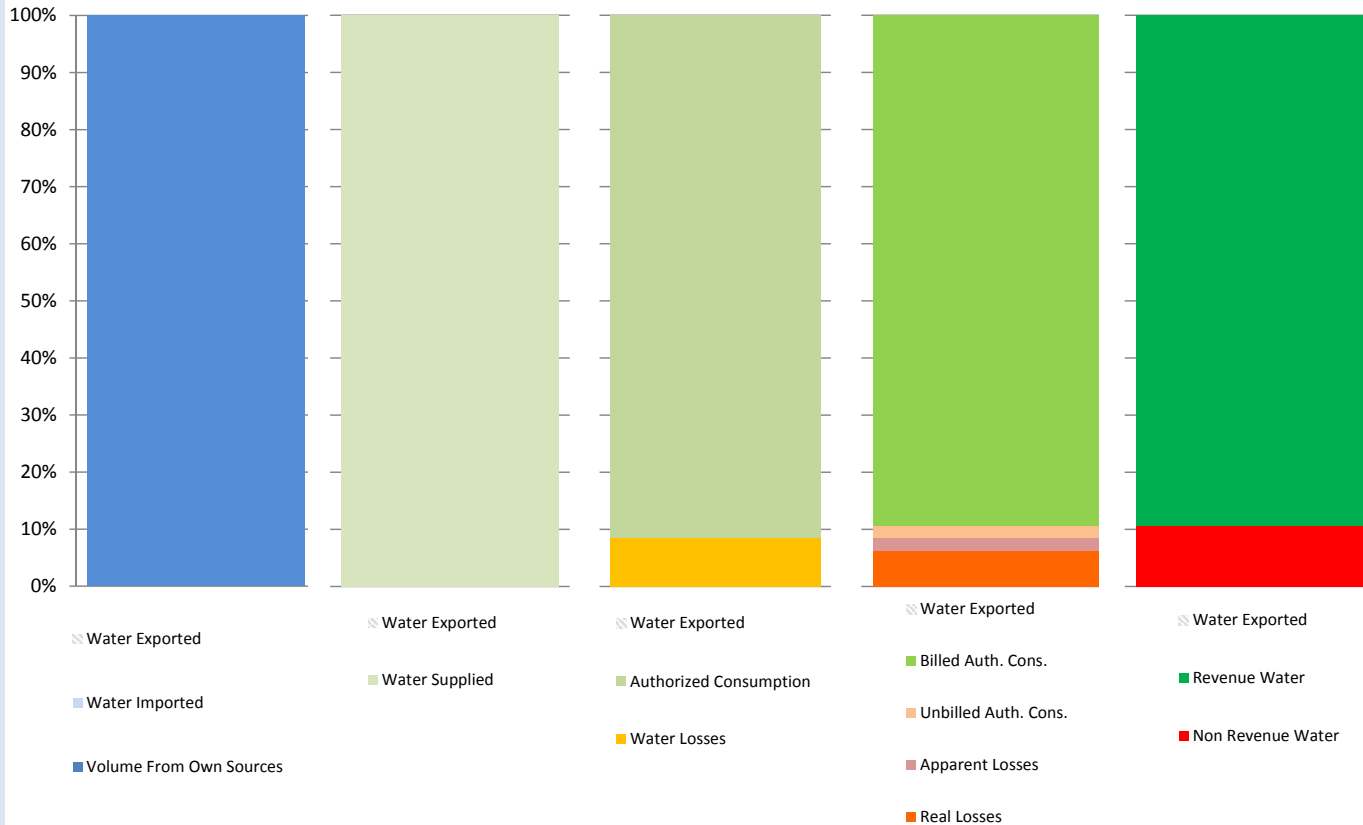
The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

Water Audit Report for: **Eldorado Area Water and Sanitation District (EAWSD)**

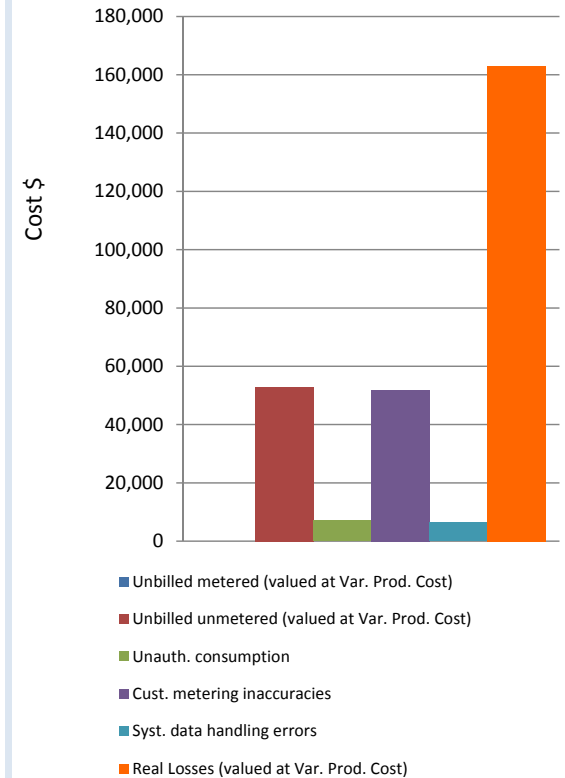
Reporting Year: **2014**    **1/2014 - 12/2014**

Data Validity Score: **72**

- Show me the VOLUME of Non-Revenue Water
- Show me the COST of Non-Revenue Water



Total Cost of NRW = \$281,213



# AWWA Free Water Audit Software: Grading Matrix

WAS 5.0

American Water Works Association. Copyright © 2014, All Rights Reserved.

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
<b>WATER SUPPLIED</b>											
<b>Volume from own sources:</b>	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, <u>at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.</u>	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Volume from own Sources" component:		<u>to qualify for 2:</u> Organize and launch efforts to collect data for determining volume from own sources	<u>to qualify for 4:</u> Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		<u>to qualify for 8:</u> Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing and calibration of related instrumentation for all meter installations. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to further improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system; tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component, and data gaps in the archived data are corrected on at least a weekly basis.	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data gaps in the archived data are corrected on a daily basis.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results are reviewed each business day. Tight accountability controls ensure that all data gaps that occur in the archived flow data are quickly detected and corrected. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature.	<u>to qualify for 4:</u> Install automatic datalogging equipment on production meters. Complete installation of level instrumentation at all tanks/storage facilities and include tank level data in automatic calculation routine in a computerized system. Construct a computerized listing or spreadsheet to archive input volumes, tank/storage volume changes and import/export flows in order to determine the composite "Water Supplied" volume for the distribution system. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly production meter data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Use daily net storage change to balance flows in calculating "Water Supplied" volume. Necessary corrections to data errors are implemented on a weekly basis.		<u>to qualify for 8:</u> Ensure that all flow data is collected and archived on at least an hourly basis. All data is reviewed and detected errors corrected each business day. Tank/storage levels variations are employed in calculating balanced "Water Supplied" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		<u>to qualify for 10:</u> Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters. Data is reviewed and corrected each business day.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits. Stay abreast of new and more accurate water level instruments to better record tank/storage levels and archive the variations in storage volume. Keep current with SCADA and data management systems to ensure that archived data is well-managed and error free.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component: <i>(Note: usually the water supplier selling the water - "the Exporter" - to the utility being audited is responsible to maintain the metering installation measuring the imported volume. The utility should coordinate carefully with the Exporter to ensure that adequate meter upkeep takes place and an accurate measure of the Water Imported volume is quantified.)</i>		<u>to qualify for 2:</u> Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	<u>To qualify for 4:</u> Locate all imported water sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters.		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all imported water meters, planning for both regular meter accuracy testing and calibration of the related instrumentation. Continue installation of meters on unmetered imported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters and conduct calibration of related instrumentation at least annually. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Continue to conduct calibration of related instrumentation on a semi-annual basis. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Water imported master meter and supply error adjustment:	Select n/a if the Imported water supply is unmetered, with Imported water quantities estimated on the billing invoices sent by the Exporter to the purchasing Utility.	Inventory information on imported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with water Exporter(s) are missing or written in vague language concerning meter management and testing.	No automatic datalogging of imported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Imported supply metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis by the Exporter with necessary corrections implemented. Meter data is adjusted by the Exporter when gross data errors are detected. A coherent data trail exists for this process to protect both the selling and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly Imported supply metered data is logged automatically & reviewed on at least a weekly basis by the Exporter. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error confirmed by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling and the purchasing Utility.	Conditions between 6 and 8	Continuous Imported supply metered flow data is logged automatically & reviewed each business day by the Exporter. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the Exporter. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling and purchasing Utility at least once every five years.
Improvements to attain higher data grading for "Water imported master meter and supply error adjustment" component:		<u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the selling and purchasing Utility.	<u>to qualify for 4:</u> Install automatic datalogging equipment on Imported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the Exporters to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.		<u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly Imported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.		<u>to qualify for 8:</u> Ensure that all Imported supply metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.		<u>to qualify for 10:</u> Conduct accountability checks to confirm that all Imported supply metered data is reviewed and corrected each business day by the Exporter. Results of all meter accuracy tests and data corrections should be available for sharing between the Exporter and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreement between the selling and the purchasing Utility, at least every five years.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the Exporter to help identify meter replacement needs. Keep communication lines with Exporters open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component:  (Note: usually, if the water utility being audited sells (Exports) water to a neighboring purchasing Utility, it is the responsibility of the utility exporting the water to maintain the metering installation measuring the Exported volume. The utility exporting the water should ensure that adequate meter upkeep takes place and an accurate measure of the Water Exported volume is quantified.)		<u>to qualify for 2:</u> Review bulk water sales agreements with purchasing utilities; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	<u>To qualify for 4:</u> Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all exported water meters. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water exported master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its exported supply interconnections.	Inventory information on exported meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined. Written agreement(s) with the utility purchasing the water are missing or written in vague language concerning meter management and testing.	No automatic datalogging of exported supply volumes; daily readings are scribed on paper records without any accountability controls to confirm data accuracy and the absence of errors and data gaps in recorded volumes. Written agreement requires meter accuracy testing but is vague on the details of how and who conducts the testing.	Conditions between 2 and 4	Exported metered flow data is logged automatically in electronic format and reviewed at least on a monthly basis, with necessary corrections implemented. Meter data is adjusted by the utility selling (exporting) the water when gross data errors are detected. A coherent data trail exists for this process to protect both the utility exporting the water and the purchasing Utility. Written agreement exists and clearly states requirements and roles for meter accuracy testing and data management.	Conditions between 4 and 6	Hourly exported supply metered data is logged automatically & reviewed on at least a weekly basis by the utility selling the water. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and to correct for error found by meter accuracy testing. Any data gaps in the archived data are detected and corrected during the weekly review. A coherent data trail exists for this process to protect both the selling (exporting) utility and the purchasing Utility.	Conditions between 6 and 8	Continuous exported supply metered flow data is logged automatically & reviewed each business day by the utility selling (exporting) the water. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and any error confirmed by meter accuracy testing. Any data errors/gaps are detected and corrected on a daily basis. A data trail exists for the process to protect both the selling (exporting) Utility and the purchasing Utility.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically records data which is reviewed each business day by the utility selling (exporting) the water. Tight accountability controls ensure that all error/data gaps that occur in the archived flow data are quickly detected and corrected. A reliable data trail exists and contract provisions for meter testing and data management are reviewed by the selling Utility and purchasing Utility at least once every five years.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water exported master meter and supply error adjustment" component.		<p><u>to qualify for 2:</u> Develop a plan to restructure recordkeeping system to capture all flow data; set a procedure to review flow data on a daily basis to detect input errors. Obtain more reliable information about existing meters by conducting field inspections of meters and related instrumentation, and obtaining manufacturer literature. Review the written agreement between the utility selling (exporting) the water and the purchasing Utility.</p>	<p><u>to qualify for 4:</u> Install automatic datalogging equipment on exported supply meters. Set a procedure to review this data on a monthly basis to detect gross anomalies and data gaps. Launch discussions with the purchasing utilities to jointly review terms of the written agreements regarding meter accuracy testing and data management; revise the terms as necessary.</p>		<p><u>to qualify for 6:</u> Refine computerized data collection and archive to include hourly exported supply metered flow data that is reviewed at least on a weekly basis to detect specific data anomalies and gaps. Make necessary corrections to errors/data errors on a weekly basis.</p>		<p><u>to qualify for 8:</u> Ensure that all exported metered flow data is collected and archived on at least an hourly basis. All data is reviewed and errors/data gaps are corrected each business day.</p>		<p><u>to qualify for 10:</u> Conduct accountability checks to confirm that all exported metered flow data is reviewed and corrected each business day by the utility selling the water. Results of all meter accuracy tests and data corrections should be available for sharing between the utility and the purchasing Utility. Establish a schedule for a regular review and updating of the contractual language in the written agreements with the purchasing utilities, at least every five years.</p>		<p><u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters; work with the purchasing utilities to help identify meter replacement needs. Keep communication lines with the purchasing utilities open and maintain productive relations. Keep the written agreement current with clear and explicit language that meets the ongoing needs of all parties.</p>
<b>AUTHORIZED CONSUMPTION</b>											
Billed metered:	n/a (not applicable). Select n/a if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billing exists for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billing for others. Manual meter reading is conducted, with less than 50% meter read success rate, remaining accounts consumption is estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based, billing from meter reads; flat or fixed rate billing for remaining accounts. Manual meter reading is conducted with at least 50% meter read success rate; consumption for accounts with failed reads is estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters are replaced only upon complete failure. Computerized billing records exist, but only sporadic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; consumption for remaining accounts is estimated. Manual customer meter reading gives at least 80% customer meter reading success rate; consumption for accounts with failed reads is estimated. Good customer meter records exist, but only limited meter accuracy testing is conducted. Regular replacement is conducted for the oldest meters. Computerized billing records exist with annual auditing of summary statistics conducted by utility personnel.	Conditions between 6 and 8	At least 97% of customers exist with volume-based billing from meter reads. At least 90% customer meter reading success rate; at least 80% read success rate with planning and budgeting for trials of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics occurs annually by utility personnel, and is verified by third party at least once every five years.	Conditions between 8 and 10	At least 99% of customers exist with volume-based billing from meter reads. At least 95% customer meter reading success rate; minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) trials underway. Statistically significant customer meter testing and replacement program in place on a continuous basis. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts undertaken annually by utility personnel. Audit is conducted by third party auditors at least once every three years.
Improvements to attain higher data grading for "Billed Metered Consumption" component.	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	<p><u>to qualify for 2:</u> Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.</p>	<p><u>to qualify for 4:</u> Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.</p>		<p><u>to qualify for 6:</u> Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Launch a program of annual auditing of global billing statistics by utility personnel.</p>		<p><u>to qualify for 8:</u> Purchase and install meters on unmetered accounts. If customer meter reading success rate is less than 97%, assess cost-effectiveness of Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system for portion or entire system; or otherwise achieve ongoing improvements in manual meter reading success rate to 97% or higher. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Implement annual auditing of detailed billing records by utility personnel and implement third party auditing at least once every five years.</p>		<p><u>to qualify for 10:</u> Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) or Advanced Metering Infrastructure (AMI) system trials if manual meter reading success rate of at least 99% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue annual detailed billing data auditing by utility personnel and conduct third party auditing at least once every three years.</p>		<p><u>to maintain 10:</u> Continue annual internal billing data auditing, and third party auditing at least every three years. Continue customer meter accuracy testing to ensure that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management to maintain very high accuracy in customer metering and billing.</p>
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no intentionally unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billing is employed. No data is collected on customer consumption. The only estimates of customer population consumption available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billing is employed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption read periodically or recorded on portable dataloggers over one, three, or seven day periods. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing in general. However, a liberal amount of exemptions and a lack of clearly written and communicated procedures result in up to 20% of billed accounts believed to be unmetered by exemption; or the water utility is in transition to becoming fully metered, and a large number of customers remain unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but established exemptions exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy does require metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because meter installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for these unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy does require metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		<p><u>to qualify for 2:</u> Conduct research and evaluate cost/benefit of a new water utility policy to require metering of the customer population; thereby greatly reducing or eliminating unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and periodically reading the meters or datalogging the water consumption over one, three, or seven day periods.</p>	<p><u>to qualify for 4:</u> Implement a new water utility policy requiring customer metering. Launch or expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes. Begin customer meter installation.</p>		<p><u>to qualify for 6:</u> Refine policy and procedures to improve customer metering participation for all but solidly exempt accounts. Assign staff resources to review billing records to identify errant unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significantly reduce the number of unmetered accounts</p>		<p><u>to qualify for 8:</u> Push to install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Plan special efforts to address "hard-to-access" accounts. Implement procedures to obtain a reliable consumption estimate for the remaining few unmetered accounts awaiting meter installation.</p>		<p><u>to qualify for 10:</u> Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties, and devise means to install water meters or otherwise measure water consumption.</p>		<p><u>to maintain 10:</u> Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed remaining unmetered accounts as is economically feasible.</p>
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	<p>Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.</p>	<p>Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.</p>	Conditions between 2 and 4	<p>Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.</p>	Conditions between 4 and 6	<p>Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.</p>	Conditions between 6 and 8	<p>Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.</p>	Conditions between 8 and 10	<p>Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.</p>
Improvements to attain higher data grading for "Unbilled Metered Consumption" component:		<p><u>to qualify for 2:</u> Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.</p>	<p><u>to qualify for 4:</u> Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum. Consider increasing the priority of reading meters on unbilled accounts at least annually.</p>		<p><u>to qualify for 6:</u> Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts. Gradually include a greater number of these metered accounts to the routes for regular meter reading.</p>		<p><u>to qualify for 8:</u> Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings. Gradually increase the number of unbilled metered accounts that are included in regular meter reading routes.</p>		<p><u>to qualify for 10:</u> Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities for unbilled accounts are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.</p>		<p><u>to maintain 10:</u> Reassess the utility's philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.</p>
Unbilled unmetered:		<p>Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.</p>	<p>Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.</p>	Conditions between 2 and 4	<p>Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running multiplied by typical flowrate, multiplied by number of events).</p>	Default value of 1.25% of system input volume is employed	<p>Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.</p>	Conditions between 6 and 8	<p>Clear policies and good recordkeeping exist for some uses (ex: water used in periodic testing of unmetered fire connections), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time running multiplied by typical flow, multiplied by number of events) or temporary meters, and relatively subjective estimates of less regulated use.</p>	Conditions between 8 and 10	<p>Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time running multiplied by typical flow, multiplied by number of events) or use of temporary meters.</p>
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		<p><u>to qualify for 5:</u> Utilize the accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use.</p> <p><u>to qualify for 2:</u> Establish a policy regarding what water uses should be allowed to remain as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushings).</p>	<p><u>to qualify for 5:</u> Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of this use.</p> <p><u>to qualify for 4:</u> Evaluate the documentation of events that have been observed. Meet with user groups (ex: for fire hydrants - fire departments, contractors to ascertain their need and/or volume requirements for water from fire hydrants).</p>		<p><u>to qualify for 5:</u> Utilize accepted default value of 1.25% of the volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process, and should focus on other components since the volume of unbilled, unmetered consumption is usually a relatively small quantity component, and other larger-quantity components should take priority.</p>	<p><u>to qualify for 6 or greater:</u> Finalize policy and begin to conduct field checks to better establish and quantify such usage. Proceed if top-down audit exists and/or a great volume of such use is suspected.</p>	<p><u>to qualify for 8:</u> Assess water utility policy and procedures for various unmetered usages. For example, ensure that a policy exists and permits are issued for use of fire hydrants by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel. Use same approach for other types of unbilled, unmetered water usage.</p>		<p><u>to qualify for 10:</u> Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.</p>		<p><u>to maintain 10:</u> Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.</p>

