

Hawthorne Water System

WATER CONSERVATION PLAN

Update 2025



OWNER:



HAWTHORNE UTILITIES

395 E STREET

HAWTHORNE, NV 89445

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ENGINEER:



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This Water Conservation Plan (Plan) has been prepared for Hawthorne Utilities (the Utility) and is intended to serve as a framework for evaluating and implementing water conservation strategies.

1.1 STATUTORY REQUIREMENTS

The Plan has been modified based on the 2019 Water Conservation Plan and has been updated in compliance with Nevada Revised Statutes (NRS) Sections 540.121 through 540.151. The requirements under NRS 540.141 state that Water Conservation Plans must address the following elements:

- a. Public education and outreach
- b. Conservation methods to meet service area needs
- c. Water system management and loss evaluation
- d. Effluent reuse optimization
- e. Contingency plan for drought conditions
- f. Plan implementation schedule
- g. Pathway to metering all connections
- h. Water efficiency standards for new development
- i. Tiered rate structure
- j. Time and day-based watering restrictions

The Hawthorne Water System (System) is relatively small, and there is limited growth anticipated in the next ten years. Effluent reuse is not anticipated to be financially feasible at this time; however, the Utility will re-evaluate this water conservation measure in future Plan updates.

NRS 540.141 additionally requires plans serving 500 or more connections to include measures to evaluate the effectiveness of the plan as well as estimates of the amount of water saved annually for each conservation measure specified in the adopted Plan.

Water loss calculation requirements included under NRS 540.145 states that systems serving 3,300 persons or more must conduct a water loss audit in accordance with American Water Works Association (AWWA) methodology and software. Alternatively, systems serving less than 3,300 persons must calculate the amount of water delivered by the supplier and the amount of water billed to the customers for each year. Although the System features a population less than 3,300 persons in the service area, the Utility has proactively elected to conduct a water loss audit in accordance with AWWA. The audit findings are discussed in this Plan. In accordance with NRS 540.145, the Plan update in five years will include an updated water loss audit as well as a comparison of the results of the updated audit to the audit results included in the current Plan.

This plan will be reviewed and revised every five (5) years in accordance with NRS 540.131. Any interested person shall have the opportunity, “including, but not limited to, any private or public entity that supplies water for municipal, industrial or domestic purposes, to submit written views and recommendations on the plan.” Every revision will be made available for inspection by these persons or entities.

This plan is available for public inspection during office hours at the following locations:

Hawthorne Utilities
395 E Street
Hawthorne, Nevada 89415
(775) 945-2486

Mineral County Library
1101 1st Street
Hawthorne, Nevada 89415
(775) 945-2778

Mina Library
908 B Street
Mina, Nevada 89422
(775) 573-2505

Public comments about this plan are encouraged. Written comments may be sent to Hawthorne Utilities at the address provided above.

1.2 SERVICE AREA

The Hawthorne Water System is a publicly owned residential/commercial non-transient community water system located in Mineral County in west-central Nevada. The water system is operated by Hawthorne Utilities, a sub-entity of Mineral County, under State permit number NV0000073.

Relative to the region, Hawthorne is located southwest of Walker Lake at the foot of Mount Grant and is bounded by the Hawthorne Army Ammunition Depot (HAAD), a government-owned/contractor-operated (GOCO) military industrial depot, to the north, east, and south. Topography generally slopes down to the northeast toward Walker Lake, and elevations range from about 4,450 feet at the south side of town to a low of 4,100 feet near the Hawthorne Utilities wastewater treatment facility. The primary water sources for the town are located in the Whiskey Flat wellfield located at an approximate elevation of 6,600 feet approximately 12 miles south of the town. A 12" transmission main conveys water from the wellfield to the town. The transmission main serves the Corey Canyon area, located at Lucky Boy Road, through a system of pressure reducing valves, which reduces the operating pressure to approximately 50 pounds per square inch on the downstream side. Hawthorne occasionally supplies water to HAAD through an existing, metered system intertie. North of Hawthorne is the Babbitt area, a former government housing area. Established during World War II, only a few active parcels remain within this region.

1.3 DEMOGRAPHICS

Historical population estimates for the town of Hawthorne, obtained from the Nevada State Demographer's Office, were evaluated for the past 20 years. Population estimates, population changes from prior year, and annual percent change values are summarized in Table 1.1.

Table 1.1: Historic Population Estimates (July 2003 to July 2024)

Date	Hawthorne Population	Population Change from Prior Year (capita)	Percent Change
2003	2,995	-	-
2004	2,968	-27	-0.90%
2005	2,956	-12	-0.40%
2006	2,931	-25	-0.85%
2007	2,960	29	0.99%
2008	2,970	10	0.34%
2009	3,028	58	1.95%
2010	3,194	166	5.48%
2011	3,008	-186	-5.82%
2012	3,086	78	2.59%
2013	3,076	-10	-0.32%
2014	3,023	-53	-1.72%
2015	3,035	12	0.40%
2016	2,868	-167	-5.50%
2017	3,066	198	6.90%
2018	3,065	-1	-0.03%
2019	3,100	35	1.14%
2020	3,192	92	2.97%
2021	3,152	-40	-1.25%
2022	3,236	84	2.66%
2023	3,214	-22	-0.68%
2024	3,164	-50	-1.56%

The historic population estimates show a net increase of 169 people between 2003 and 2024.

SECTION 2 – WATER USE PROFILE AND FORECAST

This section outlines the System water use profile and includes provisions relating to the following elements:

- Water rights
- Supply sources, production, and storage
- Service connections and meters
- Water demand forecast
- Rate schedule
- Water audit
- Water management goals

The purpose of this section is to describe existing conditions pertaining to water use and water management. This information is intended to facilitate the establishment of water management goals and a basis for conservation measures and incentives.

2.1 WATER RIGHTS

The System water supply is from groundwater sources located within the Walker Lake Valley – Whiskey Flat Hydrographic Basin 110C. These rights are vested in multiple entities: Mineral County, City of Hawthorne, and the Hawthorne Water System. A summary of the System water rights issued by the Nevada State Engineer are summarized in Table 2.1.

Table 2.1: System Groundwater Rights Summary

App	Owner of Record	Approximate Duty Balance (AFA)	Source Description
15750	HAWTHORNE-CITY	224	I STREET WELL
26663	MINERAL COUNTY	72	-
26854	MINERAL COUNTY	1809	WHISKEY WELL 3
49948	MINERAL COUNTY	575	WELL #2
49949	MINERAL COUNTY	425	WHISKEY WELL 2
62876	HAWTHORNE-CITY	500	WHISKY WELL 1
66430	MINERAL COUNTY	250	WHISKY WELL 1
75616	HAWTHORNE WATER SYSTEM	565	BABBITT WELL
75617	HAWTHORNE WATER SYSTEM	565	BABBITT WELL

2.2 SUPPLY SOURCES, PRODUCTION, AND STORAGE

Water is supplied to the System by five groundwater wells. Most of the water supplied to the System comes from the three wells in the Whiskey Flat area. The I Street Well and Babbitt Well supply remaining water demand and provide system redundancy. Use of the I Street Well and Babbitt Well is limited to periods of peak demand because of the lower aesthetic quality of the water due to sulfur and iron concentrations.

Table 2.2 shows the total water produced by each well in 2024. Volumes are provided in units of millions of gallons (MG). The production volumes presented in this subsection do not reflect any adjustments to account for under-registration commonly encountered with older meters. Error adjustments are accounted for in the water audit discussed in Section 2.6.

Table 2.2: 2024 Total Production by Well

Well Name (Well ID)	2024 Total Production (MG)
Whiskey Flat Well 1	57.582
Whiskey Flat Well 2	86.398
Whiskey Flat Well 3	82.95
Babbitt Well	6.621
I Street Well	0.000

Babbitt Well was only used during the months of May, June, July, August, September, and December, and the volumes produced from this well were much lower than the volumes produced from the Whiskey Flat wells. The I Street Well was not used during this time period. Figure 2.1 illustrates the total monthly production volumes for each supply well used in 2024.

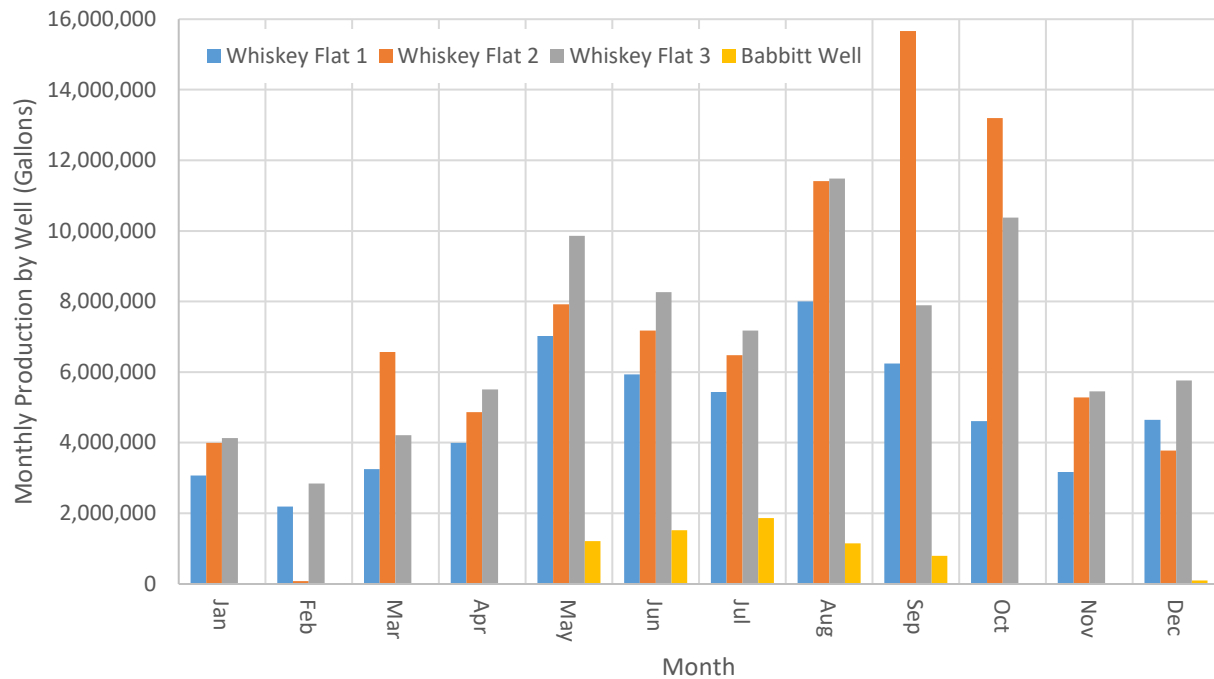


Figure 2.1. 2024 Monthly Production Volumes by Well.

Peak production for the System occurred in August, and approximately 32 MG was produced during that month. The peak individual well production occurred in September for Whiskey Flat Well 2, which produced nearly 15.7 MG. Consumption data related to peak production is discussed in Section 2.3.

The System features three active water storage tanks. The Whiskey Flat Tank (ST04) is 250,000 gallons and serves as a blending tank for the three wells located in the Whiskey Flat well field. The remaining two tanks, ST05 and ST06, are welded steel ground-level tanks located on the south side of town. These two tanks each have a capacity of 1.2 MG.

Excessive water pressure in a distribution system can negatively impact the water use profile through increased leakage occurrence and leakage volumes and increased flow through open faucets. The System features an average operating pressure of 80 pounds per square inch (psi). Previous water modeling efforts indicate that the System largely meets pressure and velocity requirements of NAC 445A.6672, and there are no notable pressure concerns or deficiencies applicable to the Plan at this time.

2.3 SERVICE CONNECTIONS AND METERS

The System is fully metered on all service connections. Service connections can be divided into five basic types for the purpose of evaluating water use within the System. These connection types include:

- Residential
- Commercial
- Industrial
- Institutional/Government
- Agricultural

Table 2.3 shows the total consumption by connection type for the period from January 1, 2024 to December 31, 2024. The table also includes the average number of connections based on billing data as well as the average annual consumption per connection in units of 1,000 gallons. The data presented in this subsection does not reflect any adjustments to account for potentially metering inaccuracies. Error adjustments are accounted for in the water audit discussed in Section 2.6.

Table 2.3: 2024 Total Water Consumption by Connection Type

Connection Type	Total Annual Consumption (MG)	Average Number of Connections	Average Annual Use per Connection (1,000 Gallons)
Residential	140.3	1,385	101.3
Commercial	34.1	119	285.6
Industrial	19.1	5	3,951.7
Institutional/Government	49.3	33	1,497.7
Agricultural	0.8	27	30.1
Total	243.6	1,569	155.2

Water sold to the HAAD system comprised nearly all the 2024 industrial usage and nearly 8% of the total consumption in the System. The Utility sold water to HAAD from the months of May to October, with the peak volume of 4.5 MG being sold in the month of May. Billing history shows that HAAD demand has the potential to nearly double the System demand and is significant enough to warrant future collaboration between the Utility and HAAD in evaluating potential water conservation opportunities.

