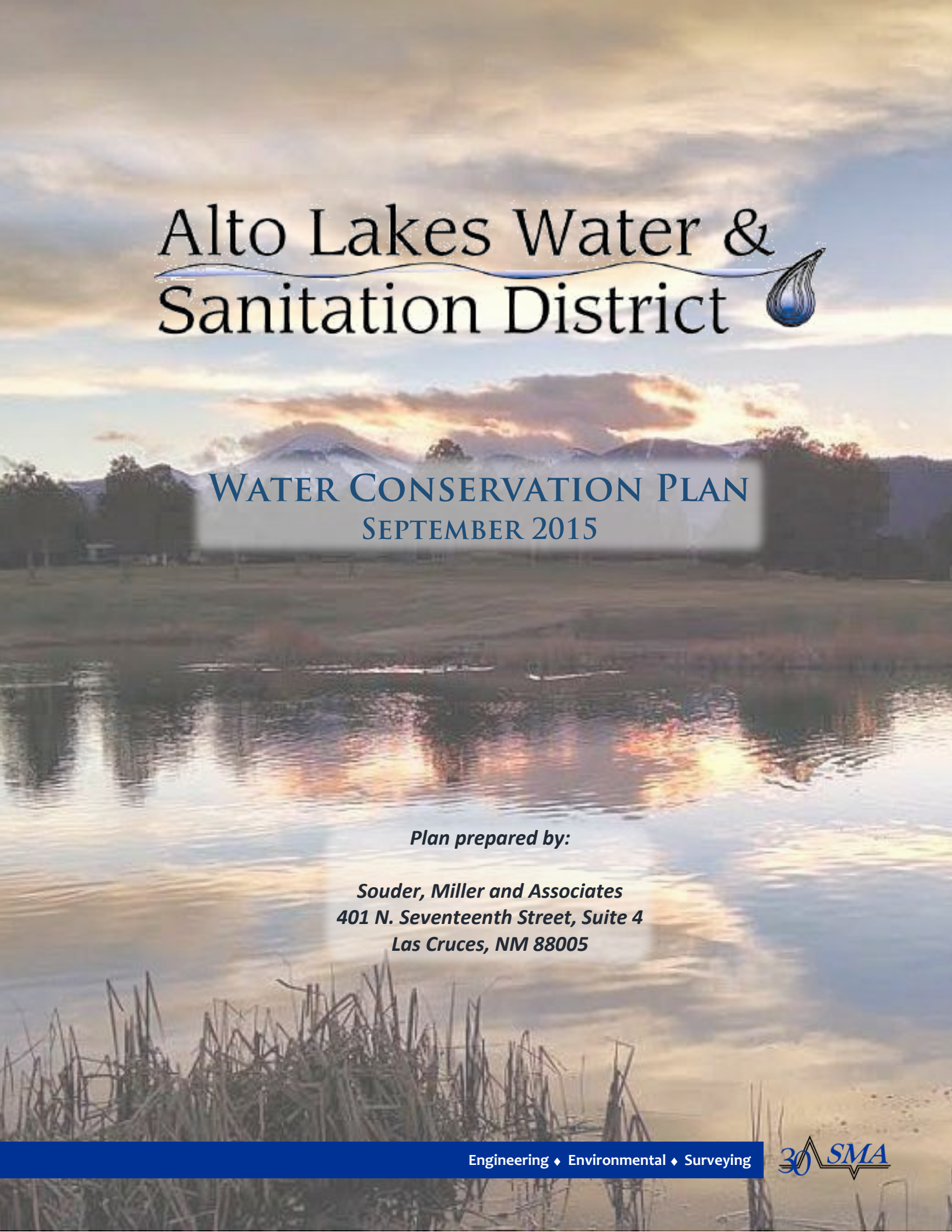

Alto Lakes Water & Sanitation District

Water Conservation Plan
September 2015

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Engineering ♦ Environmental ♦ Surveying

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Abbreviations and Acronyms

AFY	acre-feet per year
ALGCC	Alto Lakes Golf & Country Club
ALWSD	Alto Lakes Water & Sanitation District
AWWA	American Water and Wastewater Association
EPA	Environmental Protection Agency
GPCD	gallons per capita day
gpd	gallons per day
gpm	gallons per minute
HDPE	High density polyethylene
ICI	Industrial, commercial and institutional
mfr	multi-family residence
MG	million gallons
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
PER	Preliminary Engineering Report
PSCI	Parkhill, Smith and Cooper, Inc.
psi	pounds per square inch
PVC	polyvinyl chloride
SCADA	System Control and Data Acquisition
sfr	single family residence
SMA	Souder, Miller & Associates
USDA	United States Department of Agriculture
USEPA	Unites States Environmental Protection Agency

Executive Summary

The Alto Lakes Water and Sanitation District (ALWSD) provides potable water to the Alto Lakes community, Kokopelli subdivision, and Eagle Creek II subdivision. These unincorporated communities are located in the Sacramento Mountains of Lincoln County, New Mexico, approximately five miles north of Ruidoso, NM. The ALWSD serves an area of approximately 3.8 square miles.

The system serves 1,252 residential connections, 19 small commercial connections (i.e. condominiums), and 3 large commercial connections (i.e. Alto Lakes Golf and Country Club). Of the 1,271 residential connections, 724 are active 10-12 months per year, 313 are active at 6-9 months per year, and 215 are active 5 months or less per year.

The majority of the ALWSD distribution system consists of 2 and 3-inch diameter pipe with some segments of 6 and 10-inch pipe. Much of the 2 and 3-inch diameter pipe was installed in the 1960's and 70's. The system has over 25 pressure reducing stations to regulate pressures in the system. In 2012, a 8-inch waterline was installed (including necessary pressure reducing stations) to replace the existing waterline along French Drive, Deer Park Drive and High Mesa Drive from the water tanks towards the east end of the line.

The ALWSD system is supplied by four wells used for domestic demands and three wells available for providing irrigation water to the golf course. The domestic wells can provide up to 520 gpm according to the Preliminary Engineering Report (PER) by Parkhill, Smith & Cooper, Inc. (PSCI), dated November 2008.

Several studies of the ALWSD system have been performed in the last 10 years and the condition of the water system has been well documented. Recommendations have included the addition of water treatment, system integrity, reliability and improved fire protection capability.

An AWWA Water Audit and NMOSE GPCD analysis was performed as part of this work and those documents are included as attachments to this Water Conservation Plan. The Water Audit identified several areas where infrastructure and operational improvements can be made to increase the overall efficiency of the water system.

The GPCD analysis showed the total present use for the ALWSD water system to be approximately 74 gallons per capita per day (GPCD). Based on the PER by PSCI, approximately 40% of the homes in the District's service area are occupied by full-time residents with the remainder used as seasonal homes. Since the community is made up of both part time and full time residents, the number of people per household is not easy to determine. When compared to other communities in southeast New Mexico 74 GPCD is relatively low. Usage levels are likely lower than average due to the seasonal nature of the area and the aggressive rate structure which promotes conservation. All of the system's water is metered and billed, unless it is lost through leakage within the distribution system.

ALWSD reviewed the findings of the AWWA Water Audit and the GPCD report, along with potential Water Conservation Best Management Practices (BMP's) to determine the best strategy to conserve water and increase the efficiency of the water system.

The District has adopted the following goals for the water conservation program:

- Reduce nonrevenue water to below 15% by 2025,
- Maintain residential gallon per capita day (GPCD) at or below 75 for the next five years,
- Reduce outdoor water use,
- Reduce water waste,
- Reduce peak summer demands for more efficient system operation and reduced energy use,
- Reduce pumping and treatment costs,
- Educate the public about water conservation, and
- Increase the water audit data validity score from 85 to 90 by 2025.

ALWSD has a robust existing conservation program that includes watering restrictions based on projected supply and prohibition of water waste. In addition, the District adopted a stringent conservation ordinance that mandates the use of drip irrigation by December 31, 2016. The existing plan and pending ordinance directly correlate to the District's goal to reduce residential per capita use, reduce outdoor water use, reduce water waste and reduce summer demands.

As noted in the last bullet point, the ALWSD has set a goal to increase the AWWA Water Audit Data validity score from the present 85 up to 90 by 2020. The largest problem identified by the audit for the ALWSD Water System is the moderate level of unaccounted for water (water loss at 18%). By implementing the improvements suggested in the Data Validity scores, this amount of unaccounted for water should be greatly reduced.

1. Data Collection and System Overview

1.1. Purpose

The purpose of this document is to set forth a water conservation program for the ALWSD to reduce water use to the maximum feasible extent to ensure that the community has a sustainable and affordable long term water supply in the face of diminishing water sources.

In the last few years, unfortunately the area has been threatened by forest fires that may require flows above the current system capacity. The Lincoln County fire protection requirements are meant to guard against house fires contained to a single dwelling and not large scale forest fires. Based on the PER by PSCI, the District's first priority is to replace small and substandard piping to provide improved fire flow.

Because of the recent fire threats, the residents within the ALWSD service clearly understand the value of water and place a high priority on conserving this resource. The Water Conservation Plan will provide strategic direction to the District's water conservation efforts and will assist with the development of a water conservation policy to help encourage the best possible use of limited resources.

1.2. Planning Team

To accomplish the preparation of this Water Conservation Plan, a Planning team made up of ALWSD and Souder, Miller & Associates personnel was assembled. This team has the ability to provide information and monitor, assess and implement the Water Conservation Plan.

The ALWSD representative on the Planning Team is the District Manager, David Edington. The Souder Miller representatives on the team are Project Engineer Judith Gallardo, P.E., and Water Conservation Specialist Marty Howell, P.E.

1.3. Local Conditions

1.3.1 Location

The ALWSD service area is located in the Sacramento Mountains of Lincoln County, New Mexico, approximately five miles north of Ruidoso. The service area spans 3.3 miles east to west and 2.3 miles north to south and it ranges in elevation from 6,915 to 7,550 feet above sea level.

In addition to the residents within the District, the Kokopelli and Eagle Creek II subdivisions are also served by ALWSD. The ALWSD provides water service to residential and commercial properties (homes, condominiums, and a golf course).

Figure 1. ALWSD Location Map

1.3.2 Water Supply Overview

The ALWSD obtains its water supply for domestic demands from four primary production wells that are located in the Hondo Underground Water Basin. The Hondo Underground Water Basin (Rio Hondo Drainage Basin) extends from the north of Otero County, through the Southeast of Lincoln County and into mid-northwestern boundary of Chavez County, with the bulk of the aquifer being in Lincoln County (**Error! Reference source not found.**). The basin comprises about 1,400 square miles.

ALWSD has four wells (Wells E1, E2, E4, and E5) used for domestic demands and three wells (Wells S-6, 12, and 16) available for providing irrigation water to the golf course. The domestic wells are located along the southern boundary of the service area, while the irrigation wells are located on the norther boundary of the service area.

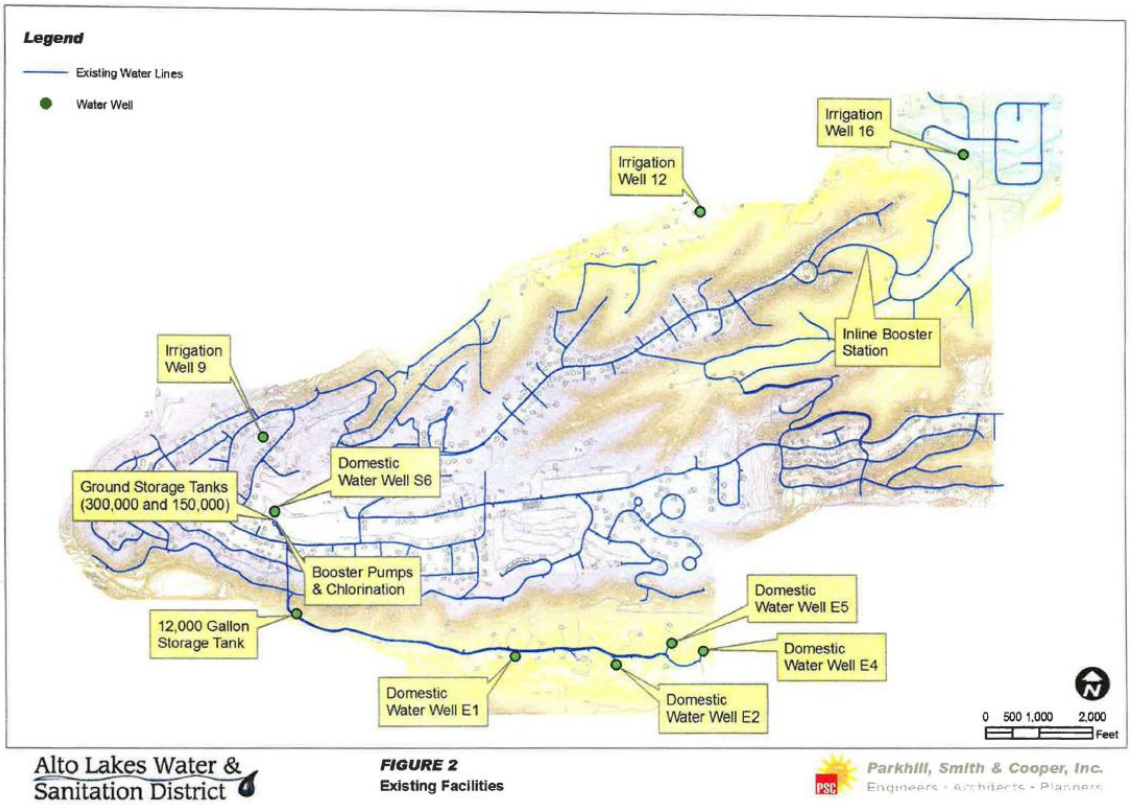


Figure 2. ALWSD Water System (PSCI, 2008)

Ground water supply in the basin fluctuates with precipitation. According to Mourant, water levels have remained relatively stable in the western and central parts of the basin. Water levels in the eastern portion of the San Andres Limestone have been lowered as a result of large withdrawals for irrigation in the Roswell artesian basin, which the Hondo Valley is hydrologically connected. The geologic formations in the Hondo basin range in age from Permian to Recent. The San Andres Limestone, of Permian age, and the alluvium of Quaternary age are the only formations that yield large supplies of water to wells. The San Andres yields as much as 2,000 gpm to wells, and the alluvium in the main valleys of the Rio Hondo, Rio Bonito, and Rio Ruidoso yields as much as 3,500 gpm to wells. (Mourant, W.A.)