APPARENT LOSSES

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running multiplied typical flowrate, multiplied by number of events).	Default value of 0.25% of volume of water supplied is employed	Coherent policies exist for some forms of unauthorized consumption (more than simply fire hydrant misuse) but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records.	Conditions between 6 and 8	Clear policies and good auditable recordkeeping exist for certain events (ex: tampering with water meters, illegal bypasses of customer meters); but other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is recorded and quantified via formulae (estimated time running multiplied by typical flow) or similar methods. All records and calculations should exist in a form that can be audited by a third party.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of volume of water supplied. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of volume of water supplied as an expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy updates to clearly identify the types of water consumption that are authorized from those usages that fall outside of this policy and are, therefore, unauthorized. Begin to conduct regular field checks. Proceed if the top-down audit already exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for detection and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in detection, documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program for any size of retail meter. Metering workflow is driven chaotically with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population. Customer meters are tested for accuracy only upon customer request.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters (more than just customer requests, but less than 1% of inventory). A limited number of the oldest meters are replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. The meter population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Statistically significant number of meters are tested in audit year. This testing is conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for these meters.	Good records of all active customer meters exist and include as a minimum: meter number, account number/location, type, size and manufacturer. Ongoing meter replacement occurs according to a targeted and justified basis. Regular meter accuracy testing gives a reliable measure of composite inaccuracy volume for the customer meter population. New metering technology is embraced to keep overall accuracy improving. Procedures are reviewed by a third party knowledgeable in the M36 methodology.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of the metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize the procedures for meter recordkeeping within an electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 9: Continue efforts to manage meter population with reliable recordkeeping. Test a statistically significant number of meters each year and analyze test results in an ongoing manner to serve as a basis for a target meter replacement strategy based upon accumulated volume throughput.	to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.	to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new metering technology and Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering of water flow and management of customer consumption data.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Systematic Data Handling Errors:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Policies and procedures for activation of new customer water billing accounts are vague and lack accountability. Billing data is maintained on paper records which are not well organized. No auditing is conducted to confirm billing data handling efficiency. An unknown number of customers escape routine billing due to lack of billing process oversight.	Policy and procedures for activation of new customer accounts and oversight of billing records exist but need refinement. Billing data is maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work is conducted to confirm billing data handling efficiency. The volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for new account activation and oversight of billing operations exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy and procedures for new account activation and oversight of billing operations is adequate and reviewed periodically. Computerized billing system is in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	New account activation and billing operations policy and procedures are reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Checks are conducted routinely to flag and explain zero consumption accounts. Annual internal checks conducted with third party audit conducted at least once every five years. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound written policy and procedures exist for new account activation and oversight of customer billing operations. Robust computerized billing system gives high functionality and reporting capabilities which are utilized, analyzed and the results reported each billing cycle. Assessment of policy and data handling errors are conducted internally and audited by third party at least once every three years, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		<u>to qualify for 2:</u> Draft written policy and procedures for activating new water billing accounts and oversight of billing operations. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	<u>to qualify for 4:</u> Finalize written policy and procedures for activation of new billing accounts and overall billing operations management. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		<u>to qualify for 6:</u> Refine new account activation and billing operations procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedure internal annual audit process.		<u>to qualify for 8:</u> Formalize regular review of new account activation process and general billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error. Plan for periodic third party audit to occur at least once every five years.		<u>to qualify for 10:</u> Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that billing system reports are utilized, analyzed and reported every billing cycle. Ensure that internal and third party audits are conducted at least once every three years.		<u>to maintain 10:</u> Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
<b>SYSTEM DATA</b>											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in an uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographical Information System (GIS) and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.
Improvements to attain higher data grading for "Length of Water Mains" component:		<u>to qualify for 2:</u> Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	<u>to qualify for 4:</u> Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		<u>to qualify for 6:</u> Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		<u>to qualify for 8:</u> Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		<u>to qualify for 10:</u> Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve the completeness and accuracy of the system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	Conditions between 6 and 8	Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well-managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	Conditions between 8 and 10	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Improvements to attain higher data grading for "Number of Active and Inactive Service Connections" component:	Note: The number of Service Connections does not include fire hydrant leads/lines connecting the hydrant to the water main	<u>to qualify for 2:</u> Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	<u>to qualify for 4:</u> Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		<u>to qualify for 6:</u> Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		<u>to qualify for 8:</u> Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		<u>to qualify for 10:</u> Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve knowledge of system.
	Note: if customer water	Gratings 1-9 apply if customer properties are unmetered, if customer meters exist and are located inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building. In any of these cases the average distance between the curb stop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gratings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met for a grading of 10:

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	meters are located outside of the customer building next to the curb stop or boundary separating utility/customer responsibility, then the auditor should answer "Yes" to the question on the Reporting Worksheet asking about this. If the answer is Yes, the grading description listed under the Grading of 10(a) will be followed, with a value of zero automatically entered at a Grading of 10. See the Service Connection Diagram worksheet for a visual presentation of this distance.	Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curb stops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curb stops.	Policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curb stop is the property of the water utility; and the piping from the curb stop to the customer building is owned by the customer. Curb stop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curb stop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curb stops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records of limited accuracy.	Conditions between 4 and 6	Clear written policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curb stops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curb stops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	a) Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping. If so, answer "Yes" to the question on the Reporting Working asking about this condition. A value of zero and a Grading of 10 are automatically entered in the Reporting Worksheet. b) Meters exist inside customer buildings, or properties are unmetered. In either case, answer "No" to the Reporting Worksheet question on meter location, and enter a distance determined by the auditor. For a Grading of 10 this value must be a very reliable number from a Geographic Information System (GIS) and confirmed by a statistically valid number of field checks.
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		<u>to qualify for 2:</u> Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curb stops. Obtain the length of this small sample of connections in this manner.	<u>to qualify for 4:</u> Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		<u>to qualify for 6:</u> Establish coherent procedures to ensure that policy for curb stop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		<u>to qualify for 8:</u> Implement an electronic means of recordkeeping, typically via a customer information system, customer billing system, or Geographic Information System (GIS). Standardize the process to conduct field checks of a limited number of locations.		<u>to qualify for 10:</u> Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		<u>to maintain 10:</u> Continue with standardization and random field validation to improve knowledge of service connection configurations and customer meter locations.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered pumping station and water storage tank sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breach pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breach pressure zones. Well-covered telemetry monitoring of the distribution system (not just pumping at source treatment plants or wells) logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System or similar realtime monitoring system exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable monitoring system data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data. Calculations are reported on an annual basis as a minimum.
Improvements to attain higher data grading for "Average Operating Pressure" component:		<u>to qualify for 2:</u> Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	<u>to qualify for 4:</u> Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		<u>to qualify for 6:</u> Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		<u>to qualify for 8:</u> Install a Supervisory Control and Data Acquisition (SCADA) System, or similar realtime monitoring system, to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		<u>to qualify for 10:</u> Annually, obtain a system-wide average pressure value from the hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		<u>to maintain 10:</u> Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for realtime pressure data calibration, and averaging.