A preliminary comparison of calculations provided in the previously submitted 2019 Plan was completed for the updated Plan results stated above. Key findings for each connection type are summarized below.

- Residential: Compared to the calculations provided for the System in the 2019 Plan, residential usage in 2024 was approximately 5 MG less than usage in 2018. Although the connection count was 41 connections less than the number of connections in 2018, the average annual use per connection in 2024 remained at approximately 101,000 gallons per connection.
- Commercial: Commercial usage in 2024 was approximately 5 MG higher than usage in 2018, despite a small decrease in the average number of connections (121 commercial connections in 2018). Average annual use per connection was approximately 20% higher than 2018.
- Industrial: Industrial usage in 2024 was approximately four times the amount of industrial usage in 2018. As discussed above, industrial usage is largely attributed to HAAD demand, which has the capacity to have significant impacts on System consumption.
- Institutional/Governmental: Institutional/governmental usage in 2024 was approximately 5.5 MG higher than usage in 2018.
- Agricultural: Agricultural usage accounted for a small percentage of the total System usage in both 2024 and in 2018. Agricultural usage in 2024 increased by approximately 100,000 gallons from 2018; however, the total average connection count increased. The resulting annual average usage per connection was approximately 5,000 gallons lower than in 2018.

Figure 2.2 illustrates the water use percentages of the total annual water consumed in 2024 by connection type. While residential customers account for a majority of the annual water consumption, the average consumption per connection shows significant consumption by industrial and institutional/governmental customers.

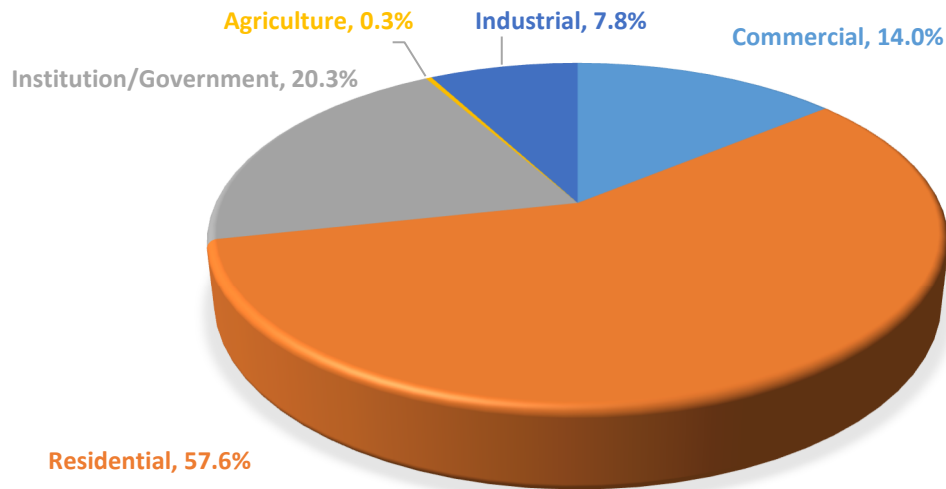


Figure 2.2. 2024 Total Consumption Percentage by Connection Type.

A comparison of the total monthly production and consumption volumes are provided for reference in Figure 2.3. These values are based on the raw data provided by the Utility and do not incorporate any adjustments to account for potential metering inaccuracies. This data was used in completing a water audit using the AWWA software and methodologies. The water audit effort and findings are discussed in Section 2.6 of this Plan.

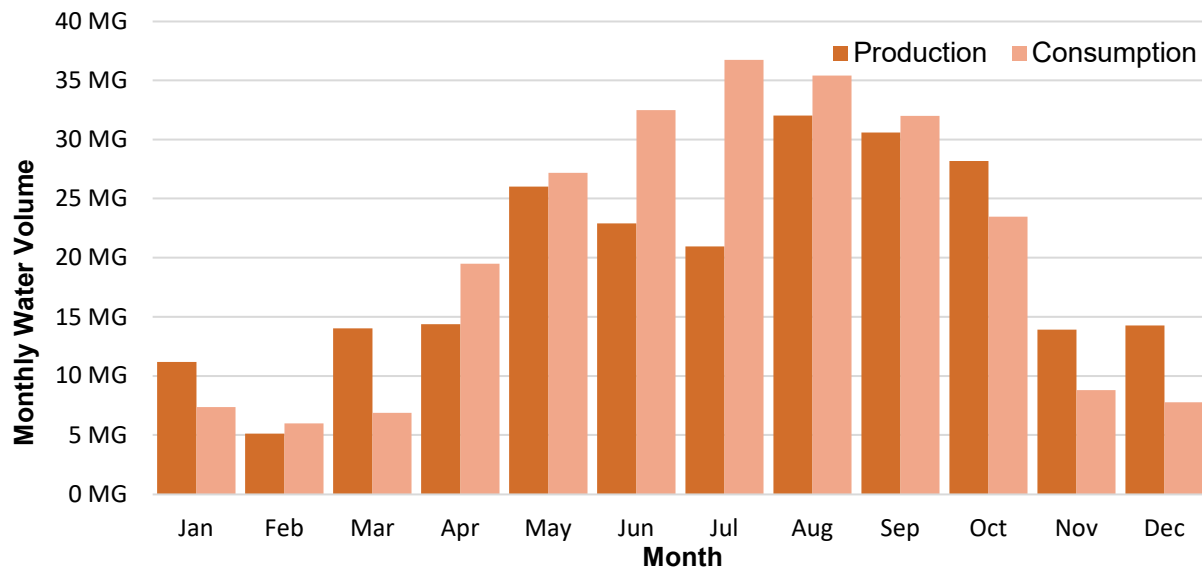


Figure 2.3. 2024 Monthly Production and Consumption Volumes.

The raw data shows water consumption values exceeding production volumes for seven months in 2024. The largest exceedance occurred in July, in which metered production was approximately 15.8 million gallons less than consumption for the month. This error is attributed to source water meters under-registering the total volume produced, which is a common occurrence as meters age. In evaluating source water meter age, the three wells in the Whiskey Flat well field each had meters that appear to be over 15 years old. For each year that the meters exceeded this recommended useful life, a 1.5% correction was applied to the volumes produced to account for under-registration. The resulting weighted correction value of 17.5% was applied in the “Water Supplied Error Adjustments” entry of the AWWA water audit completed for the system. The results of this adjustment are discussed in Section 2.6 of this Plan. As the three Whiskey Flat wells are the largest producers to meet the System demands, it is recommended that these meters be replaced to resolve metering deficiencies before the next water audit is conducted.

2.4 WATER DEMAND FORECAST

The historic population summary obtained from the State Demographer's Office for the System service area, presented in Section 1.3, shows population fluctuations resulting in a small increase of approximately 169 people in the past twenty years.

Future population estimates are not available for Hawthorne through the Nevada State Demographer's Office; however, 20-year population projections are available for Mineral County through 2043. The Nevada State Demographer's Office projects that Mineral County's population will increase from approximately 4,842 people in 2023 to 5,482 people in 2043, resulting in a total increase of 640 people in the county over the 20-year period. Applying the annual county growth rates to the population for Hawthorne results in a projected population of approximately 3,590 people in 2043. The available historic population data and the projected population values utilizing the Mineral County growth rates are shown in Figure 2.4.

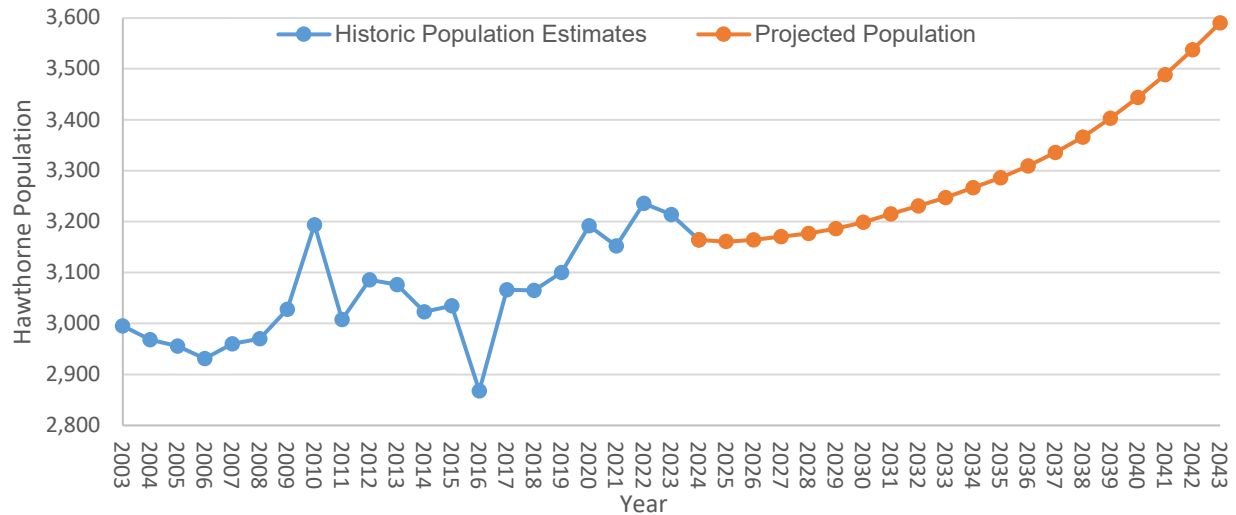


Figure 2.4. Hawthorne Projected Population Growth

This assessment results in a total increase of 426 people in Hawthorne by 2043. The population is projected to be 3,199 people in 2030 when the revised plan is being prepared. It is recommended that the forecast be reassessed when preparing the next Plan revision.

2.5 RATE SCHEDULE

The following is a summary of the current water rate schedule for the System (effective July 1, 2024).

Table 2.4: Current Water System Rate Schedule

Customer Usage (0-5,000 gal.)	Base Rate
3/4"	\$32.82
1"	\$34.57
1-1/2"	\$39.21
2"	\$44.77
3"	\$52.15
4"	\$62.69
Low Income	\$21.70
Standpipe	\$38.39
Base Main Contributor	\$45.72
Customer Usage (>5,000 gal.)	Volumetric Rate per 1,000 gal.
5,001 - 10,000	\$1.40
10,001 - 20,000	\$1.63
20,001 - 30,000	\$1.81
30,001 - 40,000	\$2.07
40,001 - 50,000	\$2.32
50,001 and up	\$2.52
Customer Type	Volumetric Rate per 1,000 gal.
Standpipe/Hydrant up to 40,000 gal.	\$7.23
Standpipe/Hydrant ≥40,001 gal.	\$8.14
Base Main Contributor	\$2.08

2.6 WATER AUDIT

All Water Conservation Plans for systems serving 3,300 or more persons are required to have an accompanying water audit submitted with the Plan. This requirement is in accordance with NRS 540.145 and applies to all plans completed after January 1, 2020. As this Plan is the first update since the water audit requirement came into effect, this is the first Plan submittal which includes a water audit conducted using AWWA software and methodologies.

The water audit was completed using AWWA Free Water Audit Software (FWAS) Version 6.0. The FWAS consists of a spreadsheet to input water supply and authorized consumption values along with operational and cost information for the water system. The audit was completed using available data provided by the Utility for calendar year 2024.

The completed water audit summary is included in Appendix I of the Plan. The next revision of the Plan will include an updated water audit to reflect updated System conditions. The revised Plan will include a comparison of the audit findings to the findings provided in this current Plan.

A summary of the water balance results from the AWWA audit is provided in Figure 2.5. Water balance volumes are provided in units of MG.

AWWA Free Water Audit Software

Water Balance

Water Audit Report for: Hawthorne Water System

Audit Year: 2024

Jan 01 2024 - Dec 31 2024

Data Validity Tier: Tier III (51-70)

FWAS v6.0
American Water Works Association,
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Volume from Own Sources (VOS) (corrected for known errors) 283.092	System Input Volume 283.092	Water Exported (WE) (corrected for known errors)	Billed Water Exported				Revenue Water (Exported)
		0.000					0.000
		Water Supplied	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (BMAC) (water exported is removed)		Revenue Water
					243.448		
				Unbilled Authorized Consumption	Billed Unmetered Consumption (BUAC)		Non-Revenue Water (NRW)
					0.000		
			Water Losses	Apparent Losses	Unbilled Metered Consumption (UMAC)		39.644
					0.140		
					Unbilled Unmetered Consumption (UUAC)		
				Real Losses	Systematic Data Handling Errors (SDHE)		
					0.609		
Customer Metering Inaccuracies (CMI)							
4.971							
Unauthorized Consumption (UC)							
0.609							
Water Imported (WI) (corrected for known errors)	0.000			Leakage on Transmission and/or Distribution Mains			
				Not broken down			
				Leakage and Overflows at Utility's Storage Tanks			
Not broken down							
Leakage on Service Connections							
Not broken down							

Figure 2.5. AWWA Audit Report Water Balance.