Currently, ALWSD has an annual average usage rate of 233 gallons per minute (gpm) including irrigation needs and 105 gpm considering only domestic (residential and commercial) needs. The peak day demand is estimated to be 420,000 gpd.

Water is pumped from the supply wells to a 60,000-gallon storage tank prior to treatment. Water is drawn from the storage tank through an iron and manganese treatment system, and stored in a 6,000-gallon finish storage tank at the treatment plant and chlorinated prior to being pumped into the two main storage tanks (300,000 and 150,000 gallons). Water is drawn from the main storage tanks and pumped to the distribution system through an adjacent booster station.

Pipe	Quantity, LF
2-inch PVC	300
3-inch PVC	26,400
4-inch PVC	23,760
6-inch PVC	29,505
8-inch PVC	26,642
6-inch DI	1,130
8-inch DI	4,342
8-inch HDPE	10,200

Table 1. ALWSD Water System Water Line Summary

As shown in Table 1, the pipe system is comprised of 2-inch to 8-inch pipe including polyvinyl chloride (PVC), ductile iron and HDPE.

The District's pump meter readings indicated that 62.5 million gallons were pumped from their wells from in 2014. That is equal to an average of 171,000 gallons per day. Based on usage data from that same time period, the District sold 139,000 gallons per day (46.6 MG/year), or 110 gallons per day per connection. Population for Alto Lakes is difficult to accurately estimate because of the seasonal nature of the development. Using an average household size of 1.7 (used by NMED), Alto Lakes residents use 65 gallons per capita per day. Comparing metered usage to billed usage, it appeared the District had 19% unaccounted water usage in 2014.

Item	Annual Volume (gallons)
Water Production[1.]	62,552,616
Metered Water Use[1.]	50,616,430
Un-accounted Water (19%)[1.]	11,936,186

1. Excluding Irrigation

Table 2. Calendar Year 2014 Water Balance

The variance between produced water and metered usage, referred to as unaccounted for water, amounts to a loss of 19 percent. These losses can be attributed to leaks, pipe breaks, and meter inaccuracy. The U.S. Environmental Protection Agency (USEPA) recommends that the maximum unaccounted loss be in the range of 10 to 15 percent (USEPA, 2010).

In response to historically higher unaccounted water usage, ALWSD replaced older, leaking water lines along High Mesa, French Drive and Deer Park in 2012 with new 8-inch PVC pipe to reduce the amount of water loss due to leaks and pipe breaks along these mains.

The next steps being pursued to improve the ALWSD water system will include continuing to replace older waterlines and the implementation of an effective water conservation plan, of which this document is the first step.

1.3.3 Demographics

The water supply and distribution infrastructure of Alto Lakes was constructed by a developer beginning in the late 1960's. The distribution system was developed in small increments as indicated by the minimal backbone system and the various pipe sizes and piping materials extended to the outlying areas. In 1990, the system was acquired out of bankruptcy by the Alto Lakes Water Corporation, a private company which was regulated by the New Mexico Public Regulatory Commission. In April of 2008, the Alto Lakes Water & Sanitation District purchased the water and wastewater assets from the Water Corporation and now operates the system as a public entity with the intention of improving the water quality and the distribution system operation while taking advantage of public programs developed to help public water utilities meet State and Federal standards for drinking water supplies.

The system serves 1,252 residential connections, 19 small commercial connections (i.e. condominiums), and 3 large commercial connections (i.e. Alto Lakes Golf and Country Club). Of the 1,271 residential connections, 724 are active 10-12 months per year, 313 are active at 6-9 months per year, and 215 are active 5 months or less per year. The seasonal nature of the residents could be interpreted as a 29% vacancy rate averaged over an entire year.

Approximately 1,252 of the 2,050 lots in the Alto Lakes community are occupied by homes. The remaining vacant lots are scattered throughout the community. The ALW&SD also serves domestic water to two areas outside of the District: the Kokopelli subdivision which includes about 10 lots currently (120 total obligation), and the Eagle Creek II subdivision which includes about 8 lots currently (25 total obligation).

While the number of connections has increased over time, the water use, on a per meter basis, has been shown to be declining at a rate of approximately one percent per year. The reduction in use is likely due to a steeply rising conservation rate schedule and to strong water conservation restrictions.

1.3.4 Housing

There are currently 1,274 meters in the ALWS&D service area. Two of the meters serve large commercial users and 22 serve small commercial users. The remaining meters are residential. Build-out is estimated at 1800 lots/meters due to lot consolidations and some lots being located on exceedingly steep slopes. The meter growth from 1998 through 2007 averaged 3.8% per year, however, growth has diminished to in the ensuing years. While the 2008 PER by PSCI predicted build out of the service area by 2018, economic conditions have significantly reduced growth, with only eight new connection added per year since 2007 (0.7% growth rate). If growth rates returned to previous levels, build out could occur by 2026. However, if those rates remain low, build out could not occur for nearly 50 years.

1.3.5 Temperatures and Precipitation

The Alto Lakes region is entirely reliant on ground water for water supply. There are no surface-water sources to develop. Precipitation, season, and temperature play major roles in the demand for irrigation water, and oil and gas development activities play a major role in commercial sales of fresh water.

Precipitation and climate data can be used for estimating water demands during drought conditions, and developing drought contingency plans. Alto Lakes is located in the Sacramento Mountains, which is characterized by warm summers, mild fall and spring temperatures, and cold winters. Historical temperature and precipitation data from 1941 to 2014 is presented below in Table 3.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg Max Temperature (F)	49.5	51.8	57.5	65.4	73.8	81.8	81.4	79.4	75.2	66.9	57.2	50.4	65.9
Avg Min Temperature (F)	18.7	20.3	24.1	29.5	35.8	43.1	49.0	48.2	41.7	32.3	23.3	19.0	32.1
Avg Total Precipitation (in.)	1.14	1.09	1.11	0.73	0.95	2.02	4.03	4.21	2.53	1.57	0.81	1.57	21.76
Avg Total Snow Fall (in.)	9.0	7.6	6.3	2.1	0.1	0.0	0.0	0.0	0.0	1.2	3.3	8.7	38.1
Avg Snow Depth (in.)	1	1	0	0	0	0	0	0	0	0	0	1	0

Source: http://www.wrcc.dri.edu/
Period of Record: 12/22/1941 to 10/13/2014

Table 3. Ruidoso, NM - Period of Record Monthly Climate Summary

Historical precipitation data from 1941 to 2010 show an average of 22 inches per year as shown in Table 3 and Figure 3. This figure also shows the minimum annual precipitation of approximately 9 inches occurred in 1945, and the maximum annual precipitation of approximately 35 inches occurred in 1965. Periods of drought (below average precipitation) and above average periods of precipitation can also be observed on Figure 3.

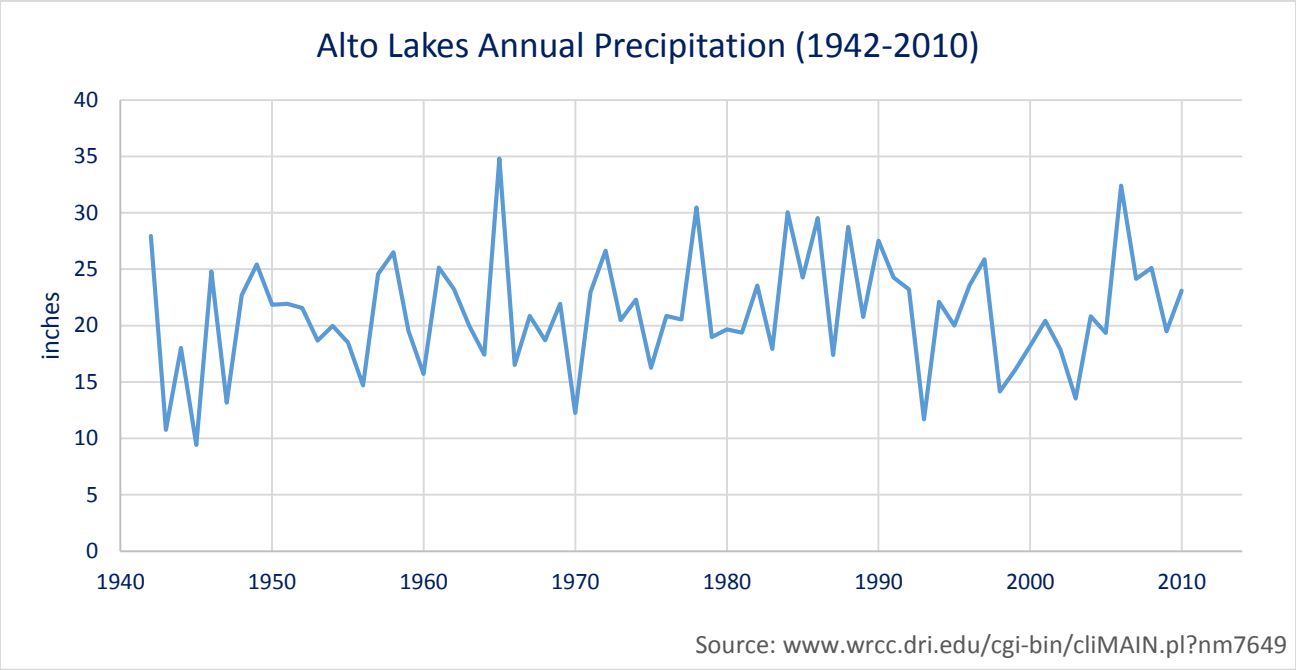


Figure 3. Hydrograph Showing Annual Precipitation at Ruidoso Weather Station No. 297649, 1942 through 2010

The majority of the annual precipitation occurs during the summer months (June through September), as shown on Figure 4. The comparison of monthly potential evaporation vastly exceeding precipitation is show in **Error! Reference source not found.**.

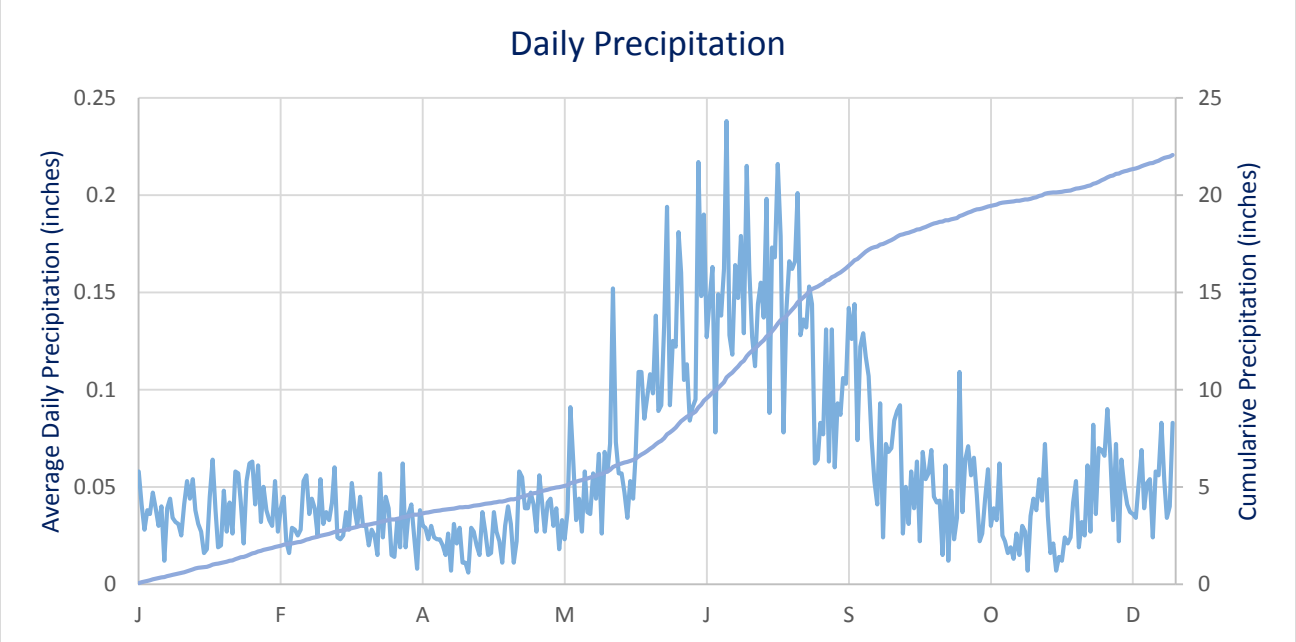


Figure 4. Hydrograph showing Daily Average Precipitation and Cumulative Daily Precipitation at Ruidoso Weather Station No. 297649, 1941 through 2014

ALWSD also provides irrigation water from three separate wells to the Alto Lakes Golf and Country Club. Since 1995, the District has provided an average of 67 million gallons per year of irrigation water.

1.3.6 Other Local Conditions – Water Rights Analysis

ALWSD owns the right to divert a total of 613.94 acre-feet per year with water rights contained in NMOSE File No. H-719-1 and H-719-2 (leased). Tables 4a and 4b summarize the District's current water rights and supply well inventory.