Grading >>>	n/a	1	2	3	4	5	6	7	8	9	10
<b>COST DATA</b>											
Total annual cost of operating water system:		Incomplete paper records and lack of financial accounting documentation on many operating functions makes calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. However, gaps in data are known to exist, periodic internal reviews are conducted but not a structured financial audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, but not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and at least once every three years by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and annually also by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		<u>to qualify for 2:</u> Gather available records, institute new financial accounting procedures to regularly collect and audit basic cost data of most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		<u>to qualify for 8:</u> Standardize the process to conduct routine financial audit on an annual basis. Arrange for CPA audit of financial records at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and long-term cost trend, and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):	Customer population unmetered, and/or only a fixed fee is charged for consumption.	Antiquated, cumbersome water rate structure is used, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Conditions between 4 and 6	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, which includes residential, commercial, industrial, institutional (CI), and any other distinct customer classes within the water rate structure.	Conditions between 8 and 10	Current, effective water rate structure is in force and applied reliably in billing operations. The rate structure and calculations of composite rate - which includes residential, commercial, industrial, institutional (CI), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		<u>to qualify for 2:</u> Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	<u>to qualify for 4:</u> Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		<u>to qualify for 6:</u> Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	<u>Launch effort to fully meter the customer population and charge rates based upon water volumes</u>	<u>to qualify for 8:</u> Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to qualify for 10:</u> Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to maintain 10:</u> Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate weighted calculation of unit variable production costs based on these two inputs and water imported purchase costs (if applicable). All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power, treatment and water imported purchase costs (if applicable) such as liability, residuals management, wear and tear on equipment, impending expansion of supply, are included in the unit variable production cost, as applicable. The data is audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent primary and secondary variable production and water imported purchase (if applicable) costs tracked. The data is audited at least annually by utility personnel, and at least once every three years by a third-party knowledgeable in the M36 methodology.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all pertinent primary and secondary variable production and water imported purchase (if applicable) costs on an annual basis. or: 2) Water supply is entirely purchased as bulk water imported, and the unit purchase cost - including all applicable marginal supply costs - serves as the variable production cost. If all applicable marginal supply costs are not included in this figure, a grade of 10 should not be selected.
Improvements to attain higher data grading for "Variable Production Cost" component:		<u>to qualify for 2:</u> Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	<u>to qualify for 4:</u> Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6:</u> Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, equipment wear, impending infrastructure expansion) should be included to calculate a more representative variable production cost.		<u>to qualify for 8:</u> Formalize the accounting process to include direct cost components (power, treatment) as well as indirect cost components (liability, residuals management, etc.) Arrange to conduct audits by a knowledgeable third-party at least once every three years.		<u>to qualify for 10:</u> Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10:</u> Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively



## AWWA Free Water Audit Software: Determining Water Loss Standing

WAS v5.0

American Water Works Association,  
Copyright © 2014, All Rights Reserved.

Water Audit Report for: Eldorado Area Water and Sanitation District (EAWSD)  
 Reporting Year: 2014 1/2014 - 12/2014  
 Data Validity Score: 72

### Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Level / Score				
	Level I (0-25)	Level II (26-50)	Level III (51-70)	Level IV (71-90)	Level V (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

*For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.*

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities in gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

**Note:** this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

**General Guidelines for Setting a Target ILI  
(without doing a full economic analysis of leakage control options)**

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
<b>1.0 - 3.0</b>	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
<b>&gt;3.0 - 5.0</b>	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
<b>&gt;5.0 - 8.0</b>	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
<b>Greater than 8.0</b>	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
<b>Less than 1.0</b>	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

## Appendix B: NMOSE GPCD Calculator Results



# NMOSE GPCD CALCULATOR

Gallons per Capita - v2.04 Beta

Release Date: Mar, 16, 2009

This spreadsheet-based GPCD calculator is designed to help quantify and track water uses associated with water distribution systems. The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons on the left below. Descriptions of each sheet are also given below.

It should be noted that all the recorded data should be from actual metered results and should not include any estimates.

Value to be entered by user  
 Dropdown box, pick from list  
 Value calculated based on input data  
 No longer available for input

THE FOLLOWING KEY APPLIES THROUGHOUT:

Look for the following boxes that provide additional instructions [Info](#)

Please begin by providing the following information, then proceed through each sheet:

NAME OF CITY OR UTILITY:

REPORTING YEARS: Enter the most recent reporting year:  Data can be entered back to:

NAME OF CONTACT PERSON:  E-MAIL:  TELEPHONE:  Ext.

SELECT THE REPORTING UNITS FOR VOLUME DATA:  Gallons per Capita - v2.04 Beta

<a href="#">Instructions &amp; Utility</a>	This sheet
<a href="#">Census Data</a>	Census data and the portal to get the data from the Census website
<a href="#">Single-Family</a>	Single-Family residential gallons and population
<a href="#">Multi-Family</a>	Multi-Family residential gallons and population
<a href="#">ICI &amp; Other Metered</a>	Other data including Commercial, Industrial and Institutional [1.3] and Other metered [1.4] categories
<a href="#">Reuse</a>	Data related to water reuse projects
<a href="#">Total Diverted</a>	Total Production and Diverted Water
<a href="#">Reported Data</a>	The calculated data graphical review of most common performance indicators
<a href="#">Annual Performance</a>	The calculated data graphical review of <b>annual</b> performance indicators
<a href="#">Monthly Performance</a>	The calculated data graphical review of <b>monthly</b> performance indicators
<a href="#">Definitions</a>	Use this sheet to understand terms used in the audit process

All parties reserve the right to validate the data recorded in this document. This does not bind the OSE or the Utility to the results. It is a tool used for planning purposes.

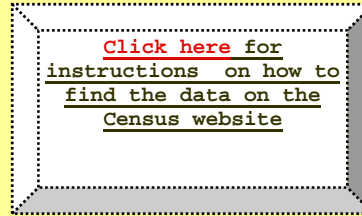
If you have questions or comments regarding the software please contact us at: [waternm@state.nm.us](mailto:waternm@state.nm.us)

## Census Information Data Table 2.1

Info



OR



	TO	
2014	TO	2008

Use the most recent census data



### DATA

US Census Table	Description		INPUT
		<b>CENSUS YEAR</b>	<b>2010</b>
P37	Group Quarters Population	Total	3,100
H3	Occupancy Status	Total	2,887
from H3		Occupied	2,887
from H3		Vacant	213
H12	Ave. Household Size of Occupied Housing Units	Total	2.1

Formula: Household Size = Total Population / Total Number of Housing Units

Vacancy Rate %	7.4%
----------------	------

### COMMENTS:

**DATA INPUT SHEET**

Eldorado

Instructions

**3. SINGLE-FAMILY RESIDENTIAL (SFR)**

[Return to Instructions](#)

**MONTHLY DATA**

**TABLE 3.1** [Info](#) 2014 TO 2008

SFR BILLED WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	9,240,300	7,909,700	8,735,400	11,714,400	14,497,500	15,566,300	15,932,100	16,674,600	13,978,363	11,720,700	8,026,700	9,233,000
2013	9,089,800	7,849,400	9,648,500	12,289,000	18,127,000	16,552,500	17,041,500	16,177,500	11,067,700	10,941,900	8,298,700	8,831,100
2012	7,407,800	8,166,900	9,951,200	12,269,300	18,814,700	18,641,700	17,251,000	18,688,300	13,568,127	12,020,400	9,170,900	8,785,600
2011	9,377,200	6,920,900	11,252,600	12,856,500	16,812,300	20,306,500	16,530,300	15,138,300	12,817,200	9,563,000	9,441,900	8,416,300
2010												
2009												
2008												

**TABLE 3.2** [Info](#) **Total Connections** You have chosen to enter Total Connections, enter the monthly values below, or enter annual values in table 3.8 Check message above Table 3.3 to see if additional data is required.

NUMBER OF SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	2,896	2,893	2,892	2,886	2,898	2,900	2,900	2,898	2,905	2,905	2,907	2,907
2013	2,879	2,882	2,880	2,885	2,875	2,870	2,893	2,888	2,883	2,890	2,889	2,894
2012	2,877	2,881	2,882	2,884	2,882	2,876	2,883	2,929	2,897	2,883	2,883	2,879
2011	2,868	2,869	2,853	2,863	2,864	2,855	2,865	2,854	2,869	2,864	2,866	2,869
2010												
2009												
2008												

**TABLE 3.3** [Info](#) You have entered Total Connections in Table 3.2; enter the number of inactive (zero use) connections below. If values are not entered, an adjustment will be made based on vacancy rates reported in the Census data

INACTIVE (ZERO USE) SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	195	191	167	162	148	156	158	137	162	168	209	187
2013	184	184	157	159	139	140	139	133	153	154	180	181
2012	194	171	172	155	132	128	126	136	152	148	169	198
2011	137	162	138	137	117	111	117	127	135	155	158	160
2010												
2009												
2008												

**TABLE 3.4** Formula = (No. of Connections - No. of Zero Use Accounts) \* Ave. Household Size

SFR POPULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	5,672	5,674	5,723	5,720	5,775	5,762	5,758	5,798	5,760	5,748	5,666	5,712
2013	5,660	5,666	5,718	5,725	5,746	5,733	5,783	5,786	5,733	5,746	5,689	5,697
2012	5,634	5,691	5,691	5,731	5,775	5,771	5,790	5,865	5,765	5,744	5,699	5,630
2011	5,735	5,685	5,702	5,725	5,769	5,762	5,771	5,727	5,741	5,689	5,687	5,689
2010	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2009	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

**TABLE 3.5** Formula = Billed Water Consumption (SFR only) / Calculated Population (SFR only)

SFR GPCD CALCULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	52.55	49.78	49.24	68.26	80.98	90.05	89.25	92.77	80.89	65.78	47.22	52.14
2013	51.81	49.48	54.43	71.56	101.77	96.24	95.05	90.20	64.35	61.43	48.63	50.00
2012	42.41	51.25	56.41	71.36	105.10	107.68	96.12	102.78	78.46	67.51	53.64	50.34
2011	52.74	43.48	63.67	74.86	94.01	117.47	92.40	85.27	74.41	54.23	55.34	47.72
2010	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2009	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

COMMENTS:

**ANNUAL DATA**

**TABLE 3.6** [Info](#) **ANNUAL CONSUMPTION**

2014	9,233,000
2013	143,229,063
2012	145,914,600
2011	154,735,927
2010	149,453,000
2009	N/A
2008	N/A

**TABLE 3.7** [Info](#) **ANNUAL CALCULATION**

2014	9,233,000
2013	143,229,063
2012	145,914,600
2011	154,735,927
2010	149,453,000
2009	N/A
2008	N/A

**TABLE 3.8** [Info](#) **AVG. ANNUAL CONNECTIONS**

2014	2,899
2013	2,884
2012	2,886
2011	2,863
2010	N/A
2009	N/A
2008	N/A

**TABLE 3.9** [Info](#) **AVG CONN. CALCULATION**

2014	2,899
2013	2,884
2012	2,886
2011	2,863
2010	N/A
2009	N/A
2008	N/A

**TABLE 3.10** [Info](#) **CALCULATED GROWTH RATE**

2014	0.52%
2013	-0.08%
2012	0.81%
2011	N/A
2010	N/A
2009	N/A
2008	N/A

**TABLE 3.11** [Info](#) **No. VACANT SFR CONNECTIONS**

2014	170
2013	159
2012	157
2011	138
2010	N/A
2009	N/A
2008	N/A

**TABLE 3.12** [Info](#) **SIZE OF HOUSEHOLD**

2014	2.1
2013	2.1
2012	2.1
2011	2.1
2010	No Data
2009	No Data
2008	No Data

**TABLE 3.13** [Info](#) **SFR POPULATION**

2014	5,731
2013	5,723
2012	5,732
2011	5,723
2010	N/A
2009	N/A
2008	N/A

**TABLE 3.14** [Info](#) **ANNUAL SFR GPCD**

2014	68.47
2013	69.85
2012	73.96
2011	71.53
2010	N/A
2009	N/A
2008	N/A

**DATA INPUT SHEET**

Eldorado

**4. MULTI-FAMILY RESIDENTIAL (MFR)**

[Return to Instructions](#)

[Instructions](#)

**MONTHLY DATA**

2014 TO 2008

**TABLE 4.1** [Info](#)

MFR BILLED WATER CONSUMPTION (Monthly) (Gallons (US))												
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014												
2013												
2012												
2011												
2010												
2009												
2008												

**TABLE 4.2**

If only Current Number of Units is Known, put this number in Table 4.7

NUMBER OF MFR UNITS (Monthly)												
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014												
2013												
2012												
2011												
2010												
2009												
2008												

**TABLE 4.3**

Formula = (Number of Units - Vacant MFR Connections) \* Ave. Household Size

MFR POPULATION (Monthly)												
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2013	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2012	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2011	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2010	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2009	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

**TABLE 4.4**

Formula = MFR Billed Water Consumption (Monthly) / MFR Population (Monthly)

MFR GPCD CALCULATION (Monthly)												
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2013	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2012	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2011	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2010	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2009	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