Non-Revenue Water is water which does not provide revenue potential to the Utility and includes the total combined volume of apparent losses, real losses, unbilled metered consumption, and unbilled unmetered consumption. The total volume of non-revenue water determined through the water audit was 39.664 MG in 2024. The percentage of non-revenue water relative to the total volume of water produced in 2024 was approximately 14%. According to the Environmental Protection Agency (EPA), national studies indicate that average water loss for individual systems due to leaks is approximately 14%. An unaccounted-for-water allowance range of 10-20% is generally acceptable for most water systems.

2.7 WATER MANAGEMENT GOALS

The findings of the water audit facilitate a clearer understanding of data collection deficiencies and existing water loss conditions in the System. Recommended water management goals for acceptable levels of water loss in the water supply have been identified for the performance indicators discussed below.

2.7.1 Improve Data Validity

The application of valid data is critical in ensuring that water audit results are reliable to facilitate sound managerial and financial decisions. The AWWA FWAS provides Interactive Data Grading (IDG) based on operational practices in categories corresponding to each input used in conducting the water audit. The user-provided information is used by the software to automatically populate a data validity grade for each input category. The data validity grades are applied to generate an overall data validity score, which can range from 0 to 100. Lower data validity scores correspond to lower reliability of water audit results.

The completed water audit featured a data validity score of 62, which is within the Tier III classification score range of 51-70. Priority input categories for improved data validity are presented in Table 2.5. The table also includes recommended actions to modify operational practices corresponding to each input category. Recommended actions are based off of limiting criteria identified by the FWAS for specific criteria question responses that most impacted the data validity score. The table includes criteria question IDs corresponding to the IDG tab of the FWAS spreadsheet.

Table 2.5: Data Validity Improvement Goals and Recommended Actions

Data Validity Goal ID and Description	Action to Modify Operational Practices to Improve Data Validity (criteria question ID)
Goal ID 1: Volume from Own Sources (VOS)	• Complete electronic calibration of meters at least annually (vos.2) • Provide electronic calibration documentation for review (vos.4) • Complete in-situ flow accuracy testing at least annually (vos.5) • Provide most recent in-situ flow accuracy testing documentation for review (vos.6)
Goal ID 2: Variable Production Cost (VPC)	• Derive input from a volume weighted average calculated for all water sources (vpc.1)
Goal ID 3: Billed Metered (BMAC)	• For billed metered accounts, reduce percentage of bills estimated in a typical billing cycle to less than 5% (bmac.1)

It is anticipated that the recommended actions can be implemented within the next five years and incorporated into the updated water audit included with the next Plan revision.

2.7.2 Verify Non-Revenue Water

As discussed in Section 2.3, production data suggests that the Whiskey Flat well field meters are under-registering and require replacement. While the water audit findings estimated non-revenue water to be approximately 14% of the total water supplied, this value relies heavily on the adjustment applied for meter error. The non-revenue water percentage in the water audit also only assessed total water volumes averaged over the period of a year, and it does not consider monthly fluctuations in which production volumes may have been less than consumption even with the applied error adjustment. It is anticipated that improved meter accuracy resulting from the replacement of the Whiskey Flat source water meters would allow for the completion of a valid assessment of non-revenue water totals to better understand system deficiencies and corresponding financial impacts.

The water management goal to verify non-revenue water can be implemented immediately through budgeting for meter replacement and improvements. It is possible that tank level information from the Whiskey Flat blending tank SCADA system could be compared against the production meter readings to assess accuracy of the meters. Following completion of metering improvements, updated production and consumption data can be used to reevaluate actions necessary to progress toward the non-revenue water reduction goal.

3.1 CONSERVATION INCENTIVES

Conservation incentives increase awareness to encourage conservation. There are three general categories of conservation incentives: Educational, Financial, and Regulatory. This section covers the incentives that are planned for the System service area.

3.1.1 Educational Conservation Incentives

- a. Literature. The American Water Works Association (AWWA) and the University of Nevada Cooperative Extension Service publish a number of water conservation related pamphlets. Some of these pamphlets can be distributed to water customers and made available at the Hawthorne Utilities Office. Appendix F includes summaries of these pamphlets.

The Utility currently has a Lawn Care Guide that is available upon request from the Hawthorne Utilities Office. The Lawn Care Guide is provided in Appendix H. Appendix C includes a list of water saving plants that are well-suited for the climate, altitude, and regional conditions of the service area.

3.1.2 Regulatory Conservation Incentives

Regulatory conservation provisions under Water Ordinance 192A have been included in the Mineral County Code of Ordinances since 2006. Title 13, pertaining to Water and Sewers, includes the conservation-specific chapters outlined below.

- a. Title 13 Chapter 30 Drought Conditions. Chapter 30 allows the Mineral County Commissioners to declare drought conditions and enact water rationing, time of use schedules, water use limitations, or other measures deemed necessary to ensure continued water availability.
- b. Title 13 Chapter 32 Water Conservation Requirements. Chapter 32 includes water conservation requirements to ensure the most efficient use of available water resources and to enable effective operation of the water system for the benefit of the System customers.

This chapter contains requirements for new construction, including installation of approved water saving fixtures and devices for new single-family, multi-family, and public uses and the insulation of all hot water pipes in accordance with the uniform plumbing code.

This chapter also includes provisions pertaining to emergency conditions and defines circumstances which may require conservation. After providing notice to customers and consideration of circumstances at a regular public hearing, the Board of Commissioners may impose limited conservation, moderate conservation, or strict conservation conditions. These conservation conditions include varying levels of restriction on watering based on the time of day and the day of the week and on water use for non-drinking water applications.

Mineral County Code of Ordinance Title 13 Chapter 30 Drought Conditions and Title 13 Chapter 32 Water Conservation Requirements are provided for reference in Appendix B.

3.1.3 Financial Conservation Incentives

- a. Water Meters. The System is fully metered at all end user connections. In 2011, the Utility started replacing the old conventional meters with Igloo Smart Meters, and it is estimated that approximately 75% of the service connections are equipped with smart meters. Smart Meters are installed at all new connections when service is activated. Meters are read monthly for billing purposes, and the consumption data is used for water auditing.
- b. Water Rates. The System has an inclining block rate structure. This type of rate structure encourages conservation because rates increase with consumption, and consumers are encouraged to conserve water to minimize water billing rates and the amount of the overall bill. The current rate schedule, effective July 1, 2024, is provided in Section 2.5. The rate schedule is reviewed annually by the Mineral County Commissioners.

3.2 CONSERVATION MEASURES

This section describes current and planned conservation measures within the System service area. A conservation measure is a device or practice that reduces water consumption. Conservation measures are divided into two fundamental categories: (1) Hardware/Equipment and (2) Behavioral/Managerial. Examples of hardware measures include low-volume toilets and irrigation rain sensors. Examples of behavioral measures include turning off the faucet when brushing teeth and watering lawns less frequently. Some conservation measures are mandated by state and/or federal laws and others are voluntarily implemented by water purveyors and/or customers. This section describes conservation measures that the Utility plans to implement and measures that can be implemented by the System customers.

3.2.1 Plumbing Standards

National Efficiency Standards for Fixtures and Appliances are included in Appendix G. These standards can help consumers make conservation-informed decisions as they retrofit fixtures and purchase new appliances. Contractors can also use these standards to ensure that fixtures and appliances used in new construction are compliant with the applicable National standards. As discussed in Section 3.1.2, installation of water saving fixtures is required for new construction under *Mineral County Code of Ordinances Title 13 Chapter 32 Water Conservation Requirements*.

3.2.2 Water Supplier Conservation Measures

Conservation measures implemented by the Utility will consist of management measures only. This is because of the size of the utility and a population trend of minimal growth.

- a. Establishment of a Conservation Budget. All materials and labor associated with conservation will require funding. Because the water system is small, funding will be limited so the budget will be conservative. Cost estimates will be made prior to the start of any program and nothing will be implemented prior to the approval of the budget.
- b. Water Watcher Procedures. Large water utilities employ full-time personnel who specialize in water waste detection and enforcement. Their duties include patrolling neighborhoods searching for water waste problems, levying fines, and providing educational materials to water customers. It is not feasible for the Utility to hire full-time personnel for this purpose; however, existing field personnel are trained in waste recognition and enforcement procedures. These procedures include the following:
 - Definitions of watering restrictions and any exceptions. This might include provisions for new sod or seed and differences between residential, commercial, industrial and institutional watering schedules.
 - Instructions on how to turn off valves in the event of a broken pipe.
 - Hydrant use
 - Water stealing
 - Distribution of educational materials
 - Customer service/relations
 - Waste warnings
 - Waste Report Form complaint system (an example Water Waste Report Form is provided in Appendix E)
 - Reporting to the Director any issues that may result in warning notices or fines

Warning notices designed to hang on doorknobs will be considered as part of the procedures. The intent of these procedures is to increase the effectiveness of the water ordinance.

3.2.3 Water User Conservation Measures

Appendix A contains a list of conservation measures that can be implemented voluntarily by water consumers. The list includes measures for residential, commercial, industrial, and institutional applications.

A list of informational resources pertaining to water conservation are available for reference in Appendix D.

3.3 PLAN IMPLEMENTATION SCHEDULE

A timeline for implementation of each conservation measure and incentive is presented in Table 3.1.

Table 3.1: Plan Implementation Schedule

Conservation Measure/Incentive	Implementation Start
Establish Conservation Budget	July 2026
Tiered Rate Structure	Currently in place Review and update (if applicable) in July 2026
Public Education/Outreach	Currently in place Ongoing efforts to be determined
Water Efficiency Standards for New Development	Currently in place (subsection 13.32.020 of <i>Mineral County Code of Ordinances Title 13 Chapter 32</i>)
Landscape Watering Restrictions	Currently in place under emergency conditions (subsection 13.32.030 of <i>Mineral County Code of Ordinances Title 13 Chapter 32</i>)
Retrofit Incentives	To be determined
Landscaping Incentives	To be determined
Effluent Reuse	Not applicable

3.4 PLAN METRICS AND EVALUATION

Requirements from NRS 540.141(2)(a) state that water suppliers must include means of measuring the effectiveness of conservation measures moving forward. The following methods are recommended for the Utility to consider in evaluating the effectiveness of conservation measures:

- Routinely conduct small-scale water audits. The Utility may choose to conduct a water audit for a shorter audit period or for a portion of the system. This is a manageable approach to assessing the performance of conservation measures outside of the water audit effort conducted every five years.
- Evaluate usage after a conservation measure is implemented. Specific measures in which this evaluation method could be applied include rate increases and water restrictions due to drought or, on a smaller scale, the completion of a voluntary water audit or a fixture retrofit by an individual customer.
- Evaluate usage of a sample group that could be representative of the larger system. The sample group could include high-volume water users in each customer type category. Evaluations of monthly usage compared to usage for the same month in the previous year may help identify whether conservation efforts are successful or if there are opportunities for improvement.
- Conduct a survey of customers and participants in public education and outreach events or efforts related to water conservation. The survey could solicit feedback from the System customers and gauge interest in alternative efforts that may increase conservation awareness.

In addition to the performance evaluation opportunities above, consistent data collection, record keeping, and analysis are required to provide a solid foundation in evaluating the effectiveness of implemented measures and identifying system inefficiencies. The recommended actions associated with the water management goals detailed in Section 2.7 are critical in assessing System conditions applied in water auditing efforts. Improved data validity and accurate non-revenue water volumes provide a necessary foundation for the Utility to evaluate System needs and pursue appropriate, beneficial conservation strategies.

3.5 ESTIMATED ANNUAL WATER SAVINGS

NRS 540.141(2)(b) requires plans serving 500 or more connections to include estimates of the amount of water saved annually for each conservation measure specified in the adopted Plan. The following estimates have been developed through the application of assumptions and approximations, and actual savings may deviate significantly from the estimated values provided in this Plan. A summary of potential water savings per year for each conservation measure and incentive is provided in Table 3.2. The annual saving volumes are provided in gallons and include a low range and high range estimate.