File No	Volume (acre-feet/year)	Priority
H-719-1	67.4	1867
H-719-1	434.54	1964
H-719-2	112.0	1866
Total	**613.94**	

Table 4a. Water Rights Summary

NMOSE File No	ALWSD File No	UTM X	UTM Y	Status
H 00719	H-719	438033	3695111	Inactive
H 00719 S	H-719-S	437226	3695517	Inactive
H 00719 S2	H-719-S-2	439622	3697123	Inactive
H 00719 S3	H-719-S-3	438224	3695933	Inactive
H 00719 S4	H-719-S-4	438224	3695933	Inactive
H 00719 S5	H-719-S-5	438610	3695739	Inactive
H 00719 S6	H-719-S-6	437824	3695726	Inactive
H 00719 S7	H-719-S-7	437624	3695926	Inactive
H 00719 S8	H-719-S-8	437822	3696128	Inactive
H 00719 S9	H-719-S-9	438220	3696134	Inactive
H 00719 S11	H-719-S-11	439622	3697123	Active
H 00719 S13	H-719-S-13	441634	3697901	Inactive
H 00719 S14	H-719-S-14	441834	3697901	Active
H 00719 S16	H-719-S-16	439188	3694933	Active
H 00719 S17	H-719-S-17	439794	3694920	Active
H 00719 S18	H-719-S-18	439388	3694933	Inactive
H 00719 S19	H-719-S-19	440202	3694906	Active
H 00719 S20	H-719-S-20	439794	3695120	Active
H 00719 S22	H-719-S-21	442033	3697701	Inactive

Table 4b. Supply Well Summary

2. Assessing Alto Lakes Water System Performance

2.1 Data Results and Analysis, AWWA Water Loss Control Committee (WLCC) Free Water Audit Software Reporting Worksheet

2.1.1 Performance Indicators

The American Water Works Association (AWWA) developed a standard water audit methodology that accounts for all water uses within a common water provider's system. The audit focuses on supply-side uses. AWWA also created a free spreadsheet tool to facilitate completing the audit. The water audit provides a systematic method to organize water diversion data and track its path through the distribution system. The main result of this analysis is "nonrevenue water," which is an estimation of water losses, theft, meter inaccuracies, and non-billed authorized consumption.

Based on the audit methodology, the ALWSD shows approximately 18% nonrevenue water. However, this is a moderately high value and specific steps can reduce this amount of nonrevenue water. The AWWA spreadsheet for the ALWSD is located in Appendix A.

The Audit Data Results are as follows:

a. Financial –
   The annual cost of apparent losses is $5,391. This is a relatively small number and is primarily the result of the new waterlines recently installed in 2012. Although, ALWSD replaces their customer's meters every ten years, a meter testing program to verify meter accuracy has not been put in place yet. A meter testing program would improve this score.

   The annual cost of real losses is $11,148. This cost is more significant and is higher due to the estimated 18% of nonrevenue water figure found in the audit. The 2014 residential and commercial use figures total to 51.386 MG/year which is reasonable for a system with an estimated population of 2,783 residents (1,271 residential meters x 2.19 residents/home).

b. Operational Efficiency
   The apparent losses per service connection per day is estimated to be 0.59 gallons/connection/day. This number was determined with the default estimation of 0.25% unauthorized use along with a default estimation of 1.5% meter accuracy figure, and an estimation of 0.127 MG/year for systematic data handling errors.

   As will be discussed more in detail during the data validity score analysis, the ALWSD does not presently have a set of procedures established to document or calculate unauthorized water use. The creation of clear policies and good record keeping procedures are recommended to quantify and limit unauthorized water use.

   As noted earlier, all of the ALWSD system meters are replaced every ten years but a meter testing program has not yet been implemented. It is the intent of the ALWSD to begin testing the meters regularly to verify accuracy and allow for the strategic replacement of meters as they age.

2.1.2 Data Validity Score

The overall data validity score for the ALWSD water system was 85 out of 100. This is an above average score, which is representative of the system's scores for each of the individual data categories, which varied between 7 and 10 of 10.

High scores (8 and above) were received in the several categories. Although meters are replaced every ten years, an official meter accuracy testing program will need to be set in place to assure a maximum accuracy of +/- 3%. This will help improve the data quality to a score of 10 in their next water audit.

Billed Metered Consumption is another area where the ALWSD received a relatively high score. Recommendations by the audit to qualify for a 10 include launching an Automatic Meter Reading (AMR) or system, implement and continue with an accuracy testing program, budget for meter replacement, and continue annual detailed billing data auditing by utility personnel and conduct a third party auditing at least once every three years.

Customer Meter Inaccuracy Volume is also another category which received a high score. In order to qualify for a 9 or higher on the next audit, efforts to manage meter population with reliable recordkeeping must continue, and an accuracy testing program must be in place.

The Average Operating Pressure score, although high, can be improved by obtaining a system-wide average pressure value from the hydraulic model of the distribution system and confirming the modeled pressure with comparisons to actual system measurements.

The Customer Retail Unit Cost's score of an 8/9 of 10 can be improved by conducting a periodic third-party audit of water used in each level by all classifications of users.

Two of the data categories received average scores (7). Master Meter and Supply Error Adjustment received a 7 of 10 along with the recommendation to ensure that all flow data is collected and archived on at least an hourly basis, all data is reviewed and detected errors are corrected each business day, and implementing an official inaccuracy testing program. The District has plans to add this capacity to the existing SCADA system in the next year. Length of Water Mains received a data score of 7 of 10. The audit recommends implementing a geographic information system and asset management system to manage infrastructure data. The District is also planning to begin an asset management plan this year.

2.1.3 Priority Areas for Attention

The following improvements were recommended by the audit to improve the District's water management:

a. Establish meter testing and electronic calibration procedures to be conducted annually on all production meters.
b. Establish a customer meter accuracy testing program for all water use meters.
c. Establish clear policies and record keeping procedures for tracking unauthorized consumption.
d. Continue the replacement of older waterlines in the system to reduce water losses associated with leakage and line breaks.
e. Set up clear procedures to add records of new lines placed into the system. Work toward setting up an Asset Management Plan for the water system.
f. Work toward setting up pressure reading equipment at various locations around the system to accurately gauge pressure zone readings. Use telemetry or dataloggers to read and record system pressures.

2.2 Data Results and Analysis, GPCD Calculator Table

Census information is not available for the ALWSD, but is required to complete the New Mexico Office of the State Engineer (NMOSE) gallon per capita per day (GPCD) spreadsheet. The spreadsheet was utilized with census data from the nearby village of Ruidoso as well as housing estimates based on water usage records.

The NMOSE spreadsheet was completed using:

- Single Family Residential (SFR) meter totals and usage for the years 2013 and 2014
- Estimated population and vacancy rates based on historic water use data
- Multi-Family Residential monthly meter totals from 2008 to 2014 for 19 connections
- Industrial, Commercial & Institutional (ICI) monthly meter totals from 2008 to 2014 for three connections
- A total metered residential use in 2014 of 48,760,360 gallons and total metered ICI use of 1,876,070 gallons

When reviewing the overall 2008-2014 water system data to see if it was reasonable, the figures show the usage to vary almost 25 GPCD throughout the reported years. The largest variation in this usage is in "non-revenue water," while single-family usage only varies by 10 GPCD.

Figure 5 illustrates the annual GPCD estimates from 2008 to 2014 produced by the NMOSE spreadsheet.

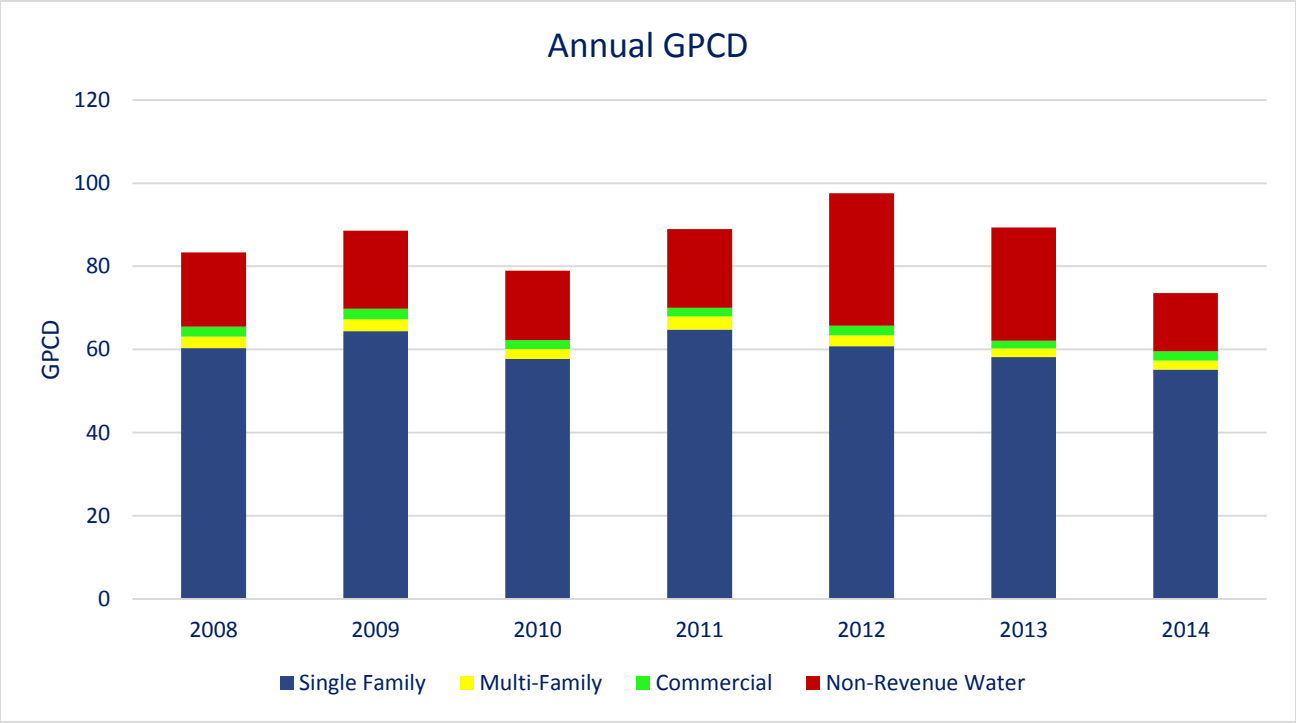


Figure 5. ALWSD Water System Annual GPCD

The ALWSD Water System data input items for the GPCD spreadsheet are attached as Exhibit B of this document.

The largest user of water in the service area is the Alto Lakes Golf & Country Club (ALGCC). Meter data indicates that this facility uses an estimated 1.9 MG/year of treated water and another 64 MG of untreated water for irrigation. ALGCC is planning to implement water conservation measures to reduce this use.

The NMOSE GPCD spreadsheet indicates that the Total ALWSD System GPCD number of 73.59 in 2014. This is relatively low and represents little opportunity to save water through Water Conservation measures. For comparison, a 2009 preliminary 40-year planning document for Hobbs found a total GPCD use of 250 to 300 GPCD at that time, with a goal of 264 GPCD. Las Cruces has a total GPCD goal of 180 GPCD by 2045, and Alamogordo has a total GPCD goal of 165 GPCD by 2045. The City of Lovington has a 240 GPCD goal listed in their 40 year plan (Stephens, 2009). In addition, the City of Las Cruces' 2013 NMOSE GPCD indicates that the City has an annual single-family GPCD of 123.11 and a total GPCD of 176.27.

A key output from the GPCD spreadsheet is the amount of non-metered water used in the ALWSD System. For 2014, the nonrevenue water represents 14 GPCD of the total 73.59 use figure for the entire water system. This category represents the greatest level of opportunity for Water Conservation within the ALWSD service area.

3. Water Conservation Goals

3.1 Objective

The objective of the ALWSD water conservation program is to reduce water use to the maximum feasible extent to ensure that the service area has a sustainable and affordable long term water supply in the face of diminishing water sources.

3.2 Reason Why the PWS is developing a Water Conservation Plan

ALWSD is preparing a formal Water Conservation Plan to meet NMOSE requirements and to provide strategic direction in future conservation efforts.

3.3 Identify Water Conservation Goals

As previously discussed, approximately 18% of the City's water is unaccounted for on an annual basis. On average, utilities lose approximately 10-15% of their water to leaks and unmetered connections. In addition, the Alto Lakes water system uses an average of 74 gallons of water per day per resident. Average daily use in the southwest varies from a low of below 100 GPCD up to 300 GPCD. Other cities in Lea County (Hobbs, Lovington, and Eunice) are reported to have a per capita water consumption ranging from approximately 250 to 350 GPCD. (Miller, 1994)

Based on this information, ALWSD set the following goals for its water conservation program:

- Reduce nonrevenue water to below 15% by 2025
- Maintain residential gallon per capita day (GPCD) at or below 75
- Reduce outdoor water use
- Reduce water waste
- Reduce peak summer demands for more efficient system operation and reduced energy use
- Reduce pumping and treatment costs
- Educate the public about water conservation
- Increase the water audit data validity score from 85 to 90 by 2025.

ALWSD's primary objective is to reduce unaccounted for water to below 15% by 2025. This goal is projected to reduce overall demand by 7.8 acre – feet per year. ALWSD has also set an overall water conservation goal to maintain the currently low usage at or below 75 GPCD by 2025.

As noted in the last bullet point, the District set a goal to increase the AWWA Water Audit Data validity score from the present 85 up to 90 by 2025. The primary area for improvement with the ALWSD water system is the 18% of unaccounted for water. With the use of system operating improvements detailed in the Data Validity scores, this amount of unaccounted for water can be significantly reduced.

3.4 Prioritize Goals

Since the District has higher than average unaccounted for water (18%) with daily uses that are well below average, ALWSD is prioritizing those goals related to reducing losses. Specifically, the District's primary goal is to reduce nonrevenue water to below 15% by 2025. The District's next goal is to maintain residential GPCD at or below 75. The final goal is to both maintain the excellent current data validity score of 85 and increase that score to 90 by 2025.