**ANNUAL DATA**

**TABLE 4.5**

ANNUAL CONSUMPTION
N/A
N/A
N/A
N/A
N/A
N/A
N/A

**TABLE 4.6**

ANNUAL CALCULATION
N/A
N/A
N/A
N/A
N/A
N/A
N/A

**TABLE 4.7**

No. CURRENT UNITS

**TABLE 4.8**

ANNUAL UNIT CALCULATION
N/A
N/A
N/A
N/A
N/A
N/A
N/A

X = calculated from Single-family growth-rate data

**TABLE 4.9** [Info](#)

MFR POPULATION
N/A
N/A
N/A
N/A
N/A
N/A
N/A

**TABLE 4.10**

VACANT MFR CONNECTIONS
N/A
N/A
N/A
N/A
N/A
N/A
N/A

**TABLE 4.11** [Info](#)

ANNUAL MFR GPCD
N/A
N/A
N/A
N/A
N/A
N/A
N/A



**DATA INPUT SHEET** Info

**6. REUSE** Return to Instructions

Eldorado

**MONTHLY DATA**

2014 TO 2008

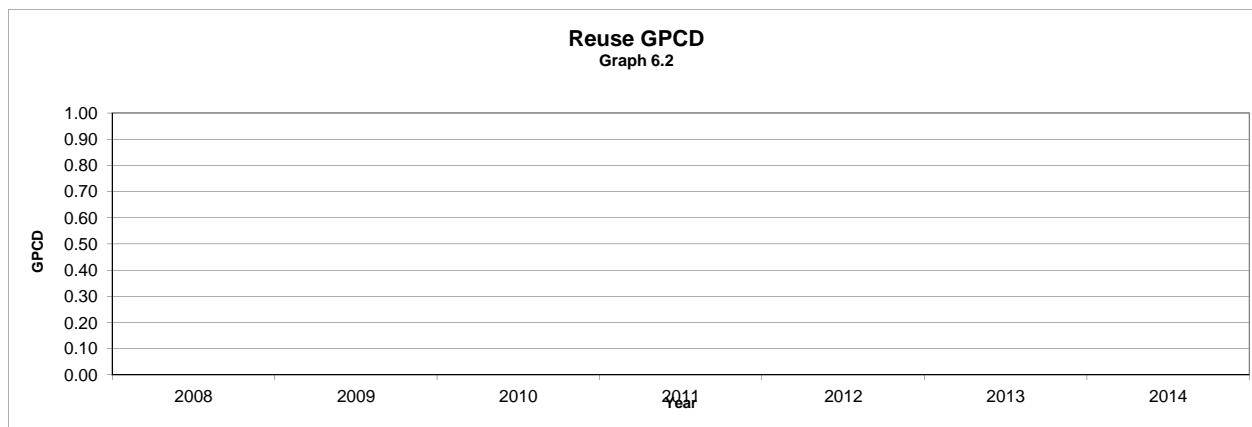
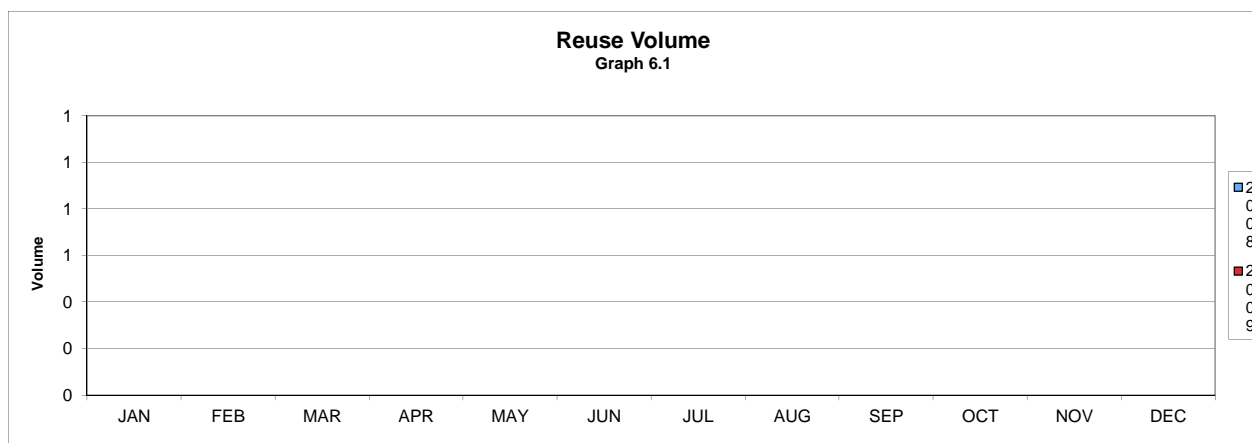
**TABLE 6.1**  
REUSE DIVERSIONS (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014												
2013												
2012												
2011												
2010												
2009												
2008												

**COMMENTS:**

**ANNUAL DATA**

TABLE 6.2	TABLE 6.3
REUSE ANNUAL DIVERSIONS	REUSE GPCD
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A
	N/A



DATA INPUT SHEET

## 7. TOTAL WATER DIVERTED AND SUPPLIED

[Return to Instructions](#)

Eldorado

### MONTHLY DATA

TABLE 7.1

TOTAL WATER DIVERTED (Monthly) (Gallons (US))		2014 TO 2008											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
2014	10,280,000	9,670,000	11,750,000	12,880,000	16,090,000	18,670,000	17,610,000	15,420,000	15,660,000	13,120,000	10,660,000	10,500,000	
2013	11,700,000	9,120,000	10,390,000	13,600,000	17,760,000	19,360,000	16,650,000	16,600,000	13,650,000	12,220,000	9,790,000	11,160,000	
2012	10,070,000	9,770,000	12,180,000	14,200,000	18,260,000	11,770,000	13,080,000	12,830,000	12,280,000	9,240,000	9,270,000	8,120,000	
2011	11,450,000	11,330,000	12,200,000	14,510,000	19,010,000	21,170,000	20,400,000	17,820,000	15,080,000	13,280,000	10,690,000	10,370,000	
2010													
2009													
2008													

TABLE 7.2

IMPORTED WATER (Monthly)(Gallons (US))		Info											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
2014													
2013													
2012													
2011													
2010													
2009													
2008													

TABLE 7.3

EXPORTED WATER (Monthly) (Gallons (US))		Info											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
2014													
2013													
2012													
2011													
2010													
2009													
2008													

TABLE 7.4

Formula = Total Water Diverted + Imported water - Exported Water

TOTAL WATER SUPPLY (Monthly) (Gallons (US))		Info											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
2014	10,280,000	9,670,000	11,750,000	12,880,000	16,090,000	18,670,000	17,610,000	15,420,000	15,660,000	13,120,000	10,660,000	10,500,000	
2013	11,700,000	9,120,000	10,390,000	13,600,000	17,760,000	19,360,000	16,650,000	16,600,000	13,650,000	12,220,000	9,790,000	11,160,000	
2012	10,070,000	9,770,000	12,180,000	14,200,000	18,260,000	11,770,000	13,080,000	12,830,000	12,280,000	9,240,000	9,270,000	8,120,000	
2011	11,450,000	11,330,000	12,200,000	14,510,000	19,010,000	21,170,000	20,400,000	17,820,000	15,080,000	13,280,000	10,690,000	10,370,000	
2010	0	0	0	0	0	0	0	0	0	0	0	0	
2009	0	0	0	0	0	0	0	0	0	0	0	0	
2008	0	0	0	0	0	0	0	0	0	0	0	0	

Table 7.5

SYSTEM TOTAL GPCD (Monthly)		Info											
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
2014	38	39	43	49	59	70	64	56	59	48	40	38	
2013	43	37	38	51	65	73	61	61	52	45	37	41	
2012	37	40	44	54	67	44	48	47	46	34	35	30	
2011	42	46	45	55	70	80	75	65	57	49	40	38	
2010	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
2009	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	

COMMENTS:

### ANNUAL DATA

TABLE 7.6

ANNUAL TOTAL DIVERTED

TABLE 7.7

ANNUAL TOTAL DIVERTED CALC
162,310,000
162,000,000
141,070,000
177,310,000
N/A
N/A
N/A

TABLE 7.8

ANNUAL TOTAL IMPORTED

TABLE 7.9

ANNUAL TOTAL IMPORT CALC
N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 7.10

ANNUAL TOTAL EXPORTED

TABLE 7.11

ANNUAL TOTAL EXPORT CALC
N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 7.12

ANNUAL TOTAL WATER SUPPLY
162,310,000
162,000,000
141,070,000
177,310,000
0
0
0

TABLE 7.13

TOTAL POP. EST.
8,831
8,823
8,832
8,823
N/A
N/A
N/A

TABLE 7.14

Year	SYSTEM TOTAL GPCD
2014	50.36
2013	50.30
2012	43.76
2011	55.06
2010	NA
2009	NA
2008	NA

## 8. GPCD REPORTED DATA

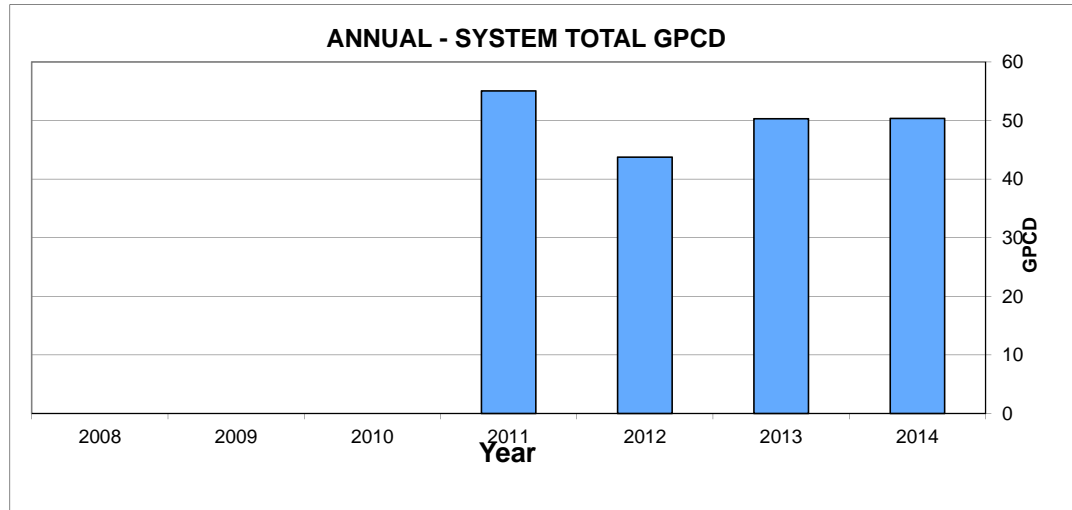
Eldorado

[Return to Instructions](#)

### ANNUAL

2014 To: 2008

Year	SYSTEM GPCD
2014	50.36
2013	50.30
2012	43.76
2011	55.06
2010	NA
2009	NA
2008	NA

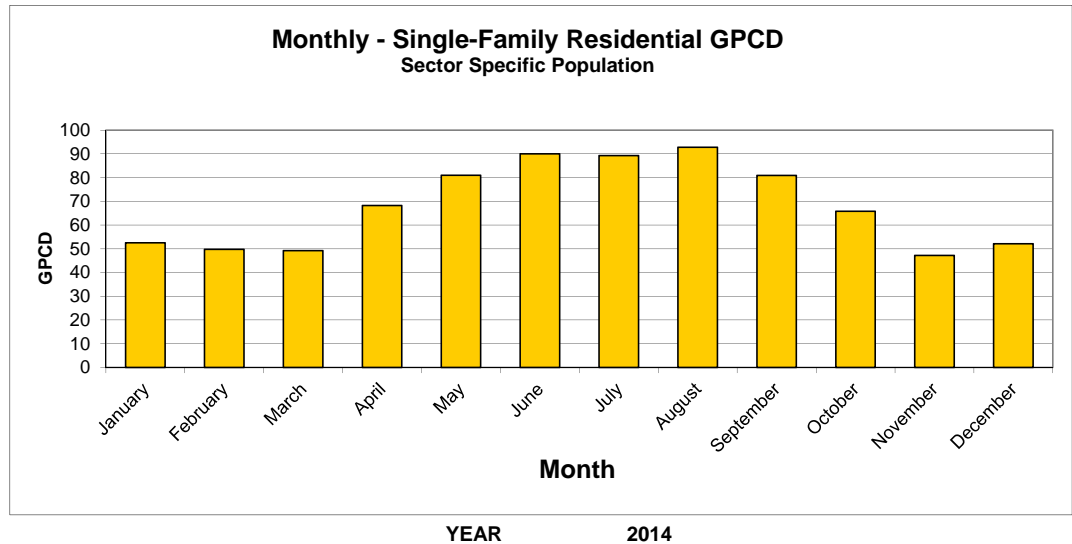


### MONTHLY

Month	SFR GPCD
January	52.55
February	49.78
March	49.24
April	68.26
May	80.98
June	90.05
July	89.25
August	92.77
September	80.89
October	65.78
November	47.22
December	52.14

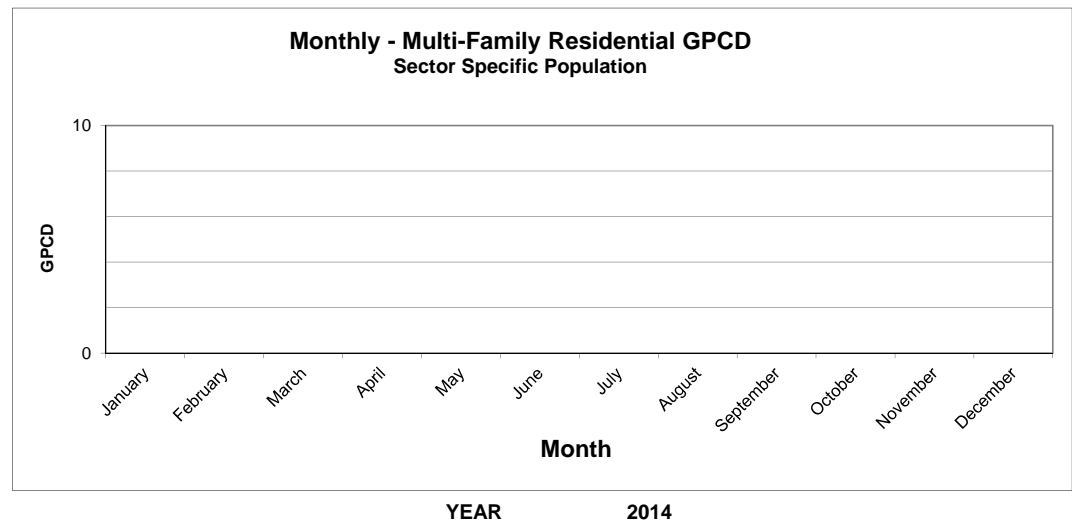
Year 2014

Peak/Ave 1.36



Month	MFR GPCD
January	No Data
February	No Data
March	No Data
April	No Data
May	No Data
June	No Data
July	No Data
August	No Data
September	No Data
October	No Data
November	No Data
December	No Data

Peak/Ave #DIV/0!