Table 3.2: Potential Annual Water Savings

Conservation Incentive/Measure	Potential Total Annual System Savings	
	Low Range (Gallons)	High Range (Gallons)
Public Education	4,871,760	12,179,399
Landscape Restrictions	30,627,713	45,941,570
Rate Structure (Residential)	2,806,681	5,613,363
Rate Structure (Non-Residential)	5,162,696	8,260,314
Residential Fixture Retrofit	9,857,738	10,236,881
Efficient Fixtures for New Development (2030)	427,050	443,475
Voluntary Irrigation Water Audit	765,693	1,531,386

The assumptions applied to obtain the values presented in Table 3.2 are detailed for each conservation incentive/measure in the remainder of this subsection.

Public Education: Public education, such as the distribution of water conservation literature promoting water-saving habits, can result in savings ranging from 2% to 5%. The values provided in the summary table apply these percentages to the total volume of water consumed in 2024.

Landscape Restrictions: Water savings resulting from landscape watering restriction measures assume a 20% to 30% reduction. Disregarding baseline water usage per connection outside of irrigation season, water consumption attributed to irrigation and non-baseline uses in 2024 was approximately 153 MG total for the 7-month period including April through October. This timeframe coincides with the period in which water was sold to HAAD through the system intertie. It is unknown whether the water was used for irrigation; however, applying landscape watering restrictions to water sold to HAAD during peak consumption months may result in significant water savings for the System.

Rate Structure: A System using a 10% inclining rate structure is estimated to save approximately 2% to 4% in residential water use and 5% to 8% in non-residential water use.

Residential Efficient Fixtures: The potential savings per connection resulting from retrofitting existing residential fixtures were calculated using AWWA methodologies. The total annual system savings utilize the estimated savings per connection per day and assume that 25% of the total average residential connections in the service area participate in replacing fixtures originally installed in the 1980s or earlier. Potential savings per connection, in gallons per day, and total annual system savings, in gallons, for each fixture type are summarized in Table 3.3.

Table 3.3: Efficient Fixture Savings (Residential Retrofit)

Retrofit Action	Potential Savings per Connection (Gallons per Day)		Potential Total Annual System Savings (Gallons)	
	Efficient Faucets	High-Efficiency Faucets	Efficient Faucets	High-Efficiency Faucets
Efficient or High-Efficiency Faucets	9	12	1,137,431	1,516,575
Low-Flow Showerhead	20		2,527,625	
Ultra High-Efficiency Toilet	34		4,296,963	
Efficient Laundry Washing Machine	8		1,011,050	
Efficient Dishwasher	7		884,669	

The potential daily savings per connection can also be applied to estimate savings resulting from the installation of efficient fixtures in new residential developments. The population projects for the service area, discussed in Section 2.4 of the Plan, show that the population will increase by approximately 35 people by 2030. Applying approximately 2.28 people per connection based on 2024 data, the population increase would result in an additional 15 residential connections by 2030. Table 3.4 applies the daily savings per connection from Table 3.3 to the projected number of new residential connections to estimate the annual System savings resulting from efficient fixture installation in new developments.

Table 3.4: Efficient Fixture Savings (New Development)

Efficient Fixture Type	Potential Annual System Savings for New Development by 2030 (Gallons)	
	Efficient Faucets	High-Efficiency Faucets
Faucets	49,275	65,700
Low-Flow Showerhead	109,500	
Ultra High-Efficiency Toilet	186,150	
Efficient Laundry Washing Machine	43,800	
Efficient Dishwasher	38,325	

Residential Efficient Fixtures: Information on irrigation water audits are provided in Appendix A. The potential savings resulting from voluntary irrigation water audits assume that 5% of residential and commercial users will participate and savings will range from 10% to 20% of the irrigation use attributed to the participating users.

Conservation measures are divided into two types: (1) Hardware/Equipment and (2) Behavioral/Managerial. Each of these is subdivided into five categories of application: (1) Residential, (2) Landscape, (3) Industrial, Commercial, and Institutional (ICI) (4) Agricultural, and (5) Purveyor. The following conservation measures will be classified first by application and then by type.

A.1 RESIDENTIAL CONSERVATION MEASURES

A.1.1 Behavioral Measures

A.1.1.1 Residential Water Audits. Water audits could target high use customers first and then be offered to all customers. The following elements should be part of an effective audit.

- Purpose for the audit.
- Estimation of use for all fixtures and appliances.
- Check for and repair leaks.
- Evaluation of Landscape (See “Landscape Conservation Measures”)
- Evaluation of outdoor water use.
- Evaluate efficiency measures.
- Educate customers using available flyers

An audit should take no more than 30 to 45 minutes.

A.1.1.2 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

A.1.2 Hardware/Equipment Measures

The following is a list of devices/practices that will reduce water consumption in the home.

Measure	Description
<i>Bathroom/Kitchen Fixtures</i>	
Low-flow toilets	1.6 gallons per flush
Toilet retrofit devices	Bladders (bags), dams, early close flappers, other hardware and adjustments
Toilet leak repairs	Includes detection (dye tabs) and replacement of worn parts.
Low-volume shower heads	2.5 gallons per minute @ 80 psi
Showerhead retrofit devices	Includes temporary cutoff valves and restrictors.
Low-volume faucets	2.5 gallons per minute @ 80 psi
Faucet retrofit devices	Includes aerators, activation sensors, self-closing and metered valves
Faucet maintenance	Includes washer replacement, repacking, tightening, and cleaning aerators
Water pressure reduction	Only needed if house pressure exceeds what's required
<i>High Efficiency Appliances</i>	
Clothes washers	27 gallons per load
Dish washers	4.5 gallons per load

A.2 LANDSCAPE CONSERVATION MEASURES

A.2.1 Behavioral Measures

A.2.1.1 Landscape Water Audits. Landscape water audits should be conducted on park and golf course irrigation systems and could be considered an option on residential irrigation systems, targeting high-volume users.

- Purpose for the audit.
- Estimation of outdoor use based on meter records.
- Check for and repair leaks.
- Evaluation of Landscape (size, soil, amount of turf, types of plants)
- Evaluation of irrigation system (timers, Use of drip, precipitation amounts).
- Efficiency recommendations.
- Educate customers using available flyers

A residential landscape audit should take no more than an hour. Parks and golf courses could take substantially longer.

A.2.1.2 Xeriscape™. Xeriscape is a method of landscaping that employs low-water use plants, turf, ground covers, shrubs and trees. It includes careful planning, soil analysis, and irrigation system design.

A.2.1.3 Additional Measures. The sample pamphlets in Appendix A include additional behavioral conservation measures.

A.2.2 Hardware/Equipment Measures

Landscape hardware measures consist of two basic groups: (1) Landscape materials and (2) irrigation equipment.

Measure	Description
<i>Landscape Materials</i>	
Trees, plants, and grass	Should be well suited to climate and altitude and be drought tolerant
Organic mulch	Grass clippings, leaves, wood chips, bark, and pine needles. Organic mulches help to retain soil moisture and keep ground cool around plants.
Inorganic mulch	Boulders, gravel, pavers, decomposed granite, and stepping stones. Inorganic mulches are generally more for decorative purposes but they reduce the amount of trees, plants, and turf thereby conserving water.
Compost	Made of manure or biosolids and wood, straw, grass, and leaves. Helps plants stay healthy and retains moisture in the soil.
<i>Irrigation Equipment</i>	
Valves	Should be sized to meet requirements and checked periodically for leaks
Sprinkler Heads	Should match water volume requirements of area being irrigated.
Sprinkler Nozzles	Should have proper arc of coverage and proper trajectory.
Irrigation Controllers	Should have required number of stations, programs, and starts. Also rain delays and sensor terminals.
Drip irrigation	Insures water is directed to where it's needed.

A.3 INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL (ICI) CONSERVATION MEASURES

A.3.1 Behavioral and Hardware/Equipment Measures

A.3.1.1 ICI Water Audits. Since ICI water audits can require a substantial amount of time (4 hours or more), it may be necessary to have a private engineering firm hired by the water user conduct the audit. There is incentive for ICI customers to pay for audits since the results of an audit could translate into substantial savings. An ICI water audit should include the following elements:

- Support from ICI owners, managers, and employees
- Survey/Estimation of facility use based on meter records.
- Calculation of water-related costs.
- Evaluation of efficiency measures.
- Evaluation of payback periods for measures.
- Efficiency recommendations and implementation.
- Tracking and reporting system.

A.3.1.2 Manual Washing. Manual washing is cleaning done on surfaces with hoses and cloths.

MANUAL WASHING	
Behavioral Measures	Hardware/Equipment Measures
Surfaces should be swept or brushed off before using water to clean.	- High pressure low-volume hoses with automatic off nozzles - High-pressure pumps, steam cleaners.

A.3.1.3 Vehicle Washing. Vehicle washing includes manual washing and automated car washes or a combination of both.

VEHICLE WASHING	
Behavioral Measures	Hardware/Equipment Measures
- Limit number of spray nozzles and set flow rates at lowest volume and pressure required. - Adjust nozzles in automated systems so that they take full advantage of gravity and position. Also make sure water is off after vehicles have passed. - Increase conveyor speeds or reduce rinse cycle time. - Sweep wash area before using water to clean. - Establish a regular maintenance schedule that includes checking for leaks and making repairs.	- Recycling systems. These would include filters and storage tanks. - High pressure pumping systems.

A.3.1.4 Kitchens and Restaurants. Kitchen and restaurant conservation is divided into four areas of application; 1. Food and drink preparation, 2. Dishwashing, 3. Garbage disposal and scraping trough, and 4. Ice making.

FOOD AND DRINK PREPARATION

Behavioral Measures	Hardware/Equipment Measures
• Presoak and wash food service articles in basins instead of running water. • Reduce thawing of food with hot water unless required by law. If required use lower flow. • Avoid running water to melt ice in sinks. • Use full loads in dishwashers and other automated equipment. • Serve water only when requested by customers.	• Low-volume faucets • Hands-free foot pedal valves for faucets • On demand hot water dispensers

DISHWASHING

Behavioral Measures	Hardware/Equipment Measures
• Presoak utensils, dishes, and pots and pans in basins of water instead of using running water prior to loading dishwashing machines. • Scrape food off of plates rather than use running water. • Operate scraping troughs only while dishes are actually being washed. • Assess the water efficiency of the current dishwashing system to determine where improvements might be made. • Always wash full loads in automated machines. • Operate conveyor type dishwashers only when dishes are actually passing through the machine. • Verify that the dishwashing equipment is using the minimum amount of flow recommended by the manufacturer. • Since many older automated dishwashing systems are neither energy nor water efficient, evaluate the cost of retrofitting or replacing existing equipment. • Turn dishwashers off when not in use. • Routinely check all dishwashing equipment to ensure there are no leaks. • Post signs requesting that personnel minimize their use of utensils, dishes, and pots and pans to save water.	• Manual pre-wash sprayers with “dead man” with off controls. • Low-flow spray heads on all sprayers. • New water efficient dishwashing equipment. • Electronic eye sensors that shut off conveyer type systems when dishes are not passing through the machine.

GARBAGE DISPOSER AND SCRAPING TROUGH

Behavioral Measures	Hardware/Equipment Measures
- Eliminate disposers and troughs. - Use the minimum acceptable flow rate on all machines. - Reuse wastewater in the mixing chamber of the disposer.	- Garbage strainers (instead of disposers) - Sensors that detect the amount of flow in a disposer and regulate flow accordingly. - Solenoid valves that turn water off when the disposer is off. - Flow regulators for disposer supply lines.

ICE MAKERS

Behavioral Measures	Hardware/Equipment Measures
- Use the minimum flow rate recommended by the manufacturer on water cooled icemakers. - Adjust machines to produce ice only when it's needed. Collect spent cooling water and reuse it for non-potable purposes.	- Air-cooled icemakers. - Re-circulating systems for water-cooled icemakers. - Ice flake machines that use less bleed off than cube machines.

A.3.1.5 Laundries and Laundromats. This section includes measures that are applicable in hotels, motels, hospitals, nursing homes, diaper services, restaurants, and coin operated Laundromats.

LAUNDRIES AND LAUNDROMATS

Behavioral Measures	Hardware/Equipment Measures
- Operate equipment with full loads only. - Reduce water levels for partial loads. - Back flush filters or softeners only when necessary.	- Computer controlled rinse water reclamation systems. - Wash and rinse water treatment and reclamation systems. - Continuous batch washers. - Ozone laundry systems. - Horizontal axis washers.

A.3.1.6 Swimming Pools. The measures in this section can be applied to commercial and residential swimming pools.