3.5 Evaluate Goals

To evaluate progress towards achieving their primary goals, the ALWSD will determine their unaccounted for water and average GPCD on an annual basis. The ALWSD will also perform the AWWA Water Audit to determine their data validity score on an annual basis.

3.6 Best Management Practices

3.6.1 Describe Best Management Practices (BMPs) Considered

ALWSD evaluated the following best management practices to determine their cost-effectiveness, their feasibility for implementation, and their appropriateness for the community:

- Source Water Metering (with Testing and Calibration)
- Program to test, calibrate, repair & replace meters systematically
- Meter Public Use
- Account for Water
- Analyze Non-accounted for Water
- Water System Audit/GPCD Analysis
- Repair Known Leaks
- Water System Audits for largest Commercial/Industrial users
- Encourage re-use of water for Commercial/Industrial users
- Inclining Block Water rate structure
- Leak Detection & Repair Strategy
- Automated Sensors/Telemetry (SCADA)
- Informative Water Bill
- Workshops
- Information Available
- Water Bill Inserts
- Advisory Committee
- Public School Education Program
- Selective End Use Audits
- Home Water Conservation Equipment Reimbursement Program
- Promotion of Landscape Efficiency
- Rebates and incentives (nonresidential)
- Rebates and incentives (residential)
- Requirements for New Developments (Efficient Fixtures/Landscaping/Irrigation)

To implement a targeted program with a higher likelihood of success, , the Alto Lakes water conservation team selected the most effective goals that would result in the practices that would most directly impact water conservation. Consequently, some of the practices that were deemed less effective were not included in the program.

3.6.2 List BMPs Selected

Based on the City's goals, the following BMP's were selected:

1) Conduct source water metering testing and calibration
2) Implement a program to test, calibrate, repair & replace meters systematically
3) Conduct water system audits for the ALGCC
4) Regularly review inclining block water rate structure
5) Upgrade older, leaking portions of the distribution system
6) Regularly complete water system audits and GPCD analyses
7) Regularly review water bills to ensure adequate and informative
8) Water Bill Inserts
9) Promotion of Landscape Efficiency
10) Requirements for New Developments (Efficient Fixtures/Landscaping/Irr.)
11) Automated Sensors/Telemetry (SCADA)

4. Public Involvement, Education, and Outreach

4.1 Describe the Public Involvement during the Planning Process.

As noted in Section 1.2, to aid in the preparation of this Water Conservation Plan, a planning team made up of ALWSD personnel and Souder, Miller & Associates personnel was assembled. This Water Conservation Planning team is responsible to monitor, assess and implement the Water Conservation Plan.

The first public involvement action taken early in the Water Conservation planning process was to compile the list of Best Water Conservation Practices into a public survey format where District residents could provide input as to which practices they would like to see put into practice immediately and which ones they would only want to see in the most extreme situations. The survey was provided to District residents in their water bill.

After the Water Conservation Plan is prepared, District Water Conservation policies will be updated to reflect the new activities described in the Plan. At such time as that policy is prepared, it will be discussed at District board meetings prior to adoption.

4.2 Describe Outreach Program Activities

The majority of the actions described in this Water Conservation Plan to reduce the 18% unaccounted for water will be performed by the District. However, the next targeted audience for Water Conservation improvements are the District Residents and the ALGCC. To reach this target audience, a multi-faceted outreach program will be implemented.

Historically, information provided with monthly bills has been the most successful tool for education and information. The District will place information in bills to disseminate regular water conservation public service announcements as well as news articles regarding District their water conservation efforts.

The District is also updating and their website to include a separate page exclusively for water conservation. Information regarding the water system, the water conservation plan, and water conservation tips are proposed to be included on this web page in addition to links to key web sites that provide water conservation information, such as the State Engineer's Office website and others. The District will also produce and acquire water conservation brochures and handouts to be set up in an information kiosk in the District office. The design of the water bill will be also be reviewed to ensure that it is easily read.

As part of this Water Conservation Plan, the District will coordinate with the country club to audit their usage and look for opportunities for conservation. The District is also contemplating upgrades to the wastewater treatment plant that would enable the use of reclaimed effluent for irrigation of the golf course.

4.3 Describe In-School Educational Programs

Since the Alto Lakes community is primarily a retirement and vacation community, there are no nearby schools and the District will not implement an in-school education program.

5 Developing a Water Conservation Program

5.1 Challenges

Challenges to success implementation of the water conservation program include the high level of unaccounted for water the District is experiencing, the seasonal nature of the District population, and regular turnover of residents.

However, these challenges also provide an excellent opportunity to save a significant amount of water. The District is a very small community with a small staff which is fully allocated. Some of the actions in this plan will be difficult accomplish without dedicating existing staff time or additional personnel to accomplish the stated goals.

Another challenge is the seasonal nature of many of the residents. Many residents may be maintaining inefficient landscapes with the tendency to waste water. The District Board passed an ordinance mandating the use of low flow or drip irrigation to reduce outdoor use and water waste by December 31, 2016.

5.2 Program Components

5.2.1 Program Title

Alto Lakes Water & Sanitation District Water Conservation Plan.

5.2.2 Summary of Program

The proposed program includes four main areas that the water conservation programs can be categorized. There are eleven water conservation measures listed earlier in Section 3.6.2 and they are listed below under their applicable headings along with their number.

Also, as noted in the Data Validity Analysis (Sections 2.1.2 and 2.1.3), there are several system and program improvements that will be necessary to improve the water system operation and efficiency to help the water system meet the Data Validity goal of 90 as established by the planning committee. Many of these action items overlap with the Best Management Practices selected for implementation (Section 3.6.2). The following elements will be implemented as part of the program:

1. Conduct source water metering testing and calibration
2. Implement a program to test, calibrate, repair & replace meters systematically
3. Conduct water system audits for the ALGCC
4. Regularly review inclining block water rate structure
5. Upgrade older, leaking portions of the distribution system
6. Regularly complete water system audits and GPCD analyses
7. Regularly review water bills to ensure adequate and informative
8. Create informative water bill inserts
9. Promote landscape efficiency
10. Adopt stringent requirements for new developments (efficient fixtures/landscaping/irrigation)
11. Implement automated Sensors and telemetry (SCADA)

5.2.3 Why the Program was Chosen

The District selected the twelve elements of the program to keep the program manageable and focus on the most effective goals that would result in the practices that would most result in the most conservation. Consequently, some of the practices that were deemed less effective were not included in the program.

5.2.4 How the Program will be Implemented

The first step in this process would be to review this document and develop a clear plan regarding who is going to implement each item in accordance with the proposed schedule. Outreach should be made to the community and key stakeholders to provide helpful information that will allow water system customers to fully understand the need for water conservation and begin to "buy in" to the implementation of the program. After these items are completed, the individual steps of the water conservation plan can begin to be implemented.

As noted earlier, the District has already made significant improvements to the water system and is in the process of implementing another phase of waterline replacements. One of the first new programs that will be placed into operation will be to develop a program for production meter testing, calibration, and repair, as needed. In addition the District will begin the implementation of an asset management plan to increase data validity.

The District will also begin completing annual audits of the system for using the AWWA and NMOSE tools to evaluate unaccounted for water and opportunities for continuous improvement.

The final action proposed to be taken during the first year would be include developing water conservation information and education processes including reviewing the design of the water bill and the creating of conservation information as water bill inserts including information on promoting landscaping water efficiency. If revisions of the water bill are necessary they will be implemented in the second year. Educational material will be placed in the District office and inserted into water bills in the second year as well.

After the educational efforts are implemented in the second year, the District will coordinate with ALGCC staff to perform a water audit of their processes using the NMOSE ICI water audit guidelines and forms. In the second year, the District's ordinance mandating the use of low flow or drip irrigation will take effect.

In the third year, the District will review existing water conservation policies and requirements for new construction as related to water conserving fixtures. If warranted, the new policies fully be developed and approved in the fourth year of the five year program. The District will also review the existing rate structure to ensure that it is adequately promoting water conservation.

Also in the fourth year, the District will evaluate available telemetry that can be integrated with the existing SCADA system to monitor system pressures and flows and allow for faster response to leaks. Any warranted additions to the system would be implemented in the fifth year.

The District already has a mature meter replacement program. In the fourth year, the District will begin a customer meter testing and calibration program to complement the existing replacement program.

5.2.5 Implementation Dates

Water Conservation Measure	Year 1	Year 2	Year 3	Year 4	Year 5
Source meter testing and calibration	Begin	Continue	Continue	Continue	Continue
Distribution meter testing and calibration	-	-	-	Begin	Continue
ALGCC system audit	-	Begin	Continue	Continue	Continue
Review water rate structure	-	-	Begin	Continue	Continue
Upgrade older portions of system	Continue	Continue	Continue	Continue	Continue
AWWA water system audits and GPCD analyses	Implement	Continue	Continue	Continue	Continue
Review water bills	Review	Begin	Continue	Continue	Continue
Water bill inserts	Develop	Begin	Continue	Continue	Continue
Promote landscape efficiency		Begin	Continue	Continue	Continue
Adopt requirements for new construction	-	-	Review	Implement	Continue
Implement automated Sensors and telemetry (SCADA)	-	-	-	Begin	Continue

Table 5. Water Conservation Measures Implementation Dates

5.2.6 Targeted Users

The targeted users for this Water Conservation Plan are as listed below. The Conservation Measures (listed in Section 5.2.2) that are applicable to that user are listed following the user name.

- Residential Users – Sections 2, 4, 7, 8, and 9
- ICI User (ALGCC) – Sections 2, 3, 4, 7, 8, and 9
- New Development/Construction – Section 10
- ALWSD – Sections 1, 2, 3, 4, 5, 6, and 11

5.2.7 Anticipated Cost (by year and total project)

Water Conservation Measure	Year 1	Year 2	Year 3	Year 4	Year 5
Source meter testing and calibration	$5k+$2k(L)	$2k(L)	$2k(L)	$2k(L)	$2k(L)
Distribution meter testing and calibration	-	-	-	$2k+$2k(L)	$2k(L)
ALGCC system audit	-	$1k(L)	$1k(L)	$1k(L)	$1k(L)
Review water rate structure	-	-	$2k(L)	-	-
Upgrade older portions of system[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]
AWWA water system audits and GPCD analyses	$2k(L)	$2k(L)	$2k(L)	$2k(L)	$2k(L)
Review water bills	$2k(L)	$2k(L)	-	-	-
Water bill inserts	$4k(L)	$2k(L)	$1k(L)	$1k(L)	$1k(L)
Promote landscape efficiency	$2k(L)	$1k(L)	$1k(L)	$1k(L)	$1k(L)
Adopt requirements for new construction			$4K(L)	$4K(L)	-
Implement automated Sensors and telemetry (SCADA)				$2K(L)	$20K
Yearly Cost	$17k	$10k	$13k	$17k	$29k
Total Five Year Program Cost	$86k				

Table 6. Water Conservation Measures Estimated Program Costs

Note 1: As noted earlier, water system improvements that are being implemented to replace older, leaking portions of the system have already been anticipated under the standard capital planning and that budgeting process is not be included in the Water Conservation Plan estimated costs as noted below. This table shows the actual additional effort required to implement this Water Conservation Plan only.

These efforts will be performed by existing District staff as part of their normal duties. All of these labor costs are included in the appropriate water conservation item and shown with an (L) to denote the labor cost clearly.

5.2.8 Anticipated Staffing Needs and Partnerships

Since the major elements of this plan are focused on District operations, it is anticipated that existing District staff will implement this Water Conservation Plan as part of their normal duties. District staff will need to closely monitor the implementation of the program to evaluate whether additional resources are necessary to accomplish the desired goals.

As noted earlier, there are several agencies who could be potential partners for the implementation of this water conservation program. NMOSE has a large library of water conservation literature and guidelines available for use. District staff will also rely on USDA representatives, the local Soil and Water Conservation District, and the County Extension Agent for assistance, resources, or recommendations.

5.2.9 Funding Source

It is proposed that the funding required for this program is provided through the existing District water budget. However, if District resources fall short of the required funding, proposals may be sought to obtain grants from institutions such as community-minded businesses, federal and/or state government agencies, or private foundations.

5.2.10 Anticipated Results and How They Align with Goals

Water Conservation Measure	Results	System GPCD reduction	SFR GPCD reduction	Nonrevenue water reduction	Data Validity increase
Source meter testing and calibration	100% sources metered, less than 10% worse than 3% accuracy	X		X	X
Distribution meter testing and calibration	Statistically significant meter testing/replacement program in place.	X			X
ALGCC system audit	Reduce SFR and ICI water use	X		X	X
Review water rate structure	Fiscally encourage water conservation.	X	X		
Upgrade older portions of system	Reduce un-accounted use.	X		X	X
AWWA water system audits and GPCD analyses	Raise system efficiency, reduce un-accounted use	X	X		
Review water bills	Reduce SFR and ICI water use.	X	X		
Water bill inserts	Reduce SFR and ICI water use.	X	X		
Promote landscape efficiency	Reduce SFR and ICI water use.	X	X		
Adopt requirements for new construction	Reduce future water use.	X	X		
Implement automated Sensors and telemetry (SCADA)	Raise system efficiency, reduce high pressure leaks.	X	X	X	X

Table 7. Water Conservation Measures Goal Alignment

5.2.11 Explanation of Tracking and Evaluation

Each water conservation program will be tracked for target group participation and time or costs expended to implement the program. Evaluation measures will be developed and used during the operation of each conservation program to establish a measure of its effectiveness. Overall evaluation of the water conservation program will be assessed through the updated water audit and GPCD analysis that will be performed annually. The results of the updated AWWA Water Audit and GPCD Analysis will be included in the District's annual report.

5.2.12 Estimated Lifetime Impact of the Program

When considering the potential impact of the water conservation program, it is essential to remember that the system is beginning at a total system rate of 74 GPCD and 18% unaccounted for water. This per capita usage is very low, while the losses are moderately high. This program will aim to maintain current levels of individual use by customers, while reducing system losses.