## 9. Annual Reporting Performance

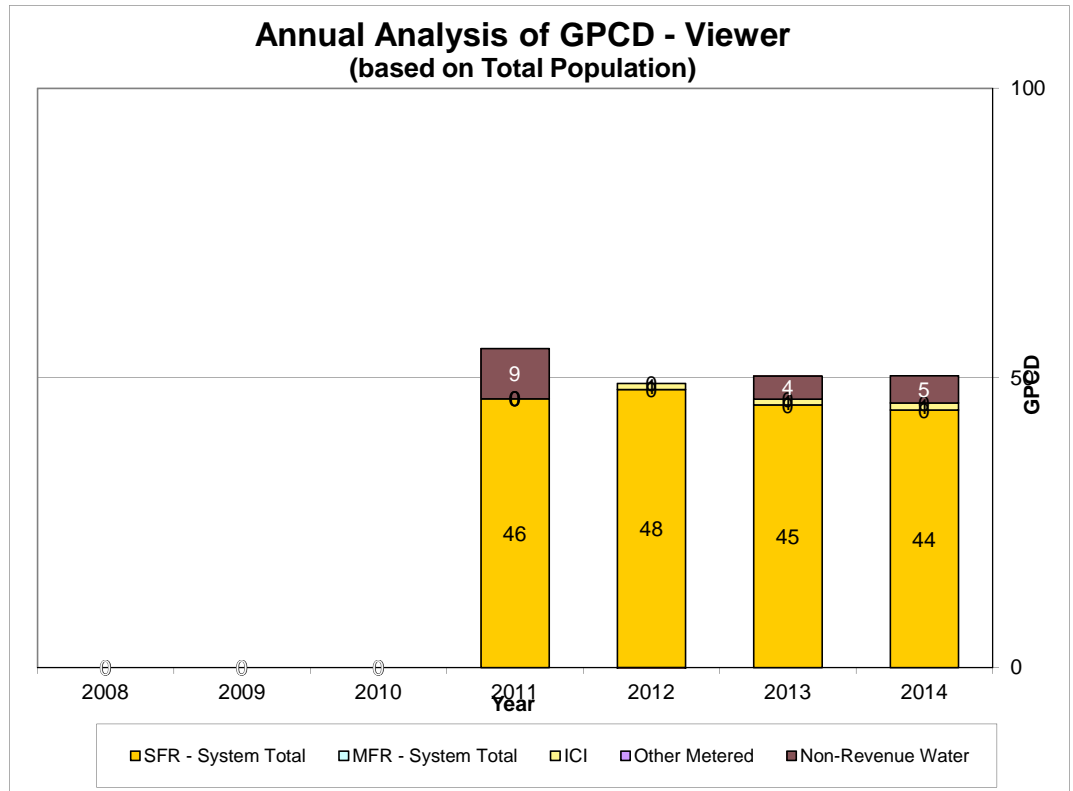
[Return to Instructions](#)

### Overall Annual GPCD (based on Total Population)

Year	SFR - System Total	MFR - System Total	ICI	Other Metered	Non-Revenue Water	Total Supplied	Non-Revenue Volume Million Gallons (US)
2014	44.44	N/A	1.23	N/A	4.69	50.36	15.13
2013	45.31	N/A	1.01	N/A	3.99	50.30	12.84
2012	48.00	N/A	1.05	N/A	-5.29	43.76	(17.05)
2011	46.40	N/A	N/A	N/A	8.66	55.06	27.88
2010	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-
2009	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-
2008	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-

Eldorado	
2014	to 2008

### Annual Analysis of GPCD - Viewer (based on Total Population)



### 10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2011

Choose Sector

Single-Family Residential

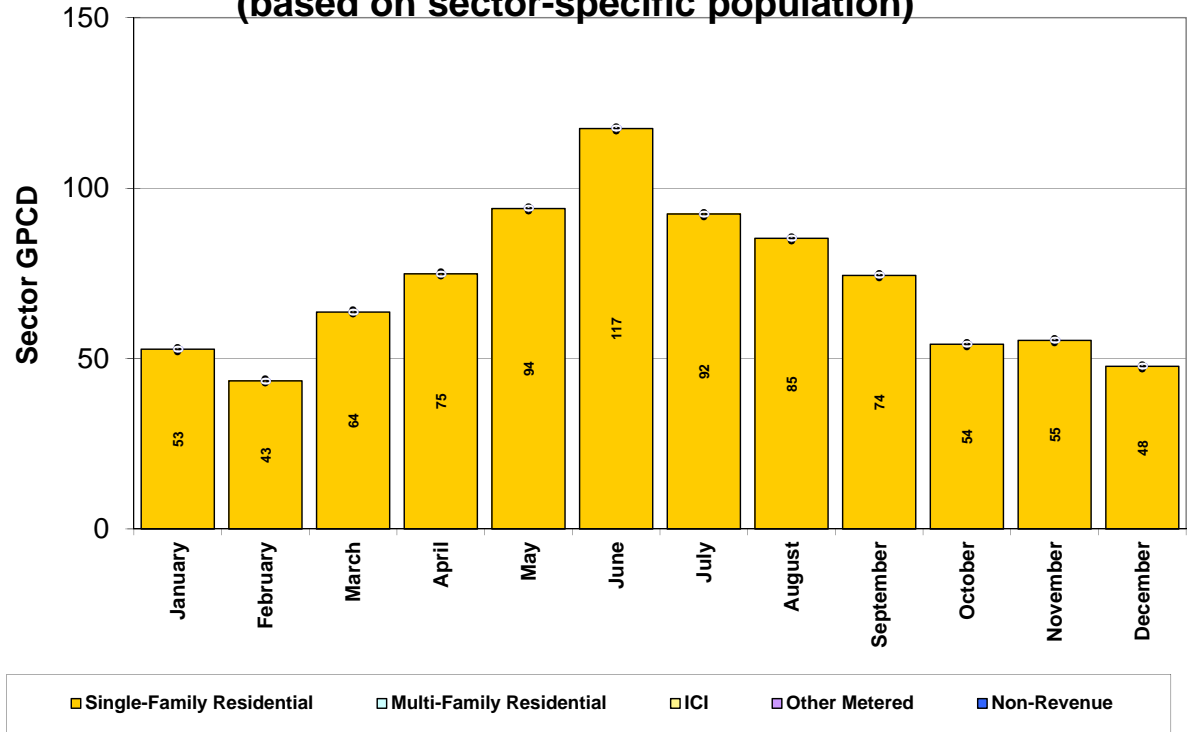
Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	52.74	No Data	0.00	0.00	7.58
FEB	43.48	No Data	0.00	0.00	17.85
MAR	63.67	No Data	0.00	0.00	3.46
APR	74.86	No Data	0.00	0.00	6.25
MAY	94.01	No Data	0.00	0.00	8.03
JUN	117.47	No Data	0.00	0.00	3.26
JUL	92.40	No Data	0.00	0.00	14.15
AUG	85.27	No Data	0.00	0.00	9.80
SEP	74.41	No Data	0.00	0.00	8.55
OCT	54.23	No Data	0.00	0.00	13.59
NOV	55.34	No Data	0.00	0.00	4.72
DEC	47.72	No Data	0.00	0.00	7.14

Eldorado

2014 to 2008

### Monthly Analysis of GPCD - Viewer (based on sector-specific population)



### 10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2012

Choose Sector

Single-Family Residential

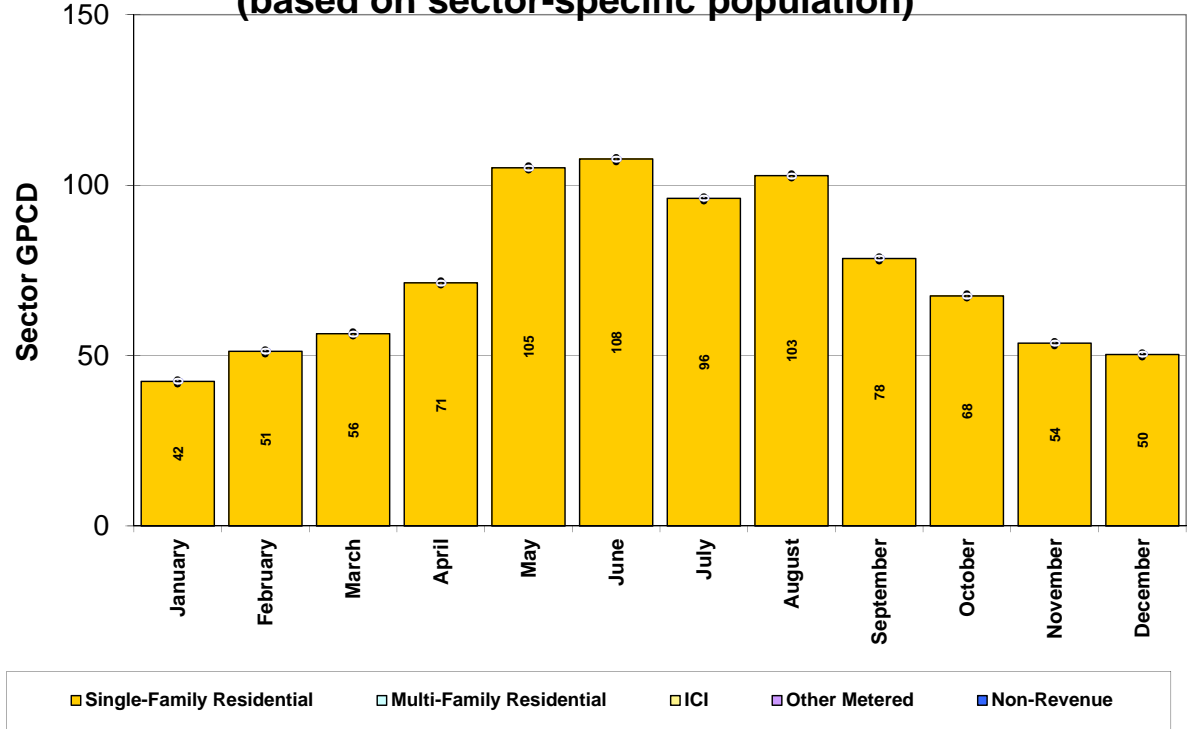
Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	42.41	No Data	0.69	0.00	9.03
FEB	51.25	No Data	0.74	0.00	5.74
MAR	56.41	No Data	0.89	0.00	7.25
APR	71.36	No Data	1.05	0.00	6.24
MAY	105.10	No Data	1.44	0.00	-3.46
JUN	107.68	No Data	1.53	0.00	-27.47
JUL	96.12	No Data	1.34	0.00	-16.57
AUG	102.78	No Data	1.32	0.00	-22.72
SEP	78.46	No Data	1.01	0.00	-5.88
OCT	67.51	No Data	0.98	0.00	-11.14
NOV	53.64	No Data	0.85	0.00	-0.48
DEC	50.34	No Data	0.71	0.00	-3.14

Eldorado

2014 to 2008

### Monthly Analysis of GPCD - Viewer (based on sector-specific population)



### 10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2012

Choose Sector

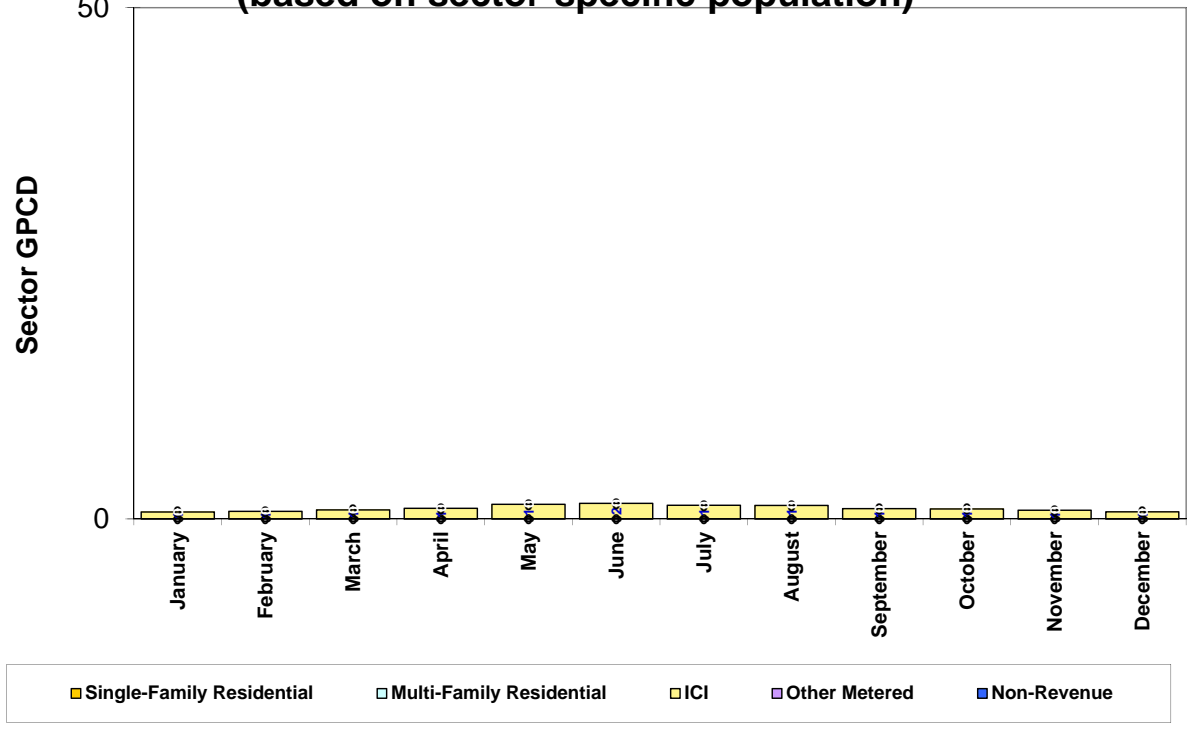
ICI

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	42.41	No Data	0.69	0.00	9.03
FEB	51.25	No Data	0.74	0.00	5.74
MAR	56.41	No Data	0.89	0.00	7.25
APR	71.36	No Data	1.05	0.00	6.24
MAY	105.10	No Data	1.44	0.00	-3.46
JUN	107.68	No Data	1.53	0.00	-27.47
JUL	96.12	No Data	1.34	0.00	-16.57
AUG	102.78	No Data	1.32	0.00	-22.72
SEP	78.46	No Data	1.01	0.00	-5.88
OCT	67.51	No Data	0.98	0.00	-11.14
NOV	53.64	No Data	0.85	0.00	-0.48
DEC	50.34	No Data	0.71	0.00	-3.14