SWIMMING POOLS

Behavioral Measures	Hardware/Equipment Measures
- Limit the frequency of pool refilling. - Cover the pool with an insulated cover when not in use to reduce losses due to heat and evaporation. - Reduce the level of the pool to avoid losses due to splashing. - Lower the pool temperature. - Back wash filters only when necessary. If backwash is timed, verify that frequency is efficient. - Regularly check pool for leaks and cracks. Keep pool and filter clean to avoid unnecessary backwashing.	There are no special equipment measures that would help conserve water in pools. It is important however that available equipment is efficient and used properly as recommended by manufactures.

A.3.1.7 Cooling Systems. This section includes measures for three types of cooling systems: 1. Single-pass, 2. Evaporative, and 3. Equipment. Single-pass cooling uses fresh water to cool without re-circulating any of the water used in the first pass. Evaporative coolers are used for cooling in commercial and residential applications and are commonly known as swamp coolers. Equipment cooling includes both single-pass and re-circulating systems that are used to cool equipment and machinery.

SINGLE-PASS COOLING

Behavioral Measures	Hardware/Equipment Measures
- Reuse water for landscaping, vehicle washing, or another cooling application that allows for water to be at a higher temperature. - Eliminate single-pass systems.	- Air-cooled equipment (i.e. compressors, pumps, icemakers, etc...) - Automatic controls that insure coolers only operate when needed.

EVAPORATIVE COOLING

Behavioral Measures	Hardware/Equipment Measures
- Regularly check for leaks in hoses and pan. - Replace pads at least annually. - Shut off cooler off when building is unoccupied. - Annually service the equipment by oiling moving parts and cleaning off accumulated scale or corrosion.	There are currently no equipment measures for evaporative coolers. The design of the coolers is relatively simple.

EQUIPMENT COOLING

Behavioral Measures	Hardware/Equipment Measures
- Reuse water in single pass systems for other cooling purposes. Examples of reuse include cooling molten materials, landscape, or boiler make-up water. - Replace al single pass cooling systems with closed-loop systems or replace water-cooled equipment with air-cooled.	

A.3.1.8 Heating Systems. This section deals with conservation measures for boilers and steam generators which are used to heat large buildings and multiple-building facilities.

HEATING SYSTEMS

Behavioral Measures	Hardware/Equipment Measures
- Regularly inspect systems for leaks and make repairs. - Insulate all piping. - Limit boiler bleed-off to a level that satisfies water quality requirements. - Discharge blow-down into an expansion tank instead of using cold water to cool it.	- Flow meters for make-up and blow-down valves. - Automatic controls to discharge blow-down.

A.3.1.9 Leaks and Water Losses. This section covers water conservation measures relating to leaks and losses.

LEAKS AND WATER LOSSES	
Behavioral Measures	Hardware/Equipment Measures
- Regularly check for leaks at all water connections. Keep in mind that higher pressure applications have more incidences of leakage. - Regularly check all vessels that contain water for cracks or bad seals. - Regularly check all heating and cooling systems. - Repair any leaks that are discovered.	- Leak detection equipment. This could include sonic or probe type equipment. - Any equipment used to stop a leak. This would depend on the material of the pipe or vessel that has a leak.

A.3.1.10 ICI Maintenance Practices. This section reemphasizes maintenance conservation measures for ICI facilities that have been mentioned in previous sections. These measures should become standard procedure at all ICI facilities.

- Create a maintenance schedule that includes schedules for leak detection inspections and meter reading, and repair procedures.
- Monitor water-use records keeping track of any increases or decreases in use.
- Conduct water audits every one to three years.
- Shut off supply lines to areas that are not being used.
- Install pressure reducers where feasible.
- Keep a maintenance schedule to clean cooling and heating equipment regularly.
- Recycle and reuse water when feasible.
- Insulate all hot water pipes.
- Replace old equipment with water saving equipment.
- Install timers wherever possible.
- Educate employees on water saving techniques.

A.4 General Residential Behavioral Measures

This list of conservation behaviors and is divided into four parts: Home, Landscaping, Community, and Miscellaneous.

HOME BEHAVIORS

- When washing dishes by hand, don't let the water run while rinsing. Fill one sink with wash water and the other with rinse water.
- Don't use running water to thaw food.
- Teach your children to turn the faucets off tightly after each use.
- Soak your pots and pans instead of letting the water run while you scrape them clean.
- Keep a pitcher of water in the refrigerator instead of running the tap for cold drinks, so that every drop goes down you not the drain.

6. Designate one glass for your drinking water each day. This will cut down on the number of times you run your dishwasher.
7. Wash your produce in the sink or a pan that is partially filled with water instead of running water from the tap.
8. Collect the water you use for rinsing produce and reuse it to water houseplants.
9. Scrape off food with a utensil or used paper napkin when pre-cleaning for dishwasher.
10. Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent from using the garbage disposal.
11. Use the garbage disposal sparingly. Compost instead and save gallons every time.
12. Cook food in as little water as possible. This will also retain more of the nutrients.
13. Select the proper size pans for cooking. Large pans require more cooking water than may be necessary.
14. Do not pre-rinse dishes except in cases of sticky or burn-on food.
15. If you accidentally drop ice cubes when filling your glass from the freezer, don't throw them in the sink. Drop them in a house plant instead.
16. For hanging baskets, planters and pots, place ice cubes under the moss or dirt to give your plants a cool drink of water and help eliminate water overflow.
17. Install an instant water heater on your kitchen sink so you don't have to let the water run while it heats up. This will also reduce heating costs for your household.
18. Cut back on rinsing if your dishwasher is new. Newer models clean more thoroughly than older ones.
19. We're more likely to notice leaky faucets indoors, but don't forget to check outdoor faucets, pipes, and hoses for leaks.
20. Grab a wrench and fix that leaky faucet. It's simple, inexpensive, and can save 140 gallons a week.
21. Insulate hot water pipes so you don't have to run as much water to get hot water to the faucet.
22. Turn off the water while you brush your teeth and save 4 gallons a minute. That's 200 gallons a week for a family of four.
23. Make sure there are aerators on all of your faucets.
24. When you are washing your hands, don't let the water run while you lather.
25. Turn off the water while you shave and you can save more than 100 gallons a week.
26. To save water and time, consider washing your face or brushing your teeth while in the shower.
27. If your shower can fill a one-gallon bucket in less than 20 seconds, then replace it with a water efficient showerhead.
28. Time your shower to keep it under 5 minutes. You'll save up to 1,000 gallons a month.
29. Before you lather up, install a low-flow showerhead. They're inexpensive, easy to install, and can save your family more than 500 gallons a week.

- 30.** Turn the water off while you shampoo and condition your hair and you can save more than 50 gallons a week.
- 31.** Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.
- 32.** Plug the bathtub before turning the water on, and then adjust the temperature as the tub fills up.
- 33.** Bathe your young children together.
- 34.** Install low-volume toilets.
- 35.** Drop that tissue in the trash instead of flushing it and save gallons every time.
- 36.** Put food coloring in your toilet tank. If it seeps into the toilet bowl, you have a leak. It's easy to fix, and you can save more than 600 gallons a month.
- 37.** Make sure your toilet flapper doesn't stick open after flushing.
- 38.** If your toilet was installed prior to 1980, place a toilet dam or bottle filled with water in your toilet tank to cut down on the amount of water used for each flush. Be sure these devices do not interfere with operating parts.
- 39.** Listen for dripping faucets and toilets that flush themselves. Fixing a leak can save 500 gallons each month.
- 40.** When doing laundry, match the water level to the size of the load.
- 41.** Wash clothes only when you have a full load and save up to 600 gallons each month.
- 42.** Pre-treat stains before washing clothes to avoid re-washing.
- 43.** Use the shortest wash cycle for lightly soil cloths.
- 44.** Run your washing machine and dishwasher only when they are full and you could save 1,000 gallons a month.
- 45.** Check washing machine hoses regularly for leaks.
- 46.** When you shop for a new appliance, consider one offering cycle and load size adjustments. They are more water and energy-efficient than older appliances.
- 47.** Make sure you know where your master water shut-off valve is located. This could save gallons of water and damage to your home if a pipe were to burst.
- 48.** Install water softening systems only when necessary. Save water and salt by running the minimum number of regenerations necessary to maintain water softness.
- 49.** Choose new water-saving appliances, like washing machines that save up to 20 gallons per load.
- 50.** When you clean your fish tank, use the water you've drained on your plants. The water is rich in nitrogen and phosphorus, providing you with a free and effective fertilizer.
- 51.** Evaporative coolers require a seasonal maintenance checkup. For more efficient cooling, check your evaporative cooler annually.
- 52.** Winterize outdoor spigots when temps dip to 20 degrees F to prevent pipes from bursting or freezing.

53. Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.
54. Check your water meter usage on bill to track your water usage monthly.

LANDSCAPE BEHAVIORS

1. Check your sprinkler system frequently and adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street.
2. Avoid planting turf in areas that are hard to water such as steep inclines and isolated strips along sidewalks and driveways.
3. Plant during the spring or fall when the watering requirements are lower.
4. Minimize evaporation by watering during the early morning hours, when temperatures are cooler and winds are lighter.
5. Use a layer of organic mulch around plants to reduce evaporation and save hundreds of gallons of water a year.
6. Divide your watering cycle into shorter periods to reduce runoff and allow for better absorption every time you water.
7. Only water your lawn when needed. You can tell this by simply walking across your lawn. If you leave footprints, it's time to water.
8. Adjust your lawn mower to a higher setting. Longer grass shades root systems and holds soil moisture better than a closely clipped lawn.
9. Use the sprinkler for larger areas of grass. Water small patches by hand to avoid waste.
10. Use porous materials for walkways and patios to keep water in your yard and prevent wasteful runoff.
11. Direct downspouts and other runoff towards shrubs and trees, or collect and use for your garden.
12. Install a rain shut-off device on your automatic sprinklers to eliminate unnecessary watering.
13. Choose a water-efficient drip irrigation system for trees, shrubs and flowers. Watering at the roots is very effective, be careful not to over water.
14. Reduce the amount of grass in your yard by planting shrubs and ground cover with rock and granite mulching.
15. Remember to check your sprinkler system valves periodically for leaks and keep the heads in good shape.
16. Don't water your lawn on windy days. After all, sidewalks and driveways don't need water.
17. Water your plants deeply but less frequently to create healthier and stronger landscapes.
18. When watering grass on steep slopes, use a soaker hose to prevent wasteful runoff.
19. Group plants with the same watering needs together to get the most out of your watering time.
20. Remember to weed your lawn and garden regularly. Weeds compete with other plants for nutrients, light, and water.

21. While fertilizers promote plant growth, they also increase water consumption. Apply the minimum amount of fertilizer needed.
22. Avoid installing ornamental water features and fountains that spray water into the air. Trickling or cascading fountains lose less water to evaporation.
23. Buy a rain gauge to track how much rain or irrigation your yard receives. Check with your local water agency to see how much rain is needed to skip an irrigation cycle.
24. Teach your family how to shut off your automatic watering systems. Turn sprinklers off if the system is malfunctioning or when a storm is approaching.
25. Set a kitchen timer when watering your lawn or garden with a hose.
26. Next time you add or replace a flower or shrub, choose a low water use plant for year-round landscape color and save up to 550 gallons each year.
27. Use a screwdriver as a soil probe to test soil moisture. If it goes in easily, don't water. Proper lawn watering can save thousands of gallons of water annually.
28. Avoid over-seeding your lawn with winter grass. Once established, ryegrass needs water every three to five days, whereas dormant Bermuda grass needs water only once a month.
29. Landscape with Xeriscape trees, plants and groundcovers. Call your local conservation office for more information about these water thrifty plants.
30. If you have an evaporative cooler, direct the water drain to a flowerbed, tree, or your lawn.
31. Leave lower branches on trees and shrubs and allow leaf litter to accumulate on top of the soil. This keeps the soil cooler and reduces evaporation.
32. Start a compost pile. Using compost when you plant adds water-holding organic matter to the soil.
33. Use sprinklers that throw big drops of water close to the ground. Smaller drops of water and mist often evaporate before they hit the ground.
34. More plants die from over-watering than from under-watering. Be sure only to water plants when necessary.
35. Water only as rapidly as the soil can absorb the water.
36. Aerate your lawn. Punch holes in your lawn about six inches apart so water will reach the roots rather than run off the surface.
37. When you give your pet fresh water, don't throw the old water down the drain. Use it to water your trees or shrubs.

COMMUNITY BEHAVIORS

1. Encourage your school system and local government to help develop and promote a water conservation ethic among children and adults.
2. Make suggestions to your employer to save water (and dollars) at work.
3. Support projects that use reclaimed wastewater for irrigation and other uses.
4. Encourage your friends and neighbors to be part of a water-conscious community.

5. Pick-up the phone and report significant water losses from broken pipes, open hydrants and errant sprinklers to the property owner or your water management district.