The below table shows the GPCD usage for several cities across the western United States. New Mexico cities include Albuquerque, with a rate of 175 GPCD rate and Santa Fe with a system-wide use of 101 GPCD. This information indicates that Alto Lakes residents use very little water in comparison to western cities.

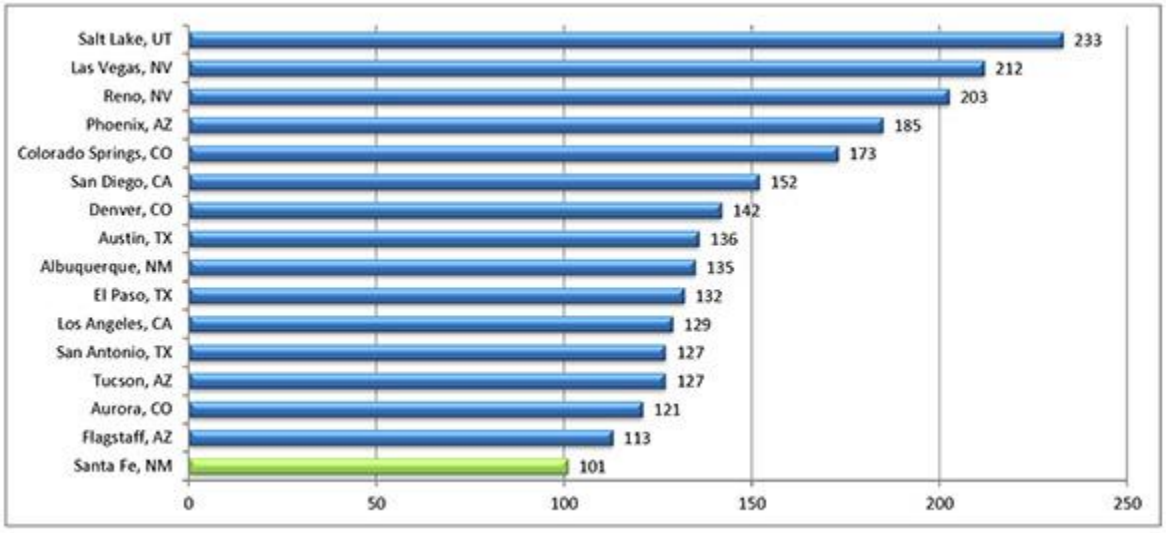


Table 8. Western City's System-Wide Water User Rates

5.2.13 Annual Reporting and Updates

As noted earlier, overall evaluation of the water conservation program will be assessed through the updated water audit and GPCD analysis that will be performed annually. The results of the updated AWWA Water Audit and the GPCD Analysis will be included in the District's annual report.

In addition, those system evaluation measures will be reviewed each year by the water conservation planning committee to help determine what portions of the water conservation plan are being effective and which portions need to be revised or amended. The water conservation plan will then be amended on an "as needed" basis following review of that water system data.

5.3 Describe Process of Prioritizing Programs

The proposed elements of this program were prioritized based the District's primary goals to reduce unaccounted for water loss while maintaining low customer use levels. As noted earlier in this document, the District is in the process of completing a series of major water system improvement projects. A great deal of benefit should be derived by completing these improvements early in this phased process.

Since the primary goal of this program is to reduce unaccounted for water, the implementation of a source meter testing and calibration program was selected for initial implementation to ensure that the District is obtaining quality data.

The District chose to prioritize the implementation of water audits for the single largest ICI user (ALGCC) for the second year because the effort could provide an immediate reduction in water use. The Water Audit would follow the format as proposed in the NMOSE Water Conservation Guidelines for Industrial, Commercial, and Institutional Users (http://www.ose.state.nm.us/WUC/PDF/cii-users-guide.pdf). The District is also in the process of analyzing the costs and benefits of improving the treatment processes at their wastewater treatment plant that would allow the use of reclaimed effluent at the golf course for irrigation.

To begin the education process soon, the education and outreach elements of the program were prioritized to begin in the first year of the program. The design of the water bills will be reviewed to ensure that they are easily readable and understood to the customer whereby they can actually see the benefit of water conservation. The second item would be to create and send out water conservation flyers and brochures with the water bills to begin to educate customers on the benefits of water conservation. Flyers to encourage landscaping and irrigation efficiency can also be started with this process at this same time.

One key elements of the District's existing program is a strong inclining block rate structure that provides sustainable funding for system operations while encouraging conservation. This is a critical component of the District's program and will be reviewed in the third year of the program to ensure that the rate structure is continuing to support District goals.

With regard for water conservation requirements for new construction, it is proposed that new policies and regulations be researched during the third year and developed during the fourth year. After the new regulations are fully reviewed and approved, they could be placed into effect in the fourth year of the five year program.

The District chose to begin researching and developing potential new policies and requirements for new construction in the third year because recent growth rates have been very slow. Since the District has a robust meter replacement program, with all meters replaced every ten years, the implementation of the customer meter testing and calibration element was delayed until the fourth year.

To improve the AWWA audit data validity score and allow for faster responses to leaks, the District will evaluate the potential to implement automated sensing of system pressures in the fourth year of the program. If an appropriate technology is available, the District will implement that technology in the fifth year of the program.

5.4 Current and Past Water Conservation Programs

5.4.1. Summary, Time Frame, and Results

ALWSD has a strong water conservation program that includes an inclining block rate structure, water restrictions in the event of reduced supplies and prohibition of water waste. Water restrictions which were implemented in 2012 are based on the District's water supply according to the following definitions:

- Normal – Ability to deliver 120% of 3 year average monthly demand
- Moderate – Ability to deliver 100% of 3 year average monthly demand
- Serious – Ability to deliver 75-99% of 3 year average monthly demand
- Severe – Ability to deliver less than 75% of 3 year average monthly demand
- Emergency – as declared by District Board.

The restrictions for the stepped program are as follows:

- Normal – no restrictions
- Moderate – Reduce demand by 20% by watering outdoors twice per week
- Serious – Reduce demand by 30% by watering outdoors once per week
- Severe – Reduce demand by 40% by watering outdoors twice per month
- Emergency – Reduce demand as required with no outdoor watering.

In addition, the District adopted an ordinance in 2009 that required that all outdoor irrigation systems utilizing potable water within the District be converted to drip irrigation systems by December 31, 2016.

5.5 Proposed Water Conservation Programs

5.5.1 How Water Conservation Programs will meet Stated Goals and Objectives

The District set the following goals for its water conservation program:

- Reduce nonrevenue water by 15% from the 2014 nonrevenue water by 2025,
- Maintain residential gallon per capita day (GPCD) at or below 75 for the next five years,
- Reduce outdoor water use,
- Reduce water waste,
- Reduce peak summer demands for more efficient system operation and reduced energy use,
- Reduce pumping and treatment costs,
- Educate the public about water conservation, and
- Increase the water audit data validity score from 85 to 90 by 2025.

The first part of the water conservation program concerns production water metering. With the implementation of a meter testing, and calibration program for the production meters, the ALWSD should eliminate inaccurate production meter readings. This will allow an immediate accurate comparison of pumped water to metered water used by customers and the city, which will support efforts to reduce the amount of nonrevenue water and accomplish the above goals.

The water accounting and loss control measures include the implementation of annual AWWA and NMOSE audits to determine unaccounted for water and system-wide GPCD. This will also account for water more accurately and will be helpful to reduce the amount of nonrevenue water.

The water conservation steps proposed include working with the ALGCC (largest ICI water user) each year to reduce water use and encourage re-use, reviewing the adequacy of the inclining block rate structure to discourage excessive water use, and requiring new construction to have water conserving fixtures, landscaping and irrigation systems will all work together to conserve water and directly accomplish the above listed goals.

Finally, the water conservation information and education steps including reviewing the water bill, adding water conservation information as water bill inserts (including information on promoting landscaping water efficiency) will keep District residents better informed regarding the status of their water system and aquifer, along with making them more knowledgeable of steps that can be taken to conserve water and extend the life of the District's water supply. These steps should assist the residents to make wise water conservation choices that will result in decreased water use and will help accomplish the stated goals.

The 2014 baseline figure of 74 GPCD determined by the NMOSE spreadsheet suggests that water system improvements and conservation efforts are not likely to result in significant reductions in water loss and total system pumping. However, addition of source meter testing and regular audits should reduce begin to immediately reduce the 18% unaccounted for water. Further reductions each year are likely still possible due to ongoing education and community outreach by keeping the message of conservation in front of the residents and ICI users.

5.5.2 Overall Timeline of Programs as Related to Objectives

A. Nonrevenue water Reduction

B. Maintain low system-wide GPCD

D. Data Validity Improvement

Water Conservation Measure/Objective	A	B	C
Source water metering testing and calibration	X		X
Distribution meter testing and calibration	X	X	X
ALGCC system audit		X	
Review water rate structure		X	
Upgrade older portions of system	X	X	
AWWA water system audits and GPCD analyses	X	X	X
Review water bills		X	
Water bill inserts		X	
Promote landscape efficiency		X	
Adopt requirements for new construction		X	
Implement telemetry (SCADA)	X	X	X

Table 9. Water Conservation Measures - Objectives

5.5.3 Anticipated/Reported Results for the Entire Water Conservation Plan

a. Nonrevenue Water over Time

The District primary goal is to reduce nonrevenue water to below 15% by 2025. The goal to reduce unaccounted for water is projected to reduce use by 7.8 acre – feet per year.

b. System Total GPCD over Time

The District's next goal is to maintain system GPCD at or below 75 for the next five years. Average water use goals for other communities in New Mexico are highly variable and reflect a diversity of residential and industrial water uses. ALWSD, in contrast, is almost entirely residential in nature. Changes that impact this singular customer base, such as education and rare structures, will likewise tend to influence the overall GPCD. With consideration of that the current GPCD value of 75 is very low in comparison to other communities, substantial reduction may not be likely. However, small changes in behavior and continued implementation of a rate structure that stresses conservation should maintain use at or below the current level of 75 GPCD.

c. AWWA Data Validity Score

The final goal is to both maintain the current data validity score of 85 and increase that score to 90 by 2025. The current score of 85 is excellent, however implementing meter testing and monitoring system pressures will increase this score and provide the District with better information to reduce future losses.

In conjunction with this plan, several older, inadequate portions of the District distribution system are being replaced. When this work is completed, along with the implementation of water meter testing, calibration, repair and systematic replacement programs, the total amount of nonrevenue water should drop significantly. The goal for this program is for the nonrevenue water to be reduced to below 15% by 2025.

6. References

Parkhill, Smith & Cooper, Inc, 2008	*Preliminary Engineering Report, Alto Lakes Water & Santiation District Water System Improvements*
Mourant, W.A., 1963	*Water resources and geology of the Rio Hondo drainage basin, Chaves, Lincoln and Otero Counties, New Mexico.* Technical Report 28, New Mexico State Engineer Office, 85p.
Gabin/Lesperance, 1975	Gabin, V.L, and Lesperance, L.E., *New Mexico Climatological Data* published by W.K. Summers and Assoc. 1975
Stephens, 2009	Daniel B. Stephens and Associates, Inc. *Forty Year Water Plan for the City of Hobbs, NM (Draft)* October 30, 2009
U.S. Census	United States Department of Commerce. *2000, 2010 Census data*.

Appendix A
AWWA Water Audit

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: Alto Lakes Water & Sanitation District (NM3558514)
Reporting Year: 2014 7/2013 - 6/2014

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.

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

Master Meter and Supply Error Adjustments

WATER SUPPLIED				Pcnt:	Value:	
Volume from own sources:	9	62.553	MG/Yr	1.50%		MG/Yr
Water imported:	10	0.000	MG/Yr			MG/Yr
Water exported:	10	0.000	MG/Yr			MG/Yr
WATER SUPPLIED:		**61.628**	MG/Yr			

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

AUTHORIZED CONSUMPTION				Pcnt:	Value:	
Billed metered:	9	50.616	MG/Yr			
Billed unmetered:	10	0.000	MG/Yr			
Unbilled metered:	10	0.000	MG/Yr			
Unbilled unmetered:		0.770	MG/Yr	1.25%		MG/Yr
AUTHORIZED CONSUMPTION:		**51.386**	MG/Yr			

Click here: ? for help using option buttons below

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)						
		10.242	MG/Yr			
Apparent Losses				Pcnt:	Value:	
Unauthorized consumption:		0.154	MG/Yr	0.25%		MG/Yr
Customer metering inaccuracies:	7	0.000	MG/Yr			MG/Yr
Systematic data handling errors:		0.127	MG/Yr	0.25%		MG/Yr
Apparent Losses:		**0.281**	MG/Yr			

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

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

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	**9.961**	MG/Yr
WATER LOSSES:	**10.242**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	**11.012**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	122,579.0	miles
Number of active AND inactive service connections:	10	1,294	
Service connection density:		0	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:	7	70.0	psi

COST DATA

Total annual cost of operating water system:	10	$1,152,775	$/Year	
Customer retail unit cost (applied to Apparent Losses):	10	$19.21	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	10	$1,119.17	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 85 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: Unauthorized consumption
3: Systematic data handling errors

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: Alto Lakes Water & Sanitation District (NM3558514)
Reporting Year: 2014 7/2013 - 6/2014

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 85 out of 100 ***

System Attributes:

	Apparent Losses:	0.281	MG/Yr
+	Real Losses:	9.961	MG/Yr
=	Water Losses:	10.242	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	16,948.50	MG/Yr
	Annual cost of Apparent Losses:	$5,391	
	Annual cost of Real Losses:	$11,148	Valued at Variable Production Cost

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	17.9%	
	Non-revenue water as percent by cost of operating system:	1.5%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	0.59	gallons/connection/day
	Real Losses per service connection per day:	N/A	gallons/connection/day
	Real Losses per length of main per day*:	0.22	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):	9.96	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.00	

* 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

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.