Eldorado  
2014 to 2008

### Monthly Analysis of GPCD - Viewer (based on sector-specific population)



### 10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2012

Choose Sector

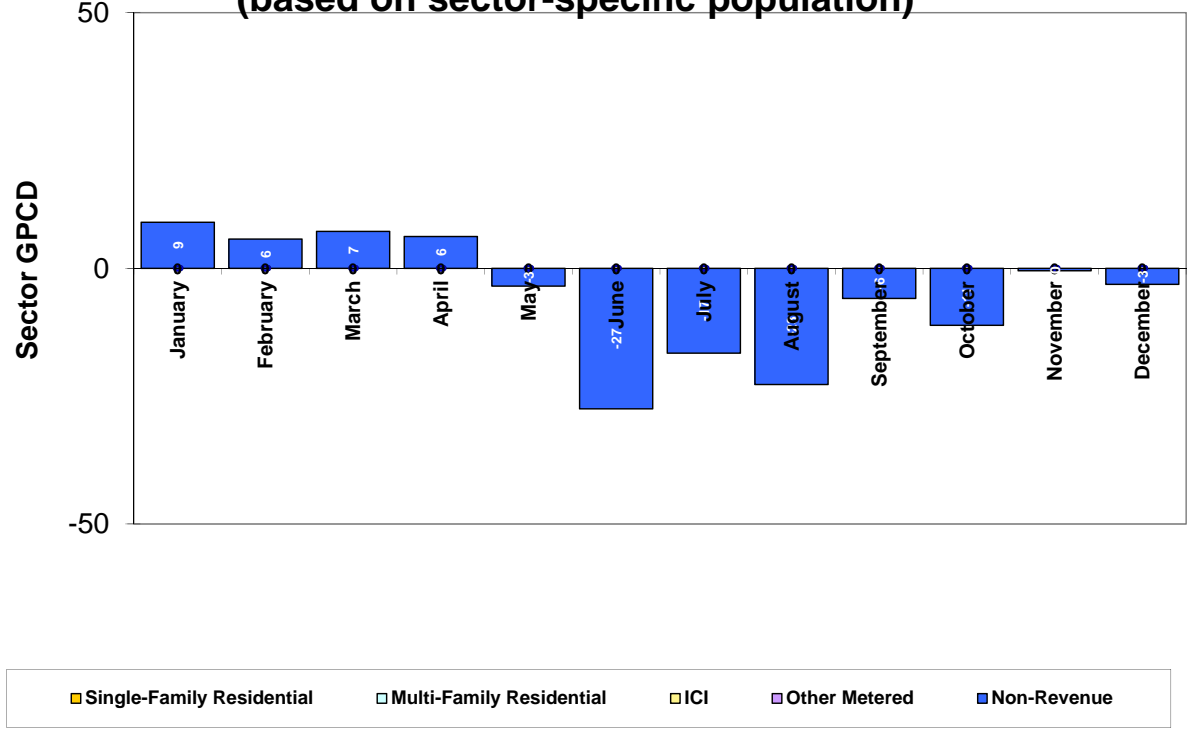
Non-Revenue

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	42.41	No Data	0.69	0.00	9.03
FEB	51.25	No Data	0.74	0.00	5.74
MAR	56.41	No Data	0.89	0.00	7.25
APR	71.36	No Data	1.05	0.00	6.24
MAY	105.10	No Data	1.44	0.00	-3.46
JUN	107.68	No Data	1.53	0.00	-27.47
JUL	96.12	No Data	1.34	0.00	-16.57
AUG	102.78	No Data	1.32	0.00	-22.72
SEP	78.46	No Data	1.01	0.00	-5.88
OCT	67.51	No Data	0.98	0.00	-11.14
NOV	53.64	No Data	0.85	0.00	-0.48
DEC	50.34	No Data	0.71	0.00	-3.14

Eldorado  
2014 to 2008

### Monthly Analysis of GPCD - Viewer (based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2013

Choose Sector

Single-Family Residential

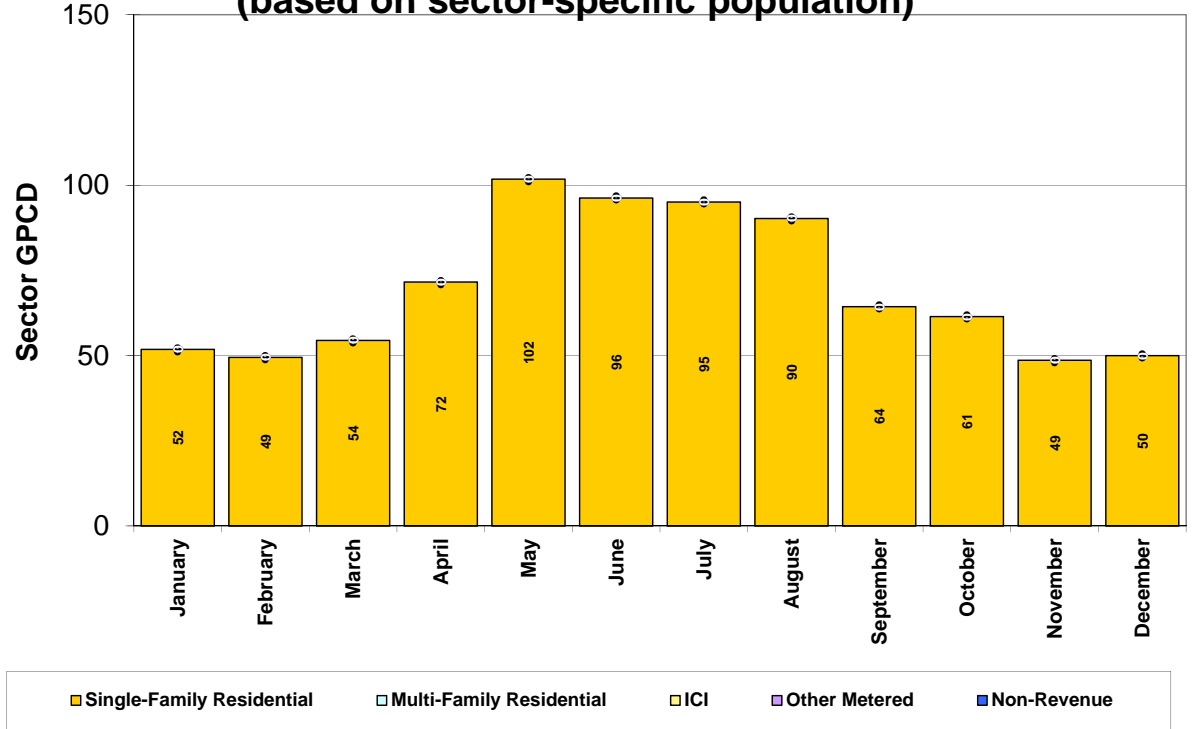
Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	51.81	No Data	0.89	0.00	8.66
FEB	49.48	No Data	0.85	0.00	4.29
MAR	54.43	No Data	0.86	0.00	1.85
APR	71.56	No Data	0.96	0.00	3.99
MAY	101.77	No Data	1.26	0.00	-2.60
JUN	96.24	No Data	1.08	0.00	9.53
JUL	95.05	No Data	1.02	0.00	-2.45
AUG	90.20	No Data	1.29	0.00	0.25
SEP	64.35	No Data	1.10	0.00	8.66
OCT	61.43	No Data	1.20	0.00	3.48
NOV	48.63	No Data	0.82	0.00	4.82
DEC	50.00	No Data	0.77	0.00	7.75

Eldorado

2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2013

Choose Sector

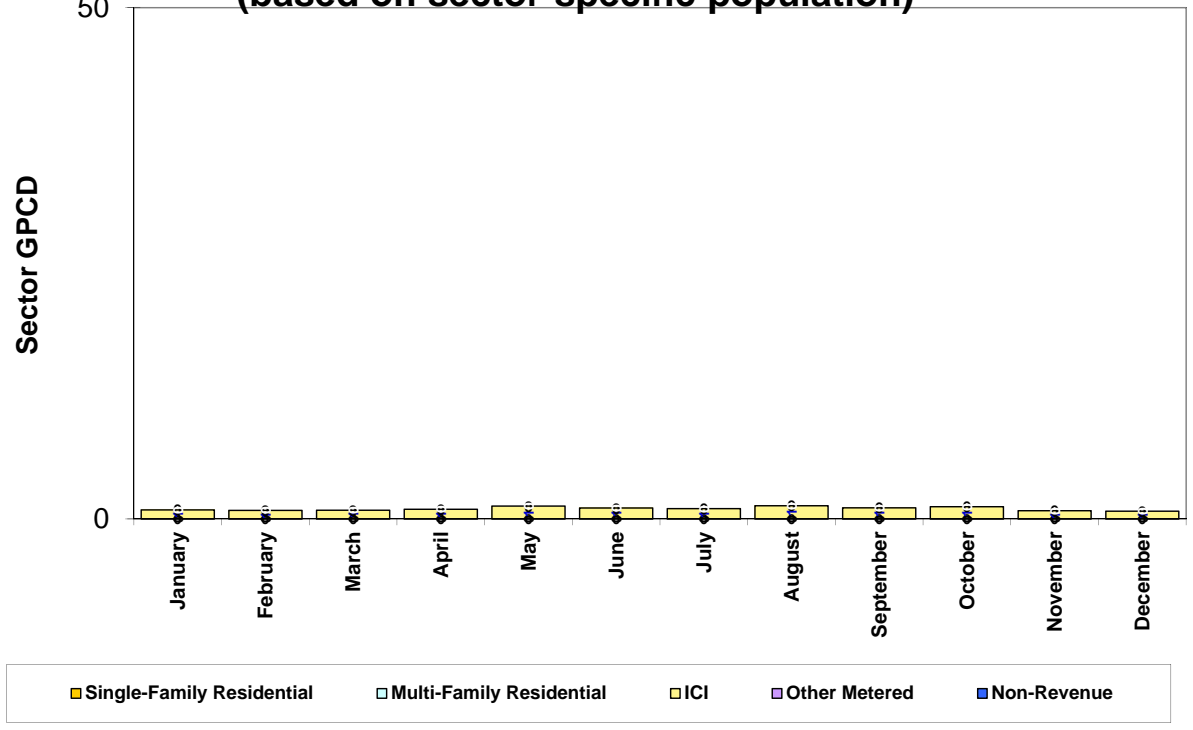
ICI

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	51.81	No Data	0.89	0.00	8.66
FEB	49.48	No Data	0.85	0.00	4.29
MAR	54.43	No Data	0.86	0.00	1.85
APR	71.56	No Data	0.96	0.00	3.99
MAY	101.77	No Data	1.26	0.00	-2.60
JUN	96.24	No Data	1.08	0.00	9.53
JUL	95.05	No Data	1.02	0.00	-2.45
AUG	90.20	No Data	1.29	0.00	0.25
SEP	64.35	No Data	1.10	0.00	8.66
OCT	61.43	No Data	1.20	0.00	3.48
NOV	48.63	No Data	0.82	0.00	4.82
DEC	50.00	No Data	0.77	0.00	7.75