MISCELLANEOUS BEHAVIORS

1. Install covers on pools and spas and check for leaks around your pumps.
2. Periodically check your pool for leaks if you have an automatic refilling device.
3. Make sure your swimming pools, fountains, and ponds are equipped with re-circulating pumps.
4. When backwashing your pool, consider using the water on your landscaping.
5. Use a commercial car wash that recycles water.
6. Don't buy recreational water toys that require a constant flow of water.
7. Use a grease pencil to mark the water level of your pool at the skimmer. Check the mark 24 hours later. Your pool should lose no more than ¼ inch each day.
8. When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.
9. Wash your car on the grass. This will water your lawn at the same time.
10. Bathe your pets outdoors in an area in need of water.
11. While staying in a hotel or even at home, consider reusing your towels.
12. When you have ice left in your cup from a take-out restaurant, don't throw it in the trash, dump it on a plant.

CHAPTER 13.30
DROUGHT CONDITIONS

13.30.010 GENERAL

Conditions of drought are not uncommon in the area served by the utility department and by action of the Mineral County Board of Commissioners, drought conditions may be declared. (MC Ord. 192A§ 16, 2006)

13.30.020 ACTIONS OF THE UTILITY DEPARTMENT

In the event of declared drought conditions, the utility department will take such actions as necessary to ensure the available utility department water supply is utilized for the benefit of the greatest number of the utility department customers. The utility department may enact water rationing, time of use schedules, limitation of use, or such other measures as deemed necessary to ensure continued water availability. (MC Ord. 192A § 16, 2006)

13.30.030 CUSTOMER RESPONSIBILITY

It will be the express responsibility of the customer to carefully observe all rules, regulations, and prohibitions set by the utility department in the event of declared drought conditions. The unavailability of water or a prohibition of water use at certain times shall not relieve the customer of paying the fees set by the utility department as set forth in subsection [13.16.020A](#) of this title. (MC Ord. 192A § 16, 2006)

CHAPTER 13.32
WATER CONSERVATION REQUIREMENTS

13.32.010 PURPOSE

These requirements are set forth to ensure the most efficient use of the water resources available to the utility department and to enable the water system to be operated in the most effective manner for the benefit of all of the water utility customers. (MC Ord. 192A § 17, 2006)

13.32.020 REQUIREMENTS FOR NEW CONSTRUCTION

- A. Requirements For New Single-Family Uses: All new single-family uses shall be equipped with approved water saving shower heads, water saving aerators on kitchen sinks and lavatories, water saving toilets, and pressure reducing valves when such a device is required to maintain sixty (60) psi or less within the structure.
- B. Requirements For New Multi-Family Uses: All new multi-family uses shall be equipped with approved water saving shower heads, water saving aerators on kitchen sinks and lavatories, water saving toilets, and pressure reducing valves when such a device is required to maintain sixty (60) psi or less within the structures.

- C. Requirements For New Public Uses: All new public uses shall be equipped with approved water saving shower heads, water saving aerators on kitchen sinks and lavatories, self-closing valves on lavatories, any water saving toilets, and pressure reducing valves when such a device is required to maintain sixty (60) psi or less within the system.
- D. Insulation Of Water Pipes In New Construction: All hot water pipes installed within any new construction shall be insulated to UPC (uniform plumbing code). (MC Ord. 192A § 17, 2006)

13.32.030 EMERGENCY CONDITIONS

When, in the opinion of the board, circumstances require water conservation by utility customer, the board may impose one or more of the following conditions after consideration of those circumstances at a regular public hearing after notice to the customers as provided for in Nevada Revised Statutes 318.199.

A. Limited Conservation:

1. Restrict watering to early morning hours and late evening hours. There is no restriction to hand watering using hoses with self-closing nozzles.
2. No outdoor watering while windy.
3. Do not utilize water for the irrigation of lawns between one o'clock (1:00) P.M. and five o'clock (5:00) P.M.
4. Prohibit wash down of driveways, sidewalks, parking lots, and other impervious surfaces.

B. Moderate Conservation:

1. All items under limited conservation.
2. Restrict landscape irrigation to alternate days. Odd numbered addresses allowed to water on odd numbered calendar days; even numbered addresses allowed to water on even numbered calendar days. No irrigation allowed on the thirty first day of the month.
3. Limit use of water from fire hydrants to actual firefighting use.
4. Hand washing of vehicles allowed only with hoses equipped with self-closing nozzles.

C. Strict Conservation:

1. All items under moderate conservation.
2. No landscape or lawn irrigation under any circumstances.
3. No new lawn or landscape installation.
4. No wash down of automobiles, trucks, vans, or other motorized equipment except at commercial washing facilities that recycle wash water.

5. Impose an excess consumption charge of three hundred percent (300%) of the existing rate per one thousand (1,000) gallons for water use in excess of the base rate.

D. Circumstances Under Which Conservation May Be Required: The Board, upon its findings that one or more of the following emergency conditions are present, may impose any or all of the above mentioned restrictions:

1. Water scarcity condition exists or is likely to exist.
 2. Failure of water production, storage or distribution system(s).
 3. Demand for service in excess of the utility department's authorized water rights.
 4. Order of any agency of the federal, state, or local government having jurisdiction in such matters.
 5. Any other condition that may require such action. (MC Ord. 192A § 17, 2006)
-

APPENDIX C – RECOMMENDED PLANTS

The following list is taken from the Truckee Meadows Water Authority (TMWA) website. Hawthorne's climate is similar to Reno's so these plants will thrive in the Hawthorne Utilities service area. More information on these plants can be found at www.tmwandscapeguide.com.

PERENNIAL FLOWERS

[Artemisia species](#)/Sage or Wormwood (Perennial)—water use: Very Low

[Eriogonum umbellatum](#)/Sulfur Flowered Buckwheat (Perennial)—water use: Very Low

[Achillea species](#)/Yarrow (Perennial)—water use:Low

[Agastache cana](#)/Bubblemint (Perennial)—water use:Low

[Aurinia saxatilis](#)/Basket-of-Gold (Perennial)—water use:Low

[Coreopsis species](#)/Tickseed (Perennial)—water use:Low

[Crocus species](#)/Spring Crocus (Perennial)—water use:Low

[Diant species](#)/Pinks (Perennial)—water use:Low

[Eschscholzia californica](#)/California poppy (Perennial)—water use:Low

[Gaillardia grandiflora](#)/Blanket Flower (Perennial)—water use:Low

[Iris germanica](#)/Iris germanica (Perennial)—water use:Low

[Linum species](#)/Flax (Perennial)—water use:Low

[Narcissus species](#)/Daffodil or Narcissus (Perennial)—water use:Low

[Nepeta racemosa](#)/Catmint (Perennial)—water use:Low

[Oenothera species](#)/Evening Primrose (Perennial)—water use:Low

[Perovskia atriplicifolia](#)/Russian Sage (Perennial)—water use:Low

[Sedum species](#)/Stonecrop (Perennial)—water use:Low

[Senecio Cineraria](#)/Dusty Miller (Perennial)—water use:Low

[Stachys byzantina](#)/Lamb's Ears (Perennial)—water use:Low

[Thermopsis montana](#)/No Lupine (Perennial)—water use:Low

[Tulbaghia violacea](#)/Society Garlic (Perennial)—water use:Low

[Alcea rosea](#)/Hollyhock (Perennial)—water use:Moderate

[Antirrhinum majus](#)/Snapdragon (Perennial)—water use:Moderate

[Armeria maritima](#)/Sea Pinks (Perennial)—water use:Moderate

[Aster species](#)/Aster (Perennial)—water use:Moderate

[Echinacea purpurea](#)/Coneflower (Perennial)—water use:Moderate

[Gaura lindheimeri](#)/Gaura (Perennial)—water use:Moderate

[Geranium species](#)/Handy Geranium (Perennial)—water use:Moderate

[Gypsophila species](#)/Baby’s Breath (Perennial)—water use:Moderate

[Hemerocallis hybrids](#)/Daylily (Perennial)—water use:Moderate

[Heuchera sanguinea](#)/Coral Bells (Perennial)—water use:Moderate

[Iberis sempervirens](#)/Candytuft (Perennial)—water use:Moderate

[Kniphofia uvaria](#)/Red Hot Poker (Perennial)—water use:Moderate

[Lavandula angustifolia](#)/Lavender (Perennial)—water use:Moderate

[Lilium species](#)/Lily (Perennial)—water use:Moderate

[N/A](#)/Pussy toes (Perennial)—water use:moderate

[Papaver species](#)/Poppy (Perennial)—water use:Moderate

[Penstemon species](#)/Beard Tongue (Perennial)—water use:Moderate

[Platycodon grandiflorus](#)/Balloon Flower (Perennial)—water use:Moderate

[Rudbeckia fulgida](#)/Black-Eyed Susan (Perennial)—water use:Moderate

[Salvia Species](#)/Sage or Salvia (Perennial)—water use:Moderate

[Saponaria species](#)/Soapwort (Perennial)—water use:Moderate

[Tanacetum species](#)/Painted or Michaelmas Daisy (Perennial)—water use:Moderate

[Tulipa species](#)/Tulip (Perennial)—water use:Moderate

[Veronica spicata](#)/Spike Speedwell (Perennial)—water use:Moderate

[Viola species](#)/Violet or Pansy (Perennial)—water use:Moderate

GROUNDCOVERS, VINES, AND GRASSES

[Opuntia polyacantha](#)/Prickly Pear Cactus (Groundcovers)—water use:Very Low

[Clematis species](#)/Clematis (Groundcovers)—water use:Low

[Euphorbia species](#)/Spurge (Groundcovers)—water use:Low

[Helictorichon sempervirens](#)/Blue Oat Grass (Groundcovers)—water use:Low

[Hypericum calycinum](#)/Jacob’s Ladder or Aaron’s Beard (Groundcovers)—water use:Low

[Juniperus horizontalis](#)/Groundcover Junipers (Groundcovers)—water use:Low

[Lathyrus latifolius](#)/Perennial Sweet Pea (Groundcovers)—water use:Low

[Lonicera species](#)/Honeysuckle (Groundcovers)—water use:Low

[Panicum virgatum](#)/Switch Grass (Groundcovers)—water use:Low

[Polygonum species](#)/Polygonum (Groundcovers)—water use:Low

[Santolina species](#)/Lavender Cotton (Groundcovers)—water use:Low

[Vinca minor](#)/Dwarf Periwinkle (Groundcovers)—water use:Low

[Wisteria sinensis](#)/Chinese Wisteria (Groundcovers)—water use:Low

[Zauschneria californica](#)/California Fuschia (Groundcovers)—water use:Low

[Calamagrostis x acutiflora](#)/Feather Reed Grass (Groundcovers)—water use:Moderate

[Campsis radicans](#)/Red Trumpet Creeper (Groundcovers)—water use:Moderate

[Cerastium tomentosum](#)/Snow in Summer (Groundcovers)—water use:Moderate

[Delosperma cooperi](#)/Hardy Purple Ice Plant (Groundcovers)—water use:Moderate

[Hedera helix](#)/Ivy (Groundcovers)—water use:Moderate

[Helianthemum nummularium](#)/Sunrose (Groundcovers)—water use:Moderate

[Mahonia repens](#)/Creeping Mahonia (Groundcovers)—water use:Moderate

[N/A](#)/Northern seacats (Groundcovers)—water use:moderate

[Phlox subulata](#)/Moss Pink (Groundcovers)—water use:Moderate

[Potentilla neumanniana](#)/Cinquefoil (Groundcovers)—water use:Moderate

[Sedum species](#)/Stonecrop (Groundcovers)—water use:Moderate

[Thymus species](#)/Thyme (Groundcovers)—water use:Moderate

SHRUBS

[Artemisia tridentata var. tridentata](#)/Big Sagebrush (Shrubs)—water use:Very Low