General Comment:	

Audit Item	Comment
Volume from own sources:	100% of the source water is metered. Meters are tested regularly.
Vol. from own sources: Master meter error adjustment:	Meter data is logged continuously, but not recorded or available remotely. To improve data score: Log production meter data is logged automatically & review each business day. Also, correct data to adjust for gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing.
Water imported:	No water is imported
Water imported: master meter error adjustment:	NA
Water exported:	Water is not exported
Water exported: master meter error adjustment:	NA
Billed metered:	100% of customers are billed on a volume-basis from meter reads. 100% of customer meters are successful with AMR system. Detailed meter records are maintained. Meters are replaced every ten years and tested inc ase of anomolous readings. Billing records are routinely audited by staff.
Billed unmetered:	No billed unmetered use exists
Unbilled metered:	No unbilled metered use exists

Audit Item	Comment
Unbilled unmetered:	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.
Unauthorized consumption:	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.
Customer metering inaccuracies:	However, testing is not currently being conducted on samples of meters of varying age and accumulated volume of throughput to determine optimum replacement time for various types of meters.
Systematic data handling errors:	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.
Length of mains:	The Ditrict has a sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper and electronic records with regular field validation are in place. The District has plans to implement an asset mangement plan.
Number of active AND inactive service connections:	Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system and Customer Billing System agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.
Average length of customer service line:	Customer water meters exist outside of customer buildings next to the curb stop or boundary separating utility/customer responsibility for service connection piping.
Average operating pressure:	Reliable pressure controls separate distinct pressure zones; pressure zones are never breeched. The distribution system has a developing telemetry monitoring system with pressure data. 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.
Total annual cost of operating water system:	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.
Customer retail unit cost (applied to Apparent Losses):	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 (CII), and other distinct customer classes - are reviewed by a third party knowledgeable in the M36 methodology at least once every five years.
Variable production cost (applied to Real Losses):	Third party CPA audit of all pertinent primary and secondary variable production costs on an annual basis.

Appendix B
NMOSE GCPD v2.04 Beta Model

Census Information Data Table 2.1

Info

Click here to access the Census Web site

OR

Click here for instructions on how to find the data on the Census website

2014 TO 2008

Use the most recent census data

Return to Instructions

DATA

US Census Table	Description		INPUT
DP-1	Profile of General Population and Housing Characteristics	Census Year	2014
Subject			
Relationship	In group quarters	Total	
Housing Occupancy	Total housing units	Total	1,345
	Occupied housing units		956
	Vacant housing units		388
Households by Type	Average household size	Total	2.19

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

Vacancy Rate %	28.8%

COMMENTS:

DATA INPUT SHEET

Alto Lakes Water & Sanitation District

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	3,079,161	2,172,091	2,564,510	3,280,890	5,608,008	6,418,602	7,319,057	4,596,014	4,139,556	3,720,395	2,036,181	2,006,094
2013	4,059,892	2,282,633	2,953,153	3,124,710	5,840,137	6,787,630	6,710,030	4,981,961	4,047,499	3,974,450	2,166,330	2,512,038
2012												
2011												
2010												
2009												
2008												

TABLE 3.2 Info — Active Connections Only

You have chosen to enter Active Connections Only, 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	998	873	929	939	1,072	1,106	1,178	1,153	1,122	1,089	949	908
2013	1,001	875	939	934	1,052	1,115	1,159	1,162	1,108	1,087	943	930
2012												
2011												
2010												
2009												
2008												

TABLE 3.3 Info — You have entered Active Connections Only in Table 3.2; leave the cells below blank

INACTIVE (ZERO USE) SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014												
2013												
2012												
2011												
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	2,186	1,912	2,035	2,056	2,348	2,422	2,580	2,525	2,457	2,385	2,078	1,989
2013	2,192	1,916	2,056	2,045	2,304	2,442	2,538	2,545	2,427	2,381	2,065	2,037
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 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	45.45	40.58	40.66	53.18	77.06	88.33	91.52	58.71	56.16	50.32	32.66	32.54
2013	59.74	42.54	46.32	50.92	81.77	92.66	85.28	63.15	55.60	53.86	34.97	39.79
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

COMMENTS:

ANNUAL DATA

TABLE 3.6 ANNUAL CONSUMPTION	TABLE 3.7 ANNUAL CALCULATION
	46,940,559
	49,440,463
51,640,805	51,640,805
55,044,698	55,044,698
48,989,744	48,989,744
54,686,599	54,686,599
51,224,363	51,224,363

TABLE 3.8 AVG. ANNUAL CONNECTIONS	TABLE 3.9 AVG CONN. CALCULATION
	1,026
	1,025
1,025	1,025
1,025	1,025
1,025	1,025
1,025	1,025
1,025	1,025

TABLE 3.10 Info CALCULATED GROWTH RATE	TABLE 3.11 No. VACANT SFR CONNECTIONS
0.09%	
0.04%	
0.00%	
0.00%	
0.00%	
0.00%	

TABLE 3.12 Info SIZE OF HOUSEHOLD	TABLE 3.13 Info SFR POPULATION
2.19	2,248
2.19	2,246
2.19	2,245
2.19	2,245
2.19	2,245
2.19	2,245
2.19	2,245

TABLE 3.14 Info

ANNUAL SFR GPCD
57.22
60.32
63.03
67.18
59.79
66.75
62.52

DATA INPUT SHEET

Alto Lakes Water & Sanitation District

Instructions

4. MULTI-FAMILY RESIDENTIAL (MFR)

Return to 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	89,310	55,810	64,830	62,970	177,060	318,480	347,775	213,745	180,200	189,510	59,310	66,160
2013	112,260	127,420	101,150	68,610	198,620	215,070	262,800	238,750	159,720	111,640	95,700	62,900
2012	128,670	150,570	91,420	105,330	199,460	315,920	300,470	363,230	224,100	130,090	92,700	72,380
2011	129,770	207,920	129,410	130,050	180,710	485,130	370,190	348,976	241,754	203,540	113,540	123,170
2010	118,990	69,920	153,020	85,330	132,510	378,790	279,340	247,810	278,620	102,900	82,260	99,060
2009	124,910	169,450	108,750	121,850	255,040	320,760	339,410	328,970	312,670	143,410	80,120	89,300
2008	148,660	315,330	133,920	149,140	190,320	294,250	341,670	270,560	217,720	143,946	76,290	80,314

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	52	52	52	52	52	52	52	52	52	52	52	52
2013	52	52	52	52	52	52	52	52	52	52	52	52
2012	52	52	52	52	52	52	52	52	52	52	52	52
2011	52	52	52	52	52	52	52	52	52	52	52	52
2010	52	52	52	52	52	52	52	52	52	52	52	52
2009	52	52	52	52	52	52	52	52	52	52	52	52
2008	52	52	52	52	52	52	52	52	52	52	52	52

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	81	81	81	81	81	81	81	81	81	81	81	81
2013	81	81	81	81	81	81	81	81	81	81	81	81
2012	81	81	81	81	81	81	81	81	81	81	81	81
2011	81	81	81	81	81	81	81	81	81	81	81	81
2010	81	81	81	81	81	81	81	81	81	81	81	81
2009	81	81	81	81	81	81	81	81	81	81	81	81
2008	81	81	81	81	81	81	81	81	81	81	81	81

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	35.56	24.60	25.81	25.90	70.49	131.02	138.45	85.09	74.13	75.45	24.40	26.34
2013	44.69	56.16	40.27	28.22	79.07	88.48	104.62	95.05	65.71	44.44	39.37	25.04
2012	51.22	66.37	36.40	43.33	79.41	129.96	119.62	144.60	92.19	51.79	38.13	28.82
2011	51.66	91.64	51.52	53.50	71.94	199.57	147.38	138.93	99.45	81.03	46.71	49.03
2010	47.37	30.82	60.92	35.10	52.75	155.83	111.21	98.66	114.62	40.97	33.84	39.44
2009	49.73	74.69	43.29	50.13	101.53	131.95	135.12	130.97	128.63	57.09	32.96	35.55
2008	59.18	138.99	53.31	61.35	75.77	121.05	136.02	107.71	89.57	57.31	31.38	31.97

ANNUAL DATA

TABLE 4.5 ANNUAL CONSUMPTION

TABLE 4.6 ANNUAL CALCULATION

	1,825,160
	1,754,640
	2,174,340
	2,664,160
	2,028,550
	2,394,640
	2,362,120

TABLE 4.7 No. CURRENT UNITS

TABLE 4.8 ANNUAL UNIT CALCULATION

	52
	52
	52
	52
	52
	52
	52

TABLE 4.9 Info MFR POPULATION

TABLE 4.10 VACANT MFR CONNECTIONS

81	15
81	15
81	15
81	15
81	15
81	15
81	15

TABLE 4.11 Info

ANNUAL MFR GPCD
61.71
59.33
73.52
90.08
68.59
80.97
79.87

DATA INPUT SHEET

5. INDUSTRIAL, COMMERCIAL & INSTITUTIONAL (ICI) AND OTHER METERED

Return to Instructions

Info Lakes Water & Sanitation District

Instructions

MONTHLY DATA

2014 TO 2008

TABLE 5.1

ICI WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	95,180	102,160	109,120	156,940	180,770	199,570	247,190	210,320	200,180	166,260	110,120	98,260
2013	117,140	120,480	132,740	114,300	127,120	134,620	156,870	170,530	131,070	148,490	83,760	113,160
2012	299,070	142,830	150,470	125,620	165,280	153,490	176,870	208,040	156,020	125,080	156,710	109,210
2011	107,920	123,490	151,150	138,680	156,250	160,120	154,120	196,380	153,760	126,840	136,050	127,130
2010	140,530	37,120	137,420	154,250	151,520	206,200	176,220	203,090	198,030	141,270	111,040	155,550
2009	160,780	314,880	232,820	139,120	166,220	209,260	183,660	198,150	174,340	119,870	115,900	140,530
2008	38,250	112,690	103,450	157,010	125,320	153,070	217,960	198,460	215,700	206,710	230,910	239,210

TABLE 5.2

OTHER METERED (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	3	3	3	3	3	3	3	3	3	3	3	3
2013	3	3	3	3	3	3	3	3	3	3	3	3
2012	3	3	3	3	3	3	3	3	3	3	3	3
2011	3	3	3	3	3	3	3	3	3	3	3	3
2010	3	3	3	3	3	3	3	3	3	3	3	3
2009	3	3	3	3	3	3	3	3	3	3	3	3
2008	3	3	3	3	3	3	3	3	3	3	3	3

COMMENTS:

ANNUAL DATA

TABLE 5.3 ICI ANNUAL CONSUMPTION	TABLE 5.4 ICI GPCD	TABLE 5.5 ICI ANNUAL CALCULATED
	2.21	1,876,070
	1.83	1,550,280
	2.32	1,968,690
	2.04	1,731,890
	2.13	1,812,240
	2.54	2,155,530
	2.35	1,998,740

TABLE 5.6 OTHER ANNUAL CONSUMPTION	TABLE 5.7 OTHER METERED GPCD	TABLE 5.8 OTHER ANNUAL CALCULATED
	0.00	36
	0.00	36
	0.00	36
	0.00	36
	0.00	36
	0.00	36
	0.00	36

DATA INPUT SHEET

Alto Lakes Water & Sanitation District

7. TOTAL WATER DIVERTED AND SUPPLIED

Return to Instructions

MONTHLY DATA

2014 TO 2008

TABLE 7.1
TOTAL WATER DIVERTED (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014												
2013												
2012												
2011												
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
TOTAL WATER SUPPLY (Monthly) (Gallons (US))

Formula = Total Water Diverted + Imported water - Exported Water

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2014	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
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

ANNUAL DATA

TABLE 7.6

ANNUAL TOTAL DIVERTED
62,552,616
75,882,450
82,835,856
75,506,402
67,041,123
75,222,292
70,784,734

TABLE 7.7

ANNUAL TOTAL DIVERTED CALC
62,552,616
75,882,450
82,835,856
75,506,402
67,041,123
75,222,292
70,784,734

TABLE 7.8

ANNUAL TOTAL IMPORTED
0
0
0
0
0
0
0

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
0
0
0
0
0
0
0

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
62,552,616
75,882,450
82,835,856
75,506,402
67,041,123
75,222,292
70,784,734

TABLE 7.13

TOTAL POP. EST.
2,329
2,327
2,326
2,326
2,326
2,326
2,326

Table 7.5
SYSTEM TOTAL GPCD (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

COMMENTS:

TABLE 7.14

Year	SYSTEM TOTAL GPCD
2014	**73.59**
2013	**89.35**
2012	**97.58**
2011	**88.95**
2010	**78.97**
2009	**88.61**
2008	**83.38**

NMOSE GPCD Calculator v2.02

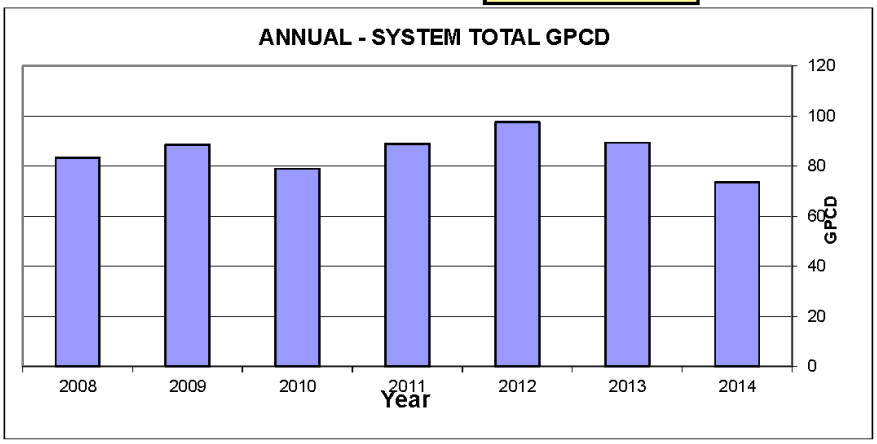
8. SUMMARY GPCD REPORTED DATA

Lakes Water & Sanitation Dist

2014 To: 2008

ANNUAL

Year	SYSTEM GPCD
2014	73.59
2013	89.35
2012	97.58
2011	88.95
2010	78.97
2009	88.61
2008	83.38