Eldorado  
2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2013

Choose Sector

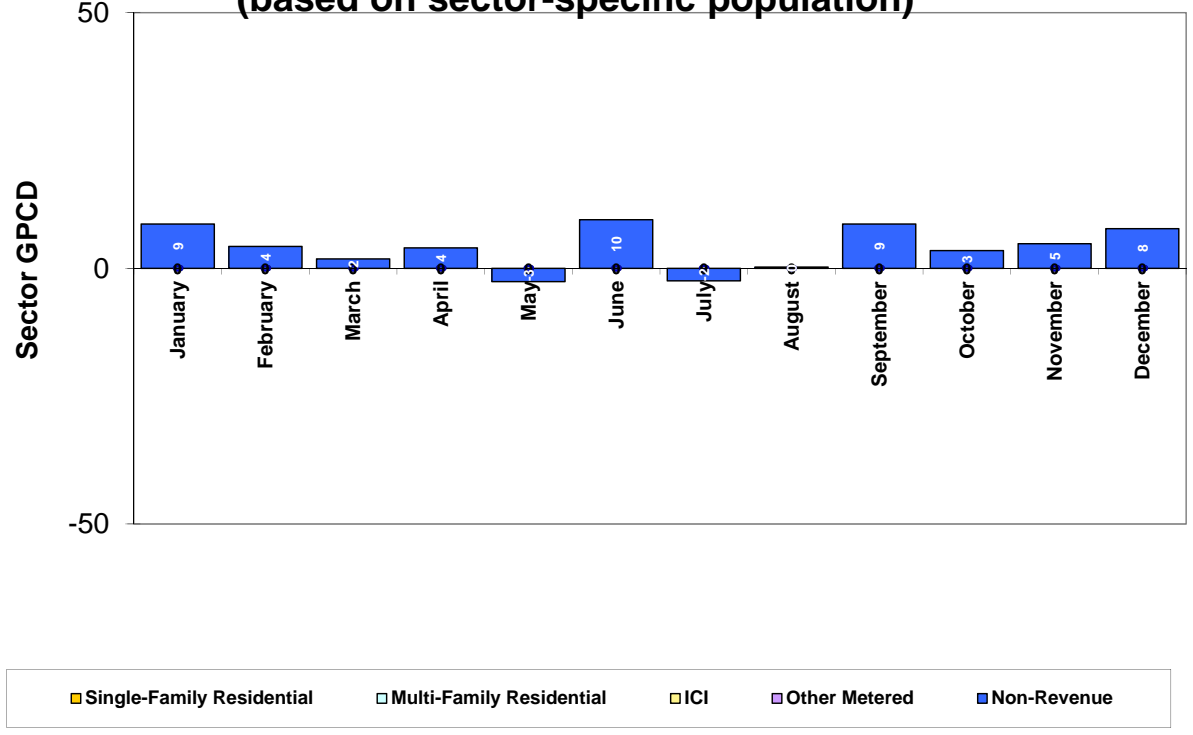
Non-Revenue

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	51.81	No Data	0.89	0.00	8.66
FEB	49.48	No Data	0.85	0.00	4.29
MAR	54.43	No Data	0.86	0.00	1.85
APR	71.56	No Data	0.96	0.00	3.99
MAY	101.77	No Data	1.26	0.00	-2.60
JUN	96.24	No Data	1.08	0.00	9.53
JUL	95.05	No Data	1.02	0.00	-2.45
AUG	90.20	No Data	1.29	0.00	0.25
SEP	64.35	No Data	1.10	0.00	8.66
OCT	61.43	No Data	1.20	0.00	3.48
NOV	48.63	No Data	0.82	0.00	4.82
DEC	50.00	No Data	0.77	0.00	7.75

Eldorado  
2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2014

Choose Sector

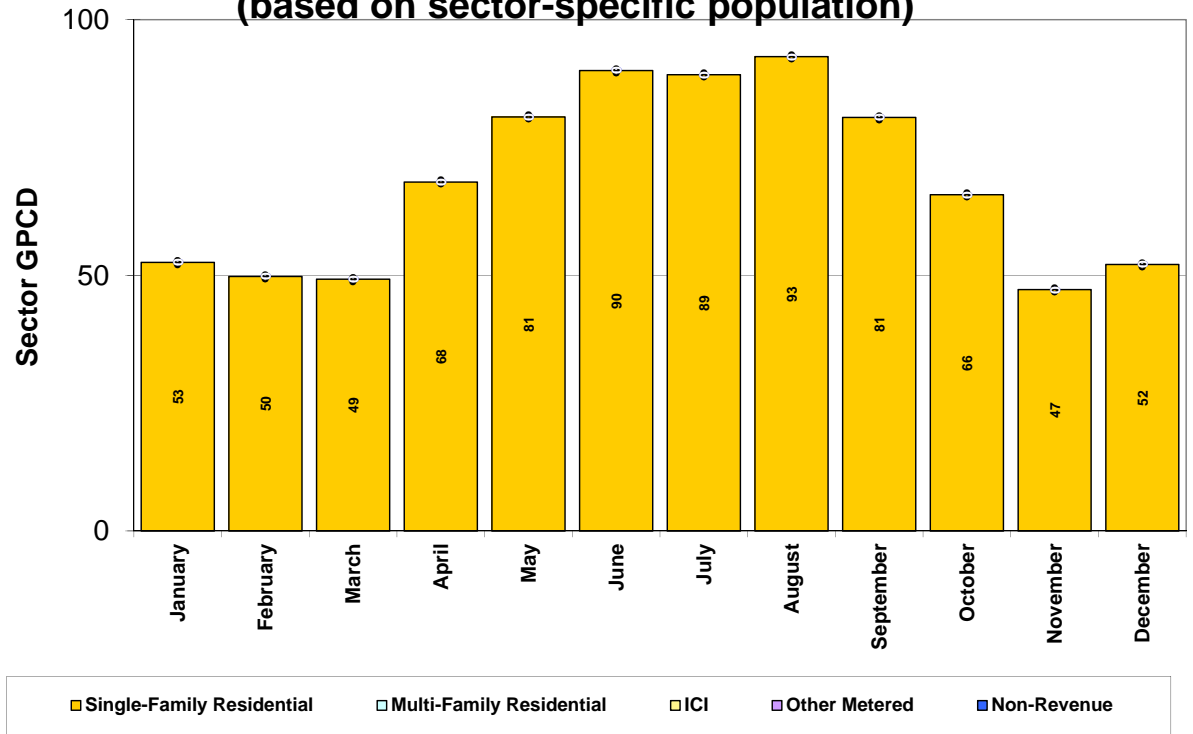
Single-Family Residential

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	52.55	No Data	0.87	0.00	2.93
FEB	49.78	No Data	1.36	0.00	5.76
MAR	49.24	No Data	1.57	0.00	9.44
APR	68.26	No Data	1.12	0.00	3.28
MAY	80.98	No Data	1.26	0.00	4.55
JUN	90.05	No Data	1.29	0.00	10.42
JUL	89.25	No Data	1.27	0.00	4.86
AUG	92.77	No Data	1.20	0.00	-5.78
SEP	80.89	No Data	1.49	0.00	4.86
OCT	65.78	No Data	1.36	0.00	3.75
NOV	47.22	No Data	0.94	0.00	9.00
DEC	52.14	No Data	0.97	0.00	3.66

Eldorado  
2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2014

Choose Sector

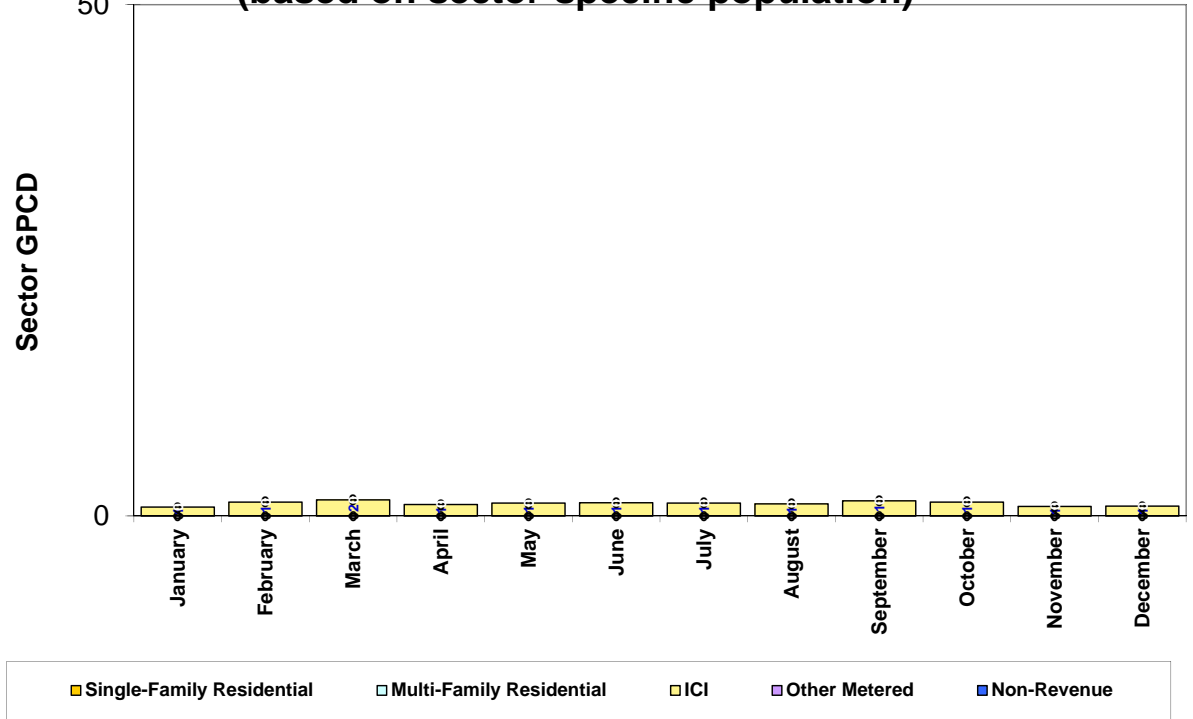
ICI

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	52.55	No Data	0.87	0.00	2.93
FEB	49.78	No Data	1.36	0.00	5.76
MAR	49.24	No Data	1.57	0.00	9.44
APR	68.26	No Data	1.12	0.00	3.28
MAY	80.98	No Data	1.26	0.00	4.55
JUN	90.05	No Data	1.29	0.00	10.42
JUL	89.25	No Data	1.27	0.00	4.86
AUG	92.77	No Data	1.20	0.00	-5.78
SEP	80.89	No Data	1.49	0.00	4.86
OCT	65.78	No Data	1.36	0.00	3.75
NOV	47.22	No Data	0.94	0.00	9.00
DEC	52.14	No Data	0.97	0.00	3.66

Eldorado  
2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



10. Monthly Reporting Performance

[Return to Instructions](#)

Choose Year for Monthly Analysis

2014

Choose Sector

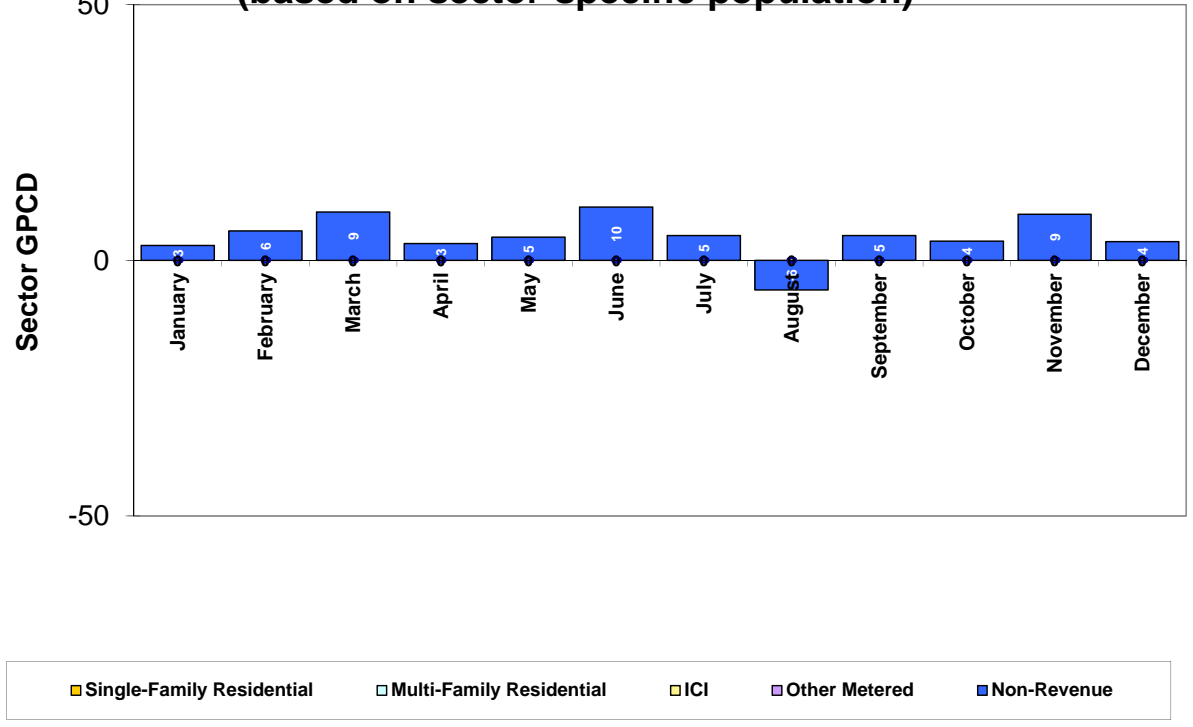
Non-Revenue

Monthly GPCD

	Single-Family Residential	Multi-Family Residential	ICI	Other Metered	Non-Revenue
Month	GPCD	GPCD	GPCD	GPCD	GPCD
JAN	52.55	No Data	0.87	0.00	2.93
FEB	49.78	No Data	1.36	0.00	5.76
MAR	49.24	No Data	1.57	0.00	9.44
APR	68.26	No Data	1.12	0.00	3.28
MAY	80.98	No Data	1.26	0.00	4.55
JUN	90.05	No Data	1.29	0.00	10.42
JUL	89.25	No Data	1.27	0.00	4.86
AUG	92.77	No Data	1.20	0.00	-5.78
SEP	80.89	No Data	1.49	0.00	4.86
OCT	65.78	No Data	1.36	0.00	3.75
NOV	47.22	No Data	0.94	0.00	9.00
DEC	52.14	No Data	0.97	0.00	3.66

Eldorado  
2014 to 2008

Monthly Analysis of GPCD - Viewer  
(based on sector-specific population)



**Appendix C: Phase II Water Rate Tier Structure and Water Surcharge Resolution No. 14-10-01**



**EAWSD PHASE II RATES EFFECTIVE WITH APRIL 2011 BILLS**

On December 16, 2010, the Board voted to implement Phase II rates. The new rates became effective with the March meter readings, and were billed in April, 2011.