[Atriplex canescens](#)/Four Wing Saltbrush (Shrubs)—water use:Very Low

[Chrysothamnus nauseosus](#)/Rubber Rabbitbrush (Shrubs)—water use:Very Low

[Amelanchier species](#)/Serviceberry or Juneberry (Shrubs)—water use:Low

[Aronia species](#)/Chokeberry (Shrubs)—water use:Low

[Berberis species](#)/Barberry (Shrubs)—water use:Low

[Caragana species](#)/Peashrub (Shrubs)—water use:Low

[Caryopteris x clandonensis](#)/Blue Mist Spiraea (Shrubs)—water use:Low

[Chaenomeles speciosa](#)/Flowering Quince (Shrubs)—water use:Low

[Cytisus species](#)/Broom (Shrubs)—water use:Low

[Elaeagnus commutata](#)/Silverberry (Shrubs)—water use:Low

[Euonymus species](#)/Euonymus (Shrubs)—water use:Low

[Forestiera neomexicana](#)/New Mexico Privet (Shrubs)—water use:Low

[Genista species](#)/Dwarf Broom (Shrubs)—water use:Low

[Hibiscus syriacus](#)/Rose of Sharon (Shrubs)—water use:Low

[Ligustrum species](#)/Privet (Shrubs)—water use:Low

[Lonicera tatarica](#)/Tatarian Honeysuckle (Shrubs)—water use:Low

[Mahonia aquifolium](#)/Oregon Grape (Shrubs)—water use:Low

[Pinus mugo](#)/Mugo Pine (Shrubs)—water use:Low

[Prunus species](#)/Bush Cherry (Shrubs)—water use:Low

[Pyracantha coccinea](#)/Firethorn or Pyracantha (Shrubs)—water use:Low

[R species](#)/Sumac (Shrubs)—water use:Low

[Ribes aureum](#)/Golden Currant (Shrubs)—water use:Low

[Shepherdia argentea](#)/Silver Buffaloberry (Shrubs)—water use:Low

[Symphoricarpos albus](#)/Snowberry (Shrubs)—water use:Low

[Syringa vulgaris](#)/Common Lilac (Shrubs)—water use:Low

[Yucca species](#)/Yucca (Shrubs)—water use:Low

[Acer circinatum](#)/Vine Maple (Shrubs)—water use:moderate

[Amorpha canescens](#)/Leadplant (Shrubs)—water use:moderate

[Buddleia species](#)/Butterfly Bush (Shrubs)—water use:Moderate

[Catalpa x Chilopsis](#)/Chitalpa (Shrubs)—water use:moderate

[Ceratoides lanata](#)/Winterfat (Shrubs)—water use:moderate

[Cercocarpus ledifolius](#)/Mt. Mahogany (Shrubs)—water use:moderate

[Chamaebatiaria millifolium](#)/Fernbush (Shrubs)—water use:moderate

[Chilopsis linearis](#)/Desert or Flowering Willow (Shrubs)—water use:moderate

[Cotoneaster species](#)/Cotoneaster (Shrubs)—water use:Moderate

[Cowania mexicana](#)/Cliffrose (Shrubs)—water use:moderate

[Fallugia paradoxa](#)/Apache Plume (Shrubs)—water use:moderate

[Forsythia species](#)/Forsythia (Shrubs)—water use:Moderate

[Hamamelis x intermedia](#)/Witch Hazel (Shrubs)—water use:Moderate

[Hesperaloe parviflora](#)/Red Yucca (Shrubs)—water use:moderate

[Juniperus chinensis](#)/Sea Green Juniper (Shrubs)—water use:Moderate

[Kerria japonica](#)/Kerria (Shrubs)—water use:Moderate

[Kolkwitzia amabilis](#)/Beautybush (Shrubs)—water use:moderate

[Philadelph virginialis](#)/Mock Orange (Shrubs)—water use:Moderate

[Picea glauca var. albertiana 'Conica'](#)/Dwarf Alberta Spruce (Shrubs)—water use:Moderate

[Pinus contorta 'Latifolia'](#)/Lodgepole Pine (Shrubs)—water use:moderate

[Potentilla fruticosa](#)/Shrubby Potentilla (Shrubs)—water use:Moderate

[Purshia tridentata](#)/Bitterbrush (Shrubs)—water use:moderate

[R. frangula 'Asplenifolia'](#)/Fernleafed buckthorn (Shrubs)—water use:Moderate

[R. frangula 'Columnaris'](#)/Tall Hedge Buckthorn (Shrubs)—water use:Moderate

[Rhamnus frangulia](#)/Sea buckthorn (Shrubs)—water use:Moderate

[Rosa species](#)/Hardy Shrub Roses (Shrubs)—water use:Moderate

[Spiraea species](#)/Spiraea (Shrubs)—water use:Moderate

[Symphoricarpa x chenaultii](#)/Coralberry 'Hancock' (Shrubs)—water use:Moderate

[Tja occidentalis](#)/American Arborvitae (Shrubs)—water use:Moderate

[Viburnum species](#)/Viburnum (Shrubs)—water use:Moderate

TREES

[Acer ginnala](#)/Amur Maple (Trees)—water use:Deep Water 10-14 days

[Ailant altissima](#)/Tree of Heaven (Trees)—water use:Deep Water 10-14 days

[Calocedrus decurrens](#)/Incense Cedar (Trees)—water use:Deep Water 10-14 days

[Catalpa species](#)/Catalpa (Trees)—water use:Deep Water 10-14 days

[Cedrus atlantica glauca](#)/Blue Atlas Cedar (Trees)—water use:Deep Water 10-14 days

[Celtis occidentalis](#)/Hackberry (Trees)—water use:Deep Water 10-14 days

[Crataegus species](#)/Hawthorn (Trees)—water use:Deep Water 10-14 days

[Elaeagnus angustifolia](#)/Russian Olive (Trees)—water use:Deep Water 10-14 days

[Gleditsia triacanthos inermis](#)/Honeylocust (Trees)—water use:Deep Water 10-14 days

[Juniperus species](#)/Tree Juniper (Trees)—water use:Deep Water 10-14 days

[Maackia amurensis](#)/Maackia (Trees)—water use:Deep Water 10-14 days

[Maclura pomifera](#)/Osage Orange (Trees)—water use:Deep Water 10-14 days

[Malus hybrids](#)/Crabapple (Trees)—water use:Deep Water 10-14 days

[Pinus species](#)/Pine (Trees)—water use:Deep Water 10-14 days

[Platanus acerifolia](#)/Sycamore (Trees)—water use:Deep Water 10-14 days

[Quercus species](#)/Oak (Trees)—water use:Deep Water 10-14 days

[Robinia species](#)/Locust (Trees)—water use:Deep Water 10-14 days

[Sequoiadendron giganteum](#)/Giant Redwood (Trees)—water use:Deep Water 10-14 days

[Ulmus parvifolia](#)/Chinese elm (Trees)—water use:Deep Water 10-14 days

[Zelkova serrata](#)/Zelkova (Trees)—water use:Deep Water 10-14 days

[Aesculus hippocastanum](#)/Common Horsechestnut (Trees)—water use:Deep Water 7-10 days

[Carpinus betulus](#)/Hornbeam (Trees)—water use:Deep Water 7-10 days

[Cotinus coggygria](#)/Smoke Tree (Trees)—water use:Deep Water 7-10 days

[Cupressus glabra](#)/Arizona Cypress (Trees)—water use:Deep Water 7-10 days

[Fraxinus species](#)/Ash (Trees)—water use:Deep Water 7-10 days

[Ginkgo biloba](#)/Maidenhair Tree (Trees)—water use:Deep Water 7-10 days

[Koelreuteria paniculata](#)/Golden Rain Tree (Trees)—water use:Deep Water 7-10 days

[Laburnum watereri](#)/Golden Chain Tree (Trees)—water use:Deep Water 7-10 days

[Liquidambar styraciflua](#)/Sweetgum (Trees)—water use:Deep Water 7-10 days

[Liriodendron tulipifera](#)/Tulip Tree (Trees)—water use:Deep Water 7-10 days

[Malus domestica](#)/Fruiting Apple Tree (Trees)—water use:Deep Water 7-10 days

[Morus alba](#)/Mulberry (Trees)—water use:Deep Water 7-10 days

[Phellodendron amurense](#)/Amur Cork Tree (Trees)—water use:Deep Water 7-10 days

[Picea species](#)/Spruce (Trees)—water use:Deep Water 7-10 days

[Pistacia chinensis](#)/Chinese Pistache (Trees)—water use:Deep Water 7-10 days

[Prunus species](#)/Plum or Cherry (Trees)—water use:Deep Water 7-10 days

[Pyrus Species](#)/Pear (Trees)—water use:Deep Water 7-10 days

[Sophora japonica](#)/Japanese Pagoda Tree (Trees)—water use:Deep Water 7-10 days

[Sorbus species](#)/Mountain Ash (Trees)—water use:Deep Water 7-10 days

[Tja occidentalis](#)/Arborvitae (Trees)—water use: Deep Water 7-10 days

[Tilia species](#)/Linden (Trees)—water use:Deep Water 7-10 days

[Gymnocladus dioica](#)/Kentucky Coffee Tree (Trees)—water use:Moderate

[Juniperus monosperma](#)/Singleseed Juniper (Trees)—water use:moderate

[Pinus edulis](#)/Pinon Pine (Trees)—water use:moderate

APPENDIX D – WATER CONSERVATION RESOURCES

WATER

- www.energystar.gov
- www.water.nv.gov

DROUGHT

- <http://droughtmonitor.unl.edu/>

LANDSCAPE

- www.tmwandscapeguide.com/landscape_guide/interactive/index.php

EDUCATION

- www.wateruseitwisely.com
- www.washoeet.dri.edu
- www.unce.unr.edu/counties/mineral

INSTITUTIONAL

- www.lvwd.com
- www.snwa.com
- www.tmh20.com
- www.cabq.gov

LEAK DETECTION

- www.americanleakdetection.com
- www.leakdetection.com/water

Hawthorne Utilities WATER WASTE REPORT FORM

Please use this form to report water waste. Our investigators must witness the waste in progress to issue a violation form. Please provide as much information as possible of help us identify the problem.

TIME OBSERVED:

DATE OBSERVED (M/D/Y):

--	--

ADDRESS OR LOCATION OF WASTE:

STREET ADDRESS:	CITY:

MAJOR CROSS STREETS:

--

☐ **OVER-WATERING**

☐ **FOUNTAIN / WATER FEATURE VIOLATION**

☐ **BROKEN SPRINKLER**

☐ **BROKEN PIPE OR ONSITE LEAK**

☐ **TIME-OF-DAY VIOLATION**

☐ **MISTING SYSTEM VIOLATION**

☐ **ASSIGNED DAY VIOLATION**

☐ **OTHER**

DESCRIPTION:

APPENDIX F – AWWA CONSERVATION PAMPHLETS

Water Conservation at Home Sixteen illustrated pages of water conservation tips for homeowners includes information on toilets, showers, bathtubs, shaving, tooth brushing, kitchen, laundry, leaks, water-saving devices, shutoff valves, emergencies, and water meters. (see figure 1).

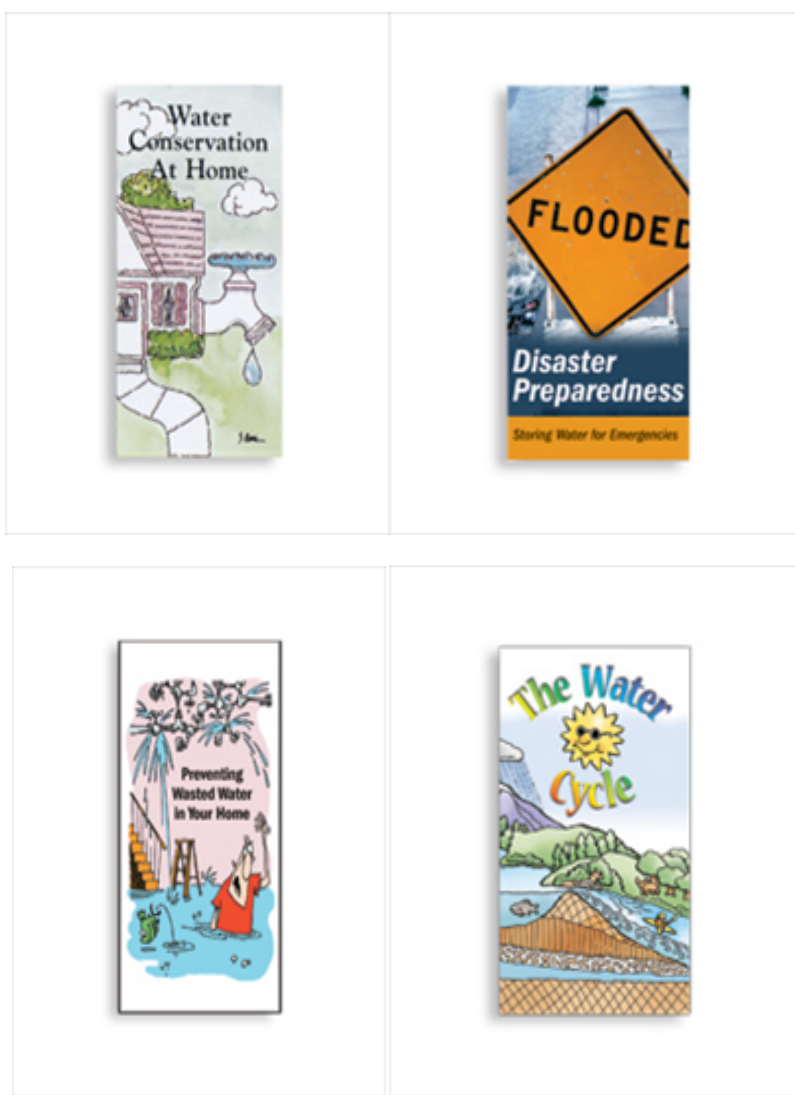
Disaster Preparedness: Storing Water for Emergencies Consumers learn how much water to store, what storage containers to use, how long water will keep, and what a Boil-Water Order is. (see figure 2).