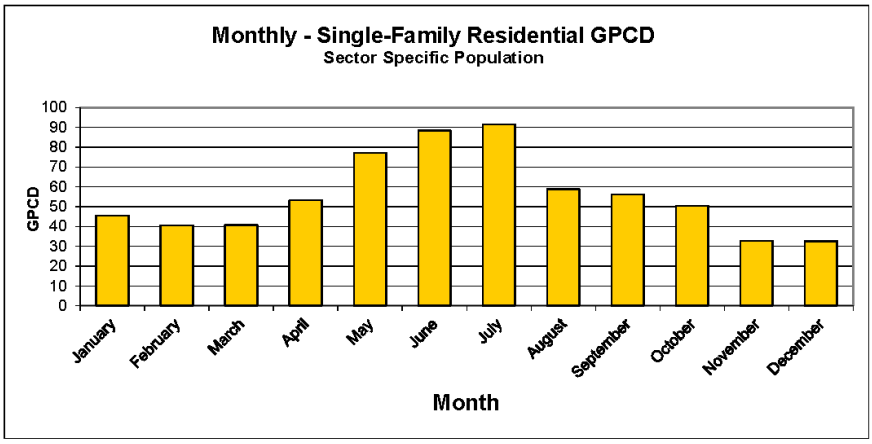


MONTHLY

Month	SFR GPCD
January	45.45
February	40.58
March	40.66
April	53.18
May	77.06
June	88.33
July	91.52
August	58.71
September	56.16
October	50.32
November	32.66
December	32.54

Year	2014

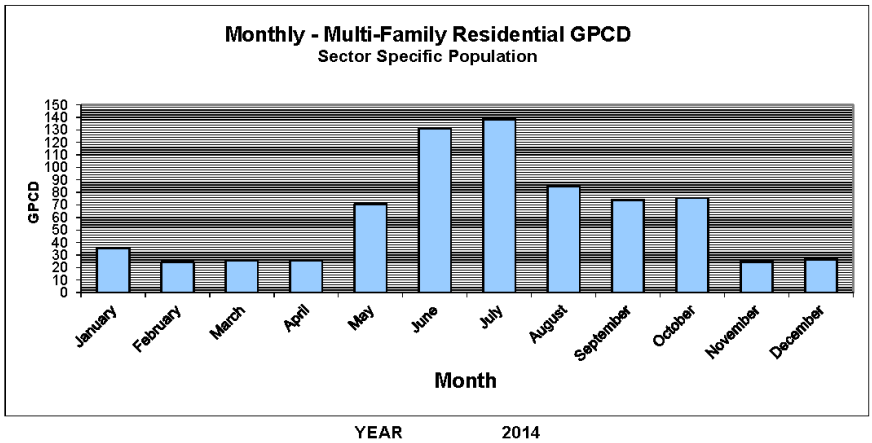
Peak/Ave	1.65



YEAR 2014

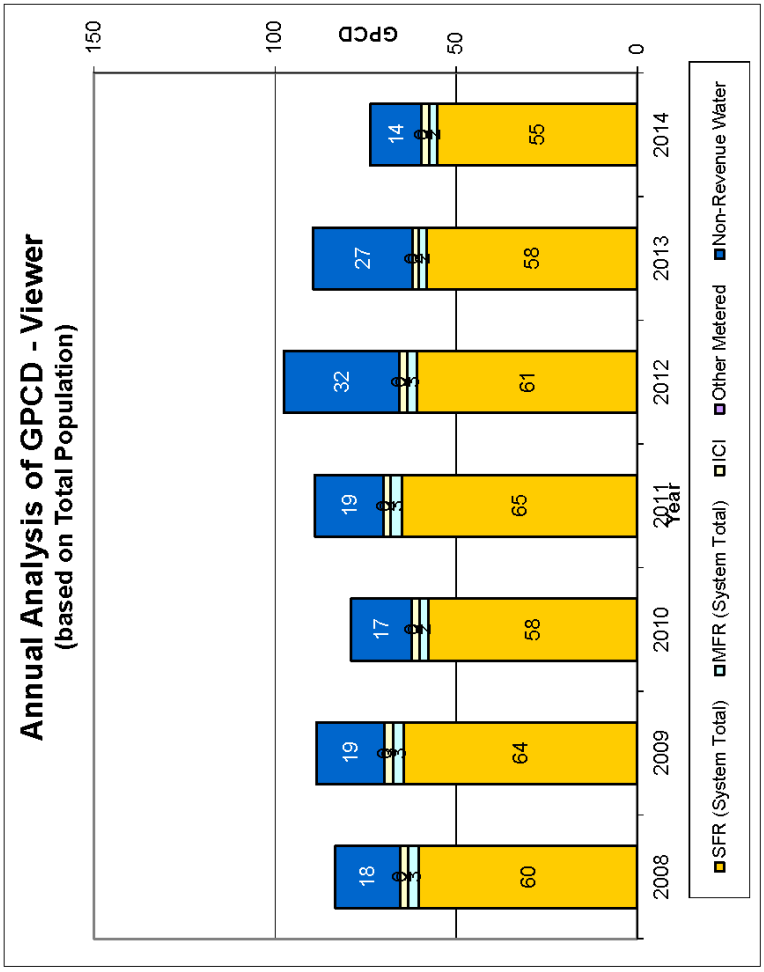
Month	MFR GPCD
January	35.56
February	24.60
March	25.81
April	25.90
May	70.49
June	131.02
July	138.45
August	85.09
September	74.13
October	75.45
November	24.40
December	26.34

Peak/Ave	2.25



YEAR 2014

NMOSE GPCD Calculator v2.02



9. System Total Annual Reporting Performance

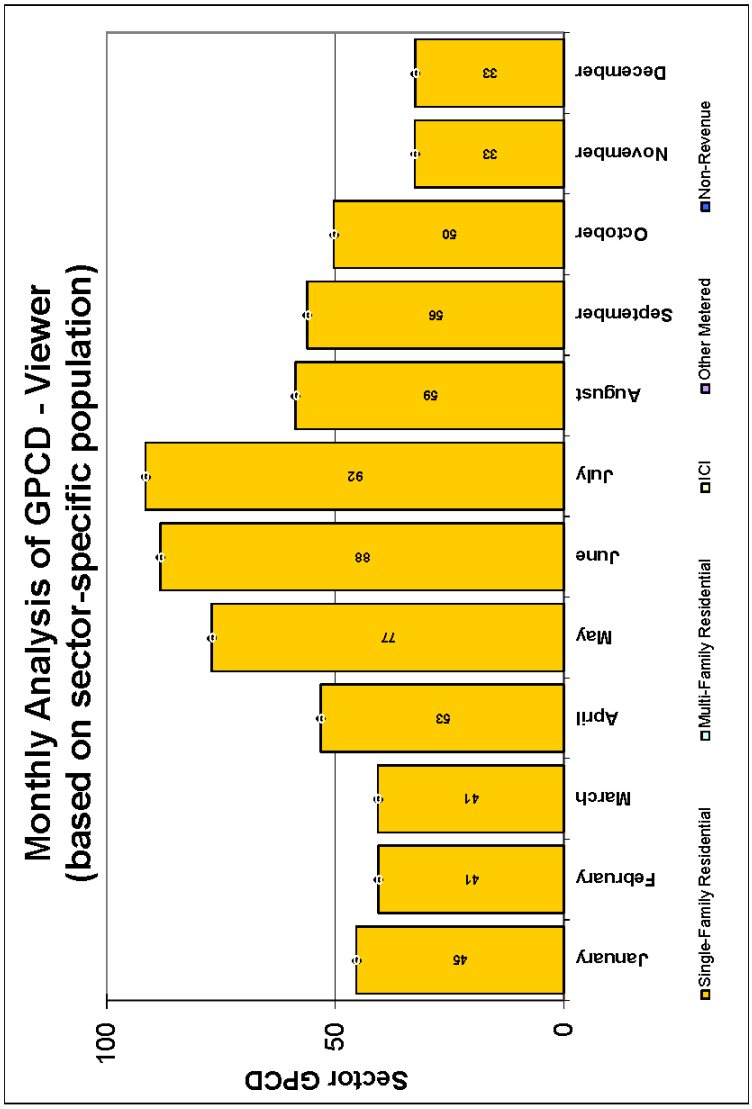
Overall Annual GPCD (based on Total Population)

Year	On Graph?	SFR (System Total)	MFR (System Total)	ICI	Other Metered	Non-Revenue Water	Total Supplied	Non-Revenue Volume Million Gallons (US)
2014	Yes	55.23	2.15	2.21	0.00	14.01	73.59	11.91
2013	Yes	58.22	2.07	1.83	0.00	27.24	89.35	23.14
2012	Yes	60.83	2.56	2.32	0.00	31.87	97.58	27.05
2011	Yes	64.84	3.14	2.04	0.00	18.93	88.95	16.07
2010	Yes	57.71	2.39	2.13	0.00	16.74	78.97	14.21
2009	Yes	64.42	2.82	2.54	0.00	18.83	88.61	15.99
2008	Yes	60.34	2.78	2.35	0.00	17.90	83.38	15.20

Info

Alto Lakes Water & Sanitation District

2014 to 2008



10. Monthly Reporting Performance

Choose Year for Monthly Analysis 2014

Choose Sector Single-Family Residential

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	45.45	35.56	1.32	0.00	-45.21
FEB	40.58	24.60	1.57	0.00	-35.74
MAR	40.66	25.81	1.51	0.00	-37.93
APR	53.18	25.80	2.25	0.00	-50.11
MAY	77.06	70.49	2.50	0.00	-82.64
JUN	88.33	131.02	2.86	0.00	-99.29
JUL	91.52	138.45	3.42	0.00	-109.63
AUG	58.71	85.09	2.91	0.00	-88.54
SEP	56.16	74.13	2.87	0.00	-64.70
OCT	50.32	75.45	2.30	0.00	-56.46
NOV	32.86	24.40	1.58	0.00	-31.57
DEC	32.54	26.34	1.36	0.00	-30.07

Alto Lakes Water & Sanitation District

2014 to 2008

Appendix C
Best Management Practices

System Water Audit and Water Loss

A. Description

System water audits and water loss programs are effective methods of accounting for all water usage by a utility within its service area. Performing a reliable water audit is the foundation of proper water resource management and loss control in public drinking water systems. There has been much recent interest in revising and developing water audit procedures to move away from simply considering "unaccounted for water" to a systematic methodology of accounting for all water uses. The structured approach of a water audit allows a utility to reliably track water uses and provide the information to address unnecessary water and revenue losses. The resulting information from a water audit will be valuable in setting performance indicators and in setting goals and priorities for cost-effectively reducing water losses.

Compiling a water audit is a two-step approach, a top-down audit followed by a bottom-up audit. The first step, the top-down audit, is a desktop audit using existing records and some estimation to provide an overall picture of water losses. If a utility has been conducting a water audit using the American Water Works Association ("AWWA") M36 Manual, the utility will already have the data needed to complete the first step of this audit. The records that will be needed include quantity of water entering the system, customer billing summaries, leak repair summaries, average pressures, meter accuracy test, meter change-out summary, permitted fire hydrant use, and other records that may be kept on water theft and unmetered uses such as street cleaning.

The second step of the audit, the bottom-up approach, involves a detailed investigation into actual policies and practices of the utility. This part of the audit is phased in over several years. There are several areas to be addressed including development of better estimates of water use by the fire department, water used in line flushing and street cleaning, and metering of all authorized uses. The procedures of the detailed water audit also include using night flow and zonal analysis to better estimate leakage; analysis of leakage repair records for length of time from reporting to repair of the leak; and analyzing pressure throughout the system.

Several indicators from the analyses in a water audit should be considered by utilities in order to improve water loss control procedures. These include:

1) Real Losses
   Losses due to leakage and excess system pressure. Real losses can be reduced by more efficient leakage management, improved response time to repair leaks, improved pressure management and level control, and improved system maintenance, replacement, and rehabilitation. The cost of real losses is estimated using the marginal production costs, such as energy and chemicals needed to treat and deliver the water.
2) Apparent Losses
   Losses due to meter accuracy error, data transfer errors between meter and archives, data analysis errors between archived data and data used for billing/water balance, and unauthorized consumption including theft. The cost of apparent losses is estimated using the retail commodity rates.

3) Unavoidable Annual Real Losses ("UARL")
   This represents the theoretically low level of annual real losses in millions of gallons daily ("MGD") that could exist in a system if the current best management practices for leak management are successfully implemented. It is based on data obtained from systems where effective leakage management was implemented. The calculation of the UARL is based on number of miles of water mains, number of service connections, average water pressure, and length of service connections. The UARL is allocated to service lines and water mains. The revised AWWA M36 Manual will provide details on how to calculate unavoidable annual real losses.
4) Infrastructure Leakage Index ("ILI")
   Ratio of annual real losses divided by UARL. The ILI provides a ratio of current leakage relative to the best level obtainable with current best management practices for leakage. A ratio of 1.0 would indicate that the utility has reduced losses to the theoretically lowest level possible.
5) Economic Level of Leakage ("ELL")
   This is a calculation based on the cost of reducing leakage. It is the theoretical level at which the cost of leakage reduction meets the cost of the water saved through leakage reduction. These costs include not only the cost of producing water but also the avoided cost of replacing the water.