**THE FORMER AND NEW RESIDENTIAL RATE SCHEDULES ARE SHOWN BELOW:**

<b>Residential</b>	<b>Former Rates</b>	<b>*New Rates</b>
	<b>Within/Outside District</b>	<b>Within/Outside District</b>
<i>Per metered connection:</i>		
Inside District	\$13.40	\$13.99
Outside District	\$37.90	\$38.49
<i>Water usage per 1,000 gallons:</i>		
3,000 gallons or less	\$9.40	\$10.00
3,000-6,000 gallons	\$10.50	\$11.20
6,001-10,000 gallons	\$13.00	\$13.90
10,001-20,000 gallons	\$17.00	\$18.20
20,000-30,000 gallons	\$24.00	\$25.70
Over 30,000 gallons	\$35.50	\$38.00

\*\* EXAMPLE: A residential customer using 3,000 gallons per month would pay \$43.99 per month under the new rates, an increase of \$2.39 monthly; similarly, a 6,000 gallon user would pay \$77.59, an increase of \$4.49 per month.

**THE FORMER AND NEW COMMERCIAL AND PUBLIC AUTHORITY RATE SCHEDULES ARE SHOWN BELOW:**

<b>Commercial</b>	<b>Former Rates</b>	<b>*New Rates</b>
	<b>Within/Outside District</b>	<b>Within/Outside District</b>
<i>Per metered connection:</i>		
Inside District	\$13.40	\$13.99
Outside District	\$37.90	\$38.49
<i>Water usage per 1,000 gallons:</i>		
10,000 gallons or less	\$12.50	\$13.00
10,001-18,000 gallons	\$19.00	\$19.80
18,001-30,000 gallons	\$29.50	\$30.60
Over 30,000 gallons	\$47.00	\$48.70

\*\* EXAMPLE: A commercial customer using 10,000 gallons per month would pay \$143.99 per month under the new rates, an increase of \$5.59 monthly; similarly, an 18,000 gallon user would pay \$302.39, an increase of \$11.99 per month.

**Resolution No. 14-10-01**

**Eldorado Area Water and Sanitation District**

**RESOLUTION TO ESTABLISH A WATER CONSERVATION SURCHARGE**

**WHEREAS**, the Board recognizes the need to conserve water as a precious resource and desires to encourage responsible water use and to discourage wasteful practices; and

**WHEREAS**, the Board desires to impose a water conservation surcharge to promote the conservation and efficient use of water resources; and

**WHEREAS**, the Board appointed a hearing officer and conducted a duly noticed public hearing on August 22, 2013 regarding the proposed water conservation surcharge; and


**WHEREAS**, after considering comments from all proponents and opponents of the proposal, on September 20, 2013 the hearing officer issued a decision stating the requisite procedures had been followed and that the record in the matter is sufficient for adoption of this Resolution with the amendments as shown in the Decision of Hearing Officer attached hereto as Exhibit "A."

**NOW, THEREFORE, BE IT RESOLVED** by the Board of Directors of the Eldorado Area Water and Sanitation District, as follows:

1. For residential customers, the water conservation surcharge is hereby approved in the amount of an additional fifty percent (50%) applied to each rate tier over 10,000 gallons per month.
2. For commercial customers, the water conservation surcharge is hereby approved in the amount of an additional fifty percent (50%) of the applicable rate applied to all usage in excess of 200% of the average monthly water use for that customer for the six-month period which includes the previous October through April.
3. The water conservation surcharge shall apply only during the <sup>4000</sup>months of May through August of each year.
4. Residential customers who would otherwise be subject to the water conservation surcharge may petition the Board for a variance on a case-by-case basis where there is evidence of leak or line break, that a meter reading was estimated or inaccurate, or in cases of exceptional circumstances. Line leaks, plumbing leaks, irrigation system failures, or similar problems that occur on the customer side of the water meter shall be resolved in accordance with Policy P10-08-01.
5. This Resolution shall become effective November 11, 2013.

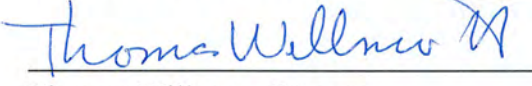
PASSED, APPROVED, AND ADOPTED this 3 day of October, 2013.

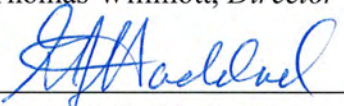
By:

  
James Jenkins, *President*

  
Jerry L. Cooper, *Vice President*

  
Stephen L. Wust, *Secretary*

  
Thomas Willmott, *Director*

  
George J. Haddad, *Director*

**Appendix D: Water Restrictions and Alert Management Plan (WRAMP)**



ELDORADO AREA WATER & SANITATION DISTRICT

# WATER RESTRICTIONS AND ALERT MANAGEMENT PLAN

Updated May 2014

**CONTENTS:** [Topic links directly to page](#)

**PURPOSE..... 2**

**STAGE 0: NORMAL CONDITIONS..... 2**

- Conditions
- Conservation Measures
- Water Conservation Surcharge

**STAGE 1: GUARDED CONDITIONS ... 3**

- Conditions
- Conservation Measures
- Enforcement
- Penalties

**STAGE 2: SEVERE CONDITIONS ..... 4**

- Conditions
- Conservation Measures
- Enforcement
- Penalties

**EMERGENCY CONDITIONS..... 4**

- Conditions
- Conservation Measures
- Enforcement
- Penalties

**ALERTS..... 5**

**VARIANCES AND APPEALS..... 5**

**WAMP GUIDELINES FOR ..... 6**  
**STORAGE TANK LEVELS**



## **ELDORADO AREA WATER & SANITATION DISTRICT**

1 Caliente Road, Suite F • Santa Fe, NM 87508 • (505) 466-2411

### **WATER RESTRICTIONS AND ALERT MANAGEMENT PLAN**

#### **➤ PURPOSE**

The Eldorado Area Water & Sanitation District (EAWSD) is dedicated to properly managing its water resources, including conservation and, under limited supply conditions, the restriction of use by rate-paying customers. At all times, appropriate conservation measures should be practiced by all water users supplied by EAWSD. Whenever the potential for water shortages appears, or temporary limitations in water supply occurs, additional conservation measures or usage curtailments, including restrictions, must be enforced in order to maintain a safe and reliable supply to EAWSD constituents. The periods of restrictions are announced via alerts to EAWSD customers and the general public. This plan sets out the various stages of water alerts, the triggers for those alerts, and the measures, including restrictions on water use, that will be enforced during alert stages.

#### **➤ STAGE 0: NORMAL CONDITIONS**

##### **CONDITIONS**

Normal conditions exist for most years and most of the year even during droughts. At this stage of normal conditions, wells can sustain the water supply to meet customer demand, water levels in the tanks are kept to necessary levels, and no major infrastructure supply disruptions have occurred.

##### **CONSERVATION MEASURES**

During Stage 0: Normal Conditions: Normal or typical effective conservation measures should be practiced by all. Please refer to the water conservation web page of EAWSD for recommended conservation practices:

<http://www.eldoradowaterdistrict.com/conservation/index.php>

##### **WATER CONSERVATION SURCHARGE — PER RESOLUTION N<sup>o</sup>. 14-10-01**

A water conservation surcharge will be imposed for water usage during the months of May through August as follows:

Residential customers using greater than 10,000 gallons per month, during the months of May through August, shall be charged a water conservation surcharge equal to 50% of the applicable water use charges for water usage over 10,000 gallons (Tiers 4,5 and 6 charges).

Commercial customers shall be charged a water conservation surcharge equal to 50% of the water use charges for water usage over 200% of the monthly average usage for the previous months of October through April.

Tables at the end of this document present guidelines for tank levels that may trigger Stage alerts, however, the General Manager or Board may direct a Stage Alert due to other factors.

## ➤ **STAGE 1: GUARDED CONDITIONS**

### **CONDITIONS**

Stage 1 will be put into effect when it appears that water supply may not be able to keep up with demand. Possible causes include, but are not limited to:

- One or more supply wells going off-line;
- Falling tank levels;
- Leaks or line breaks; or
- Unanticipated high demand.

Stage 1 may also be put into effect in anticipation of supply lagging demand, often occurring during drought periods or extended periods of exceptionally hot weather.

### **CONSERVATION MEASURES**

In Stage 1, conservation measures beyond "Normal" are imposed, which include:

- A. Outdoor watering is restricted to one of the following two options of the customer's choosing:
  1. THREE WEEKDAYS, including Monday, Wednesday and/or Friday (NO WEEKEND WATERING); OR
  2. TWO days per week including ONE weekend day as follows:
    - a) Odd-numbered house addresses on Tuesday and Saturday;
    - b) Even-numbered house addresses on Thursday and Sunday;
- B. *No* watering of lawns;
- C. *No* new in-ground planting of any trees or shrubs;
- D. *No* outdoor watering between 9:00 am and 6:00 pm;
- E. *No* washing of outdoor hard surfaces (e.g., driveways, patios, sidewalks);
- F. *No* washing of vehicles, including recreational vehicles or trailers; and
- G. *No* filling or adding water to pools or outdoor water features (e.g., fountains, ponds). Covered outdoor spa/hot tubs are allowed.

### **ENFORCEMENT**

All Stage 1 conservation measures are MANDATORY.

## PENALTIES

1st violation: Verbal warning - documented

2nd violation: Written notice of violation

3rd and subsequent violations: Water service turned off. Water service may only be turned on with written approval from the General Manager of EAWSD. All costs for reinstating service will be at prevailing District rates.

## ➤ STAGE 2: SEVERE CONDITIONS

### CONDITIONS

Stage 2 will be declared when it is anticipated that supply will be insufficient to maintain appropriate levels of system function, generally when tank levels cannot be maintained above 60-70% full.

### CONSERVATION MEASURES

All conservation measures specified in Stage 1 are in effect, with the following additions and modifications:

- A. Outdoor watering is restricted to ONE weekday per week, as follows:
  - 1. Odd-numbered house addresses on Tuesday OR Wednesday;
  - 2. Even-numbered house addresses on Thursday OR Friday;
- B. *No* new in-ground planting of any kinds of plants or vegetation;
- C. *No* filling or adding water to pools or outdoor water features (e.g., fountains, ponds) or to spa/hot tubs; and
- D. *No* water may be used for construction purposes.

### ENFORCEMENT

All Stage 1 and 2 conservation measures are MANDATORY.

### PENALTIES

1st violation: Written notice of violation

2nd and subsequent violations: Water service turned off. Water service may only be turned on with written approval from the General Manager of EAWSD. All costs for reinstating service will be at prevailing District rates.

## ➤ EMERGENCY CONDITIONS

### CONDITIONS

Emergency Conditions may be declared when it has been determined by District officials that a situation exists that places the integrity of the system at risk.

## CONSERVATION MEASURES

Emergency managers may impose whatever measures are necessary to maintain system integrity. Designated personnel, responsibilities, and implementation shall be as specified in the EAWSD Emergency Response Plan.

## ENFORCEMENT

All Stage 1 and 2 conservation measures are MANDATORY during the declared Emergency Conditions, with the additional restriction that *NO* outdoor water use is allowed.

## PENALTIES

Emergency managers may turn off water service with a single violation, if the emergency managers determine that such a violation compromises the integrity of the system. If the violation does not compromise the integrity of the system, penalties shall be as in Stage 2: Severe Conditions.

## ➤ ALERTS

Any change of Stage status shall be accompanied by alerts to the public. EAWSD shall issue the alerts, which shall include at least the following:

- ✓ Posting on the EAWSD web site @ <http://www.eldoradowaterdistrict.com>;
- ✓ Contacting the designee for each homeowners' association served wholly or in part by the District water system;
- ✓ Notification to the *Santa Fe New Mexican* and the *Albuquerque Journal North*;
- ✓ Notification to KSFR radio;
- ✓ Notification in the monthly billings;
- ✓ Posting at the Agora shopping center.

EAWSD will accept notification of possible violations from residents; however, no warnings or notices of violation shall be issued, nor any penalties imposed, unless District or Operations staff witness or document evidence of the violation.

## ➤ VARIANCES AND APPEALS

Any variance to the measures specified in this WAMP must be made in writing to the EAWSD Board prior to any Stage alert. Variances can only be approved by a vote of the Board, and must be for good cause. If a variance is requested due to medical needs, the applicant must present verification of those needs from a licensed medical professional.

Water users may appeal any penalty to the EAWSD Board. Appeals may only be granted by a vote of the Board. Each appeal will be heard on its individual merits and any decision by the Board will be at its discretion.

**ELDORADO AREA WATER AND SANITATION DISTRICT  
WAMP Guidelines for storage tank levels**

Summer Operation	Tank Level	Length of Time <sup>1</sup>	Well Run Time	Comments
Normal Operation	80 to 90 % full	7 consecutive days	60% or less Weekly	Holding tank levels at 90% is hard on pumps due to excessive cycling
Stage One Conservation	No More than 70%	7 consecutive days	Greater than 60% of the time	See note 1 below
Stage Two Conservation	No More than 50%	7 consecutive days	Greater than 60% of the time	See note 1 below

<sup>1</sup> Number of days that pumps run more than 60% of time to achieve related tank level, i.e. if the pumps run >60% of the time for 7 consecutive days and can achieve no more than 70% tank level, Stage One Conservation measures go into effect.

WAMP	Tank Capacity in Percent	Tank Capacity in Gallons	Full Tank Capacity
	100%	2,500,000	2,500,000
Normal Operation 80 to 90 %	80%	2,000,000	2,500,000
Stage One Conservation 70%	70%	1,750,000	2,500,000
Stage Two Conservation 50%	50%	1,250,000	2,500,000