In order to reduce water losses due to leakage, a utility should maintain a proactive water loss program. A structured approach to leakage management has proven to be successful in limiting losses. Potential elements of an active water loss program include:

1) Conducting regular inspections and soundings of all water main fittings and connections
2) Using a water loss modeling program. A model can range from the AWWA M36 Manual Water Audit Spreadsheet to a commercially available statistical model
3) Metering individual pressure zones
4) Establishing district metering areas ("DMA") and measuring daily, weekly or monthly flows with portable or permanently installed metering equipment
5) Continuous or intermittent night-flow measurement
6) Installing temporary or permanent leak noise detectors and loggers
7) Reducing repair time on leaks since long-running small to medium size leaks can be the greatest volume of annual leakage
8) Controlling pressure just above the utility's standard-of-service level taking into account fire requirements, outdoor seasonal demand and requisite tank filling
9) Operating pressure zones based on topography
10) Limiting surges in pressure
11) Reducing pressure seasonally and/or where feasible to reduce losses from background leaks

If a utility has not had regular leak surveys performed it will probably need at least three leak surveys performed in consecutive years or every other year for these reasons:

1) The first survey will uncover leaks that have been running for a long time.
2) The second survey will uncover additional long-running leaks whose sounds were masked by larger nearby leaks.
3) By the third survey, the level of new leaks should start to approximate the level of new reported leaks.

The utility should make every effort to inform customers when leaks exist on the customer side of the meter. If customer service line leaks are significant, a utility might consider the option of making the repairs itself.

The utility should reduce apparent losses since reducing these losses will increase utility revenue. Some of the areas that should be examined are:

1) Customer meter inaccuracy due to meter wear, malfunction or inappropriate size or type of meter
2) Data transfer error when transferring customer metered consumption data into the billing system
3) Data analysis errors including poor estimates of unmetered or unread accounts
4) Inaccurate accounting resulting in some accounts not being billed for water use
5) All forms of unauthorized consumption including meter or meter reading tampering, fire hydrant theft by contractors, unauthorized taps, and unauthorized restoration of water service cutoffs
6) Unmetered municipal connections (every effort should be made to meter municipal connections in order to better account for water use)

B. Implementation

To successfully implement this BMP, the utility should start by forming a working group from the following work areas: management, distribution, operations, production, customer service, finance, and conservation. Each of these work areas has an essential role to play in implementing this BMP. Smaller utilities may have the same person doing several of these functions and therefore the working group may just be one or two individuals. The utility should also consider a public involvement process to solicit outside input as well as to enhance public relations.

Initially the working group should focus on gathering relevant data and identifying current practices listed above in Section B that form the basis for the top-down audit. Some of the questions that should be addressed during the top-down audit are:

1) How often do we test production meters? Commercial meters over 1 inch? Over 2 inches?
2) How often do we replace or repair ⅝ and ¾-inch meters?
3) How inaccurate are the ⅝ and ¾ inch meters on average when they are replaced?
4) Do we estimate total leakage from each leak based on the leakage flow rate and length of leakage from time reported when we fix leaks?
5) How long does it take to repair leaks, itemized by size of leak?
6) Are customers encouraged to report leaks?
7) Do we have a system for tracking location of leaks and a method to calculate when it is cost-effective to replace mains and service lines?
8) Are meter readers trained to look for and report leaks?
9) Do we adjust consumption records when billing records are adjusted?
10) Is backwash and other in-plant water use optimized?
11) How effective is our theft reduction program?

Based on the data collected and information from the questions above, the utility should have enough information to complete a top-down audit.

An ILI of 3 should be used as an example of an achievable target. If the ILI is 3 or below, then further implementation of the BMP is not required until the following year. This would indicate that the utility already has an effective water audit and water loss program. If the ILI is above 3, then the utility should implement a more effective water audit and water loss program. The utility then proceeds to conduct a bottom-up audit.

In conducting the bottom-up audit, the utility addresses the relevant issues identified during the top-down audit and further investigates those issues discussed in Section B. The utility uses the results of the audit to focus on the best approaches to reduce both real and apparent losses. Depending on whether the ILI is relatively high or low determines the number of years it may take to reduce the ILI to 3.

Each subsequent year, the utility completes another top-down audit. Over time the utility should be able to gradually reduce its ILI to 3. If the utility finds the ILI is increasing, then it should perform a bottom up audit.

C. Schedule

To accomplish this BMP, the utility should:

1) Gather the necessary information for conducting the top-down audit, develop the procedures and complete the audit within the first twelve (12) months of implementing this BMP.
2) The bottom-up refinements should start to be implemented in the twelve (12) months immediately following the completion of the top-down audit if the ILI exceeds 3.
3) Based on the goal of achieving an ILI target of 3, the utility continues to implement bottom-up refinements to reduce real and apparent losses each subsequent year until the utility achieves an ILI of 3.
4) The utility's ILI should be calculated each year.

D. Scope

To accomplish this BMP, the utility should:

1) Conduct a periodic system audit following the methodology contained in the revised AWWA M36 Manual.
2) Develop and perform a proactive distribution system water loss program and repair identified leaks.
3) If the utility's ILI is greater than 3:
   a. Implement a pressure reduction strategy if warranted
   b. Implement a program to reduce real losses, including a leak detection and repair program
   c. Implement a program to reduce apparent losses
   d. Advise customers when it appears that leaks exist on the customer's side of the meter and evaluate a program to repair leaks on the customer's service line

E. Documentation

To track the progress of this BMP, the utility should gather and have available the following documentation:

1) A copy of each annual system audit, the ILI for each year, and a list of actions taken in response to audit recommendations.
2) Annual leak detection and repair survey, including number and sizes of leaks repaired.
3) Number of customer service line leaks identified and actions taken to repair these leaks.
4) Pressure reduction actions taken, if any.
5) Annual revenue increased through reducing apparent losses.

F. Determination of Water Savings

Potential water savings are an integral part of the system water audit process and should be contained in the audit report. Based on the results of the audit, the utility should set goals for reducing its losses.

G. Cost-Effectiveness Considerations

Direct costs that should be considered in implementing this BMP include the initial and ongoing costs for performing and updating the water audits and capital costs for items such as leak detection equipment and billing software upgrades. Utilities may wish to do the work in house with technical staff or by using outside consultants and contractors.

A recommended method to make cost effectiveness decisions is based on the economic value of real losses and apparent losses. Real losses are losses due to leaks and are valued at actual costs to produce and deliver the water. Apparent losses, sometimes called paper losses, are those attributable to meter and billing inaccuracies and are valued at the retail rates charged by the utility. The amount of lost revenue due to real losses, based on the utility's marginal production cost, and apparent losses, valued at the retail rate charged to customers, can be compared to the costs of reducing the sources of loss.

Public Information

A. Description

Public information programs, even though they may not be directly related to any equipment or operational change, can result in both short and long-term water savings. Behavioral changes by customers will only occur if a reasonable yet compelling case can be presented with sufficient frequency to be recognized and absorbed by customers. There are many resources that can be consulted to provide insight into implementing effective public information programs. Like any marketing or public information program, to be effective, water conservation public information should be planned out and implemented in a consistent and continual manner.

The goal is education of customers about the overall picture of water resources in the community and how conservation is important for meeting the goals of managing and sustaining existing water supplies and avoiding or delaying building of new facilities. An equally important part of the program is to provide data and information on specific actions and measures the customers should take to implement these community goals. Showing customers that the results of those actions have made a difference encourages greater participation in conservation efforts.

There are a variety of tools that can be effectively used to communicate water conservation public education. These include use of print, radio, and television media; billboards; direct distribution of materials; special events such as exhibits and facilities tours; and maintenance of an informative website.

Print media activities can include press conferences, articles and news releases. Regular columns and contributions to gardening and environmental reports are also good ways to reach a wide audience. Electronic media efforts include talk shows, news conferences, press releases, public service announcements, and even paid commercials.

Besides media, utilities can use direct distribution of materials such as inserts or messages on the utility bill, a newsletter, flyers, direct mail, and door hangers. Direct distribution allows targeting of specific messages to specific target audiences.

Special events provide excellent opportunities for direct interaction with the public. These events include facility tours, exhibits, participation in community events, trade shows, presentations to groups, water efficient landscape judging and competitions, and classes and seminars. Development of demonstration gardens and permanent exhibits are also effective.

Websites are now an essential element of public information. Much of the same printed material made available to the media and through direct distribution can be put on a website. Electronically delivered newsletters should include links to the utility's website.

An early step in development of the public information program is to identify the target audiences and what messages need to be conveyed. Themes should be selected that both convey the importance of water conservation and provide customers an opportunity to act. Thematic messages that stress the importance of water as a natural resource can be linked with specific tips or water conserving activities. The most successful public information campaigns also promote or "market" opportunities for customers to participate in utility sponsored conservation programs such as rebate and/or retrofit programs described in other BMPs.

Each public information program should be tailored to the utility and the community. The types of communication methods most effective for the target audience should be identified. Certain media outlets will be more effective than others. For example, television may be effective for large city utilities where it would not be for suburban or rural utilities. In those areas, a local newspaper or direct distribution of materials would likely be better choices.

There are many publications, brochures, videos, DVDs, etc. already available on water conservation that can be used as published or modified to meet the goals of the utility.

Some of the most effective education initiatives involve the participation of customers in the planning process. Creation of stakeholders committees, task forces, or advisory groups have proven effective for utilities in both defining the message and in recruiting allies in the community for promotion of water conservation. Such participatory programs should be well planned and may require an extensive process with numerous meetings or could be a relatively shorter process with representatives of key community organizations. The representative approach could involve neighborhood associations, business groups (i.e. nursery/landscape or other water-related businesses), academic institutions, not-for-profit agencies and environmental organizations among the mix of groups invited to participate. This process will be most successful if public input is sought not only for the public information plan but also for the entire Conservation Plan.

Partnership programs are another effective means of expanding the utility's public information efforts. Numerous not-for-profit agencies include environmental education among their goals. Integrating the utility's public information efforts with programs of other local agencies expands the impact of utility efforts.

Some business associations, neighborhood associations or not-for-profit groups may also provide partnering opportunities for the overall utility conservation program or specific BMPs. Together with these partners utility staff may be able to develop a speaker's bureau to offer adult education about specific water efficiency related topics such as Water Wise landscaping, irrigation system management, and retrofit and behavioral changes available to reduce water bills.

Another important marketing tool for successful conservation programs is public recognition of water-conserving customers. This is often used to focus attention on commercial customers as an incentive to promote greater efficiency by providing positive coverage of company conservation efforts. Awards or certification programs exist in a number of utility programs in Texas and across the nation. These programs have also been used to recognize water-saving landscape designs.

For utilities that are pursuing a number of BMPs, it is important that the public information efforts be integrated with the promotion of implementation of the other conservation BMPs. Promotional efforts or "marketing" of rebates, retrofits, surveys, or educational events should be tied together in the Public Information Plan, much like commercial entities develop a marketing plan.

B. Implementation

The first step in implementation is to develop a Public Information Plan with goals and objectives and a schedule of activities for the first year and a tentative second year schedule. Forming a committee composed of customers and community leaders can help with the development of an effective plan. Committee members may be directly involved in implementing the plan, such as partnership programs with other agencies promoting water conservation, businesses or residents which implement BMPs and receive public recognition, or providing non-utility volunteers to promote conservation through a speakers bureau. Utilities should take advantage of and coordinate their efforts with State programs on conservation[2]. Another option is using firms that specialize in marketing and public information to develop a public information program.

The goal should be, at a minimum, to provide information to each customer at least four times each year on each action that the utility would like the customer to take. The plan should be updated every year continuing with a two-year time horizon. Every other year, the utility should survey a sample of customers or consider the use of focus groups to determine if the utility messages are reaching customers and how effective the messages are in terms of customer actions.

The Public Information Plan should be a substantial part of the utility's overall Conservation Plan. Implementation of the Public Information program should be integrated with the implementation of specific BMPs included in the Conservation Plan. A successful public information effort will promote participation in other BMPs

C. Schedule

1) Utilities pursuing this BMP should begin implementing this BMP according to the following schedule: The utility should complete the Public Information Plan within six (6) months of adopting this BMP.
2) In the second year and each year thereafter, the utility should complete a revised Public Information Plan.

3) In the second year and every other year thereafter, the utility should conduct and complete a survey of customers to determine the effectiveness of its message and actions that customers have taken.
4) Every other year, the utility should survey customers or convene focus groups to assist in determining the effectiveness of materials used or to be used in the public information campaign.

D. Scope

The Public Information Plan should provide conservation information on each BMP being implemented to customers at least four times per year. For utilities focused on reducing summertime peak usage, themes and scheduling of message should be repeated numerous times during the late spring and early summer, rather than being spaced evenly throughout the year.

E. Documentation

To track the progress of this BMP, the utility should gather and have available the following documentation:

1) Number of activities and pieces of information and how many customers were at that activity or received each piece of information
2) Number and schedule of activities or information pieces related to promoting specific BMPs adopted by the utility
3) Number of news programs or advertisements that featured the utility message and how many customers had the opportunity to receive each message
4) Total population in the utility service area
5) Total budget by category for public information
6) Results of annual or biannual customer survey and/or focus groups to determine the reach and impact of the program

F. Determination of Water Savings

Water savings due to public information efforts are difficult to quantify. If the public information effort was for a specific action such as a showerhead distribution, the savings can be calculated under this BMP if the utility did not implement the BMP containing the product or action. Water savings for other public information programs that result in specific actions by customers such as changes in irrigation scheduling or reduction in water waste occurrences could also be quantified through surveys or analysis of water waste reporting.

G. Cost-effectiveness Considerations

The costs for implementing this BMP depend on the scope of the public information effort. There may be costs for administration and materials. A comprehensive program would range in costs starting at $0.50 to $3.00 per customer per year depending on the size of the utility. Larger utilities should have lower unit costs due to economies of scale. The public information program can be developed and managed by utility staff or outside contractors. Media purchases with TV, radio and print media may be done directly by utility staff.