Preventing Wasted Water in Your Home Some leaks are obvious (drip, drip), while others are silent and subtle. This bill stuffer will help your customers become leak detectives. (see figure 3).

The Water Cycle Educate kids and adults alike about the hydrologic (water) cycle with this fun, fill-in-the-blank brochure. (see figure 4).

FIGURES 1-4

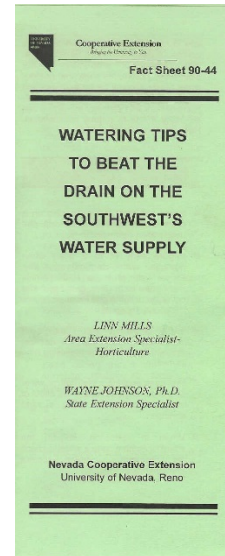
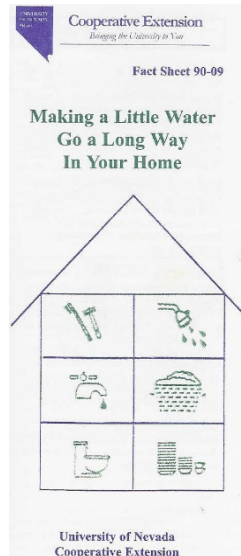
AWWA Conservation Pamphlets



In addition to the above mentioned AWWA publications, The University of Nevada Cooperative Extension publishes Fact Sheets that encourage conservation. Fact Sheet 90-09 “Making a Little Water Go a Long Way in Your Home” contains residential conservation tips (see figure 5) and Fact Sheet 90-40 “Watering Tips to Beat the Drain on the Southwest’s Water Supply” provides tips to make landscapes more water efficient (see figure 6).

FIGURES 5 & 6

University of Nevada Cooperative Extension Fact Sheets



APPENDIX G – NATIONAL EFFICIENCY STANDARDS FOR FIXTURES AND APPLIANCES



**National Efficiency Standards and Specifications
for Residential and Commercial Water-Using Fixtures and Appliances**
(Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water,
U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency	
	Current Standard	Proposed Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Commercial Clothes Washers	As of Jan 9, 2013: Top loaders: 1.6 MEF and WF ≤ 5.5 gal/cycle ¹ Front loaders: 2.0 MEF and WF ≤ 5.5 gal/cycle ²		Energy Star: Effective February 1, 2013 2.2 MEF and ≤ 4.5 WF gal/cycle ³ For both front and top loaders (NOTE: defined as a self- mounted front or top loading machine for use in common area and coin-op laundries with capacity greater than 1.6 cubic feet and not a combo washer- dryer; does NOT include multi- load, high-volume machines used in apartment or commercial buildings)		As of January 9, 2013, CEE specification is no longer active.	Considering restatement in 2014 or later

¹Measuring fixtures not subject to flow rate maximum

DOE: Department of Energy
EPA: Environmental Protection Agency
EPA 1992: Energy Policy Act of 1992
EPA 2005: Energy Policy Act of 2005
EF: energy factor
WF: water factor
gal: gallons
ft³: cubic feet
gpm: gallons per minute
gal: gallons per flush
Wt: kilowatt hour
MEF: modified energy factor
MHP: maximum performance
NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
Lpf: litres per flush
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U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency	
	Current Standard	Proposed Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Commercial Dishwashers	No standard		Energy Star v.2.0 - Effective 2012/01/01: Under counter: H6 Temp: ≤ 0.86 gal/pass; ≤ 0.5 kWh; Lo Temp: ≤ 1.19 gal/pass; ≤ 0.5 kWh Stationary Single Tank Door: H6 Temp: ≤ 0.86 gal/pass; ≤ 0.7 kWh; Lo Temp: ≤ 1.18 gal/pass; ≤ 0.6 kWh Pot, Pan, and Utensil H6 Temp: ≤ 0.58 gal/pass; ≤ 1.2 kWh; Lo Temp: ≤ 0.58 gal/pass; ≤ 1.0 kWh Single Tank Conveyor: H6 Temp: 0.70 gal/pass; ≤ 1.5 kWh; Lo Temp: 0.78 gal/pass; ≤ 1.5 kWh Multiple Tank Conveyor: H6 Temp: 0.54 gal/pass; ≤ 2.25 kWh; Lo Temp: 0.54 gal/pass; ≤ 2.0 kWh Single Tank Flight Type: Requires formula for both H6 and low temp machines: Cofn = per hour (gph) ≤ 2.97 times of full + 55 Multiple Tank Flight Type: Requires formula for both H6 and low temp machines: Cofn = 4.96 times of full + 17 NOTE: See full Energy Star requirements for definitions and details.		Specification to 6 years old and is no longer applicable	CEE waiting for final test methods before reviewing possible changes to their specifications

DOE: Department of Energy
EPA: Environmental Protection Agency
EPA 1992: Energy Policy Act of 1992
EPA 2005: Energy Policy Act of 2005
EF: energy factor
WF: water factor
gal: gallons
ft³: cubic feet
gpm: gallons per minute
gal: gallons per flush
Wt: kilowatt hour
MEF: modified energy factor
MHP: maximum performance
NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
Lpf: litres per flush
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**National Efficiency Standards and Specifications
for Residential and Commercial Water-Using Fixtures and Appliances**
(Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water,
U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency	
	Current Standard	Proposed Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Automatic Commercial Ice Makers ¹	Effective January, 2010: Energy and condenser water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table)		Energy Star: Energy and water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table). <u>Water cooled machines excluded from Energy Star</u>		Energy and water (possible and condenser) standards are based and vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table)	
Commercial Pre-riase Spray Valves (for food service applications)	Flow rate ≤ 1.6 gpm (no pressure specified; no performance requirements)		WaterSense: Flow rate ≤ 1.28 gpm (includes key performance requirements)	No change to existing specification is planned by WS	No specification at this time	Specification in development

¹Optional standards for other types of automatic ice makers are also authorized under EPA 2005.

DOE: Department of Energy
EPA: Environmental Protection Agency
EPA 1992: Energy Policy Act of 1992
EPA 2005: Energy Policy Act of 2005
EF: energy factor
WF: water factor
gal: gallons
ft³: cubic feet
gpm: gallons per minute
gal: gallons per flush
Wt: kilowatt hour
MEF: modified energy factor
MHP: maximum performance
NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
Lpf: litres per flush
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**National Efficiency Standards and Specifications
for Residential and Commercial Water-Using Fixtures and Appliances**
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Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency	
	Current Standard	Proposed Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Commercial Steam Cookers ¹	No standard		Energy Star (EPA) Electric: 50% cooking energy efficiency; (de rate 400-600 Watts Gas: 38% cooking energy efficiency; (de rate 1,250-12,500 British Thermal unit/hour *Energy Star has no specified water use factor		Electric: Same as Energy Star Water Use Factor (for both electric and gas models): Tier 1A: ≤ 15 gal/hr per compartment Tier 1B: ≤ 4 gal/hr per compartment	

¹de rate standards vary for 3, 4, 5, and 6 size commercial steam cooker models.

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EPA 2005: Energy Policy Act of 2005
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WF: water factor
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gpm: gallons per minute
gal: gallons per flush
Wt: kilowatt hour
MEF: modified energy factor
MHP: maximum performance
NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
Lpf: litres per flush
Rev. March 21, 2014 – by John Koeller
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Appendix G – National Efficiency Standards for Fixtures and Appliances



National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances (Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

DISCLAIMER: The information presented in these tables has been gathered from sources deemed to be reliable. However, neither the authors nor the organizations posing this listing on their websites make any guarantee as to its correctness, accuracy, completeness, or current status. Readers are strongly encouraged to perform their own research at the websites of the organizations cited herein, as well as with any other reliable sources of current information.

Readers are encouraged to report any incorrect or updated information to the author, John Koeller: jkoeller@earthlink.net

Information/materials on EPA 2005/NAECA & other standards:

Clothes Washers and Residential Dishwashers:

http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=23
http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=24
http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=25

Automatic Commercial Ice Maker Standards:

http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=21
http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=22 (page 118 STAT. 648)

Pre-rinse Spray Valves:

http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=24
http://www.eia.doe.gov/pub/energy_efficiency/standards/product.asp?product=25 (page 119 STAT. 612)

Information/materials on Energy Star specifications:

Clothes Washers

http://www.energystar.gov/index.cfm?c=doeshwasher_us_clo_clothes_washers

Residential Dishwashers

http://www.energystar.gov/index.cfm?c=doeshwasher_us_residential_dishwashers

Commercial Dishwashers

http://www.energystar.gov/index.cfm?c=doeshwasher_us_commercial_dishwashers

Automatic Commercial Ice Makers

http://www.energystar.gov/index.cfm?c=doeshwasher_us_commercial_ice_machines

Commercial Steam Cookers

http://www.energystar.gov/index.cfm?c=doeshwasher_us_commercial_steam_cookers

DOE: Department of Energy EPA: Environmental Protection Agency EPA 1992: Energy Policy Act of 1992 EPA 2005: Energy Policy Act of 2005	SE: energy factor WF: water factor gallons per flush gallons per minute	gallons per flush kWh kilowatt hour gal. gallons MWh: modified energy factor MWh: maximum performance	NAECA: National Appliance Energy Conservation Act pvt: pounds per square inch Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
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National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances (Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Information/materials on WaterSense specifications:

Water Closets (Toilets)

<http://www.epa.gov/watersense/products/toilets.html>
<http://www.epa.gov/watersense/products/toilets.html> (specification v.1.0.0661 final0806)

Flushing Urinals

<http://www.epa.gov/watersense/products/urinals.html>
<http://www.epa.gov/watersense/products/urinals.html> (specification v.1.0.0661 final0806)

Residential Bathroom Lavatory Faucets

http://www.epa.gov/watersense/products/bathroom_la_faucets.html
http://www.epa.gov/watersense/products/bathroom_la_faucets.html (specification v.1.0.0661 final0806)

Residential Showerheads

<http://www.epa.gov/watersense/products/showerheads.html>
<http://www.epa.gov/watersense/products/showerheads.html> (specification v.1.0.0661 final0806)

Commercial Pre-Rinse Spray Valves

<http://www.epa.gov/watersense/products/pre-rinse-spray-valves.html>
<http://www.epa.gov/watersense/products/pre-rinse-spray-valves.html> (specification v.1.0.0661 final0806)

Information/materials on CEE specifications:

Residential Clothes Washers

http://www.cee.org/energy_efficiency/standards/CEE_CW_Spec_for_web_aba.pdf

Residential Dishwashers

http://www.cee.org/energy_efficiency/standards/CEE_DD_Spec_for_web_aba.pdf

Commercial, Family-Sized Clothes Washers

http://www.cee.org/energy_efficiency/standards/CEE_CFW_Spec_for_web_aba.pdf

Commercial Ice Makers

http://www.cee.org/energy_efficiency/standards/CEE_CIM_Spec_for_web_aba.pdf

Commercial Dishwashers

http://www.cee.org/energy_efficiency/standards/CEE_CD_Spec_for_web_aba.pdf

Pre-rinse Spray Valves

http://www.cee.org/energy_efficiency/standards/CEE_PSV_Spec_for_web_aba.pdf

Commercial Steam Cookers

http://www.cee.org/energy_efficiency/standards/CEE_CSC_Spec_for_web_aba.pdf

DOE: Department of Energy EPA: Environmental Protection Agency EPA 1992: Energy Policy Act of 1992 EPA 2005: Energy Policy Act of 2005	SE: energy factor WF: water factor gallons per flush gallons per minute	gallons per flush kWh kilowatt hour gal. gallons MWh: modified energy factor MWh: maximum performance	NAECA: National Appliance Energy Conservation Act pvt: pounds per square inch Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
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National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances (Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency (CEE)	
	Current Standard	Proposed/Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Residential Toilets (Water Closets)	1.6 gpf	1.28 gpf & 4 Lpf proposed by efficiency advocates (tank-type only)	Tank-type toilets: WaterSense v.1.1 = 1.28 gpf (4.8 L) with at least 350 gram bulk waste removal Flushometer valve/bowl combinations: No WaterSense specification	Some modifications planned to bring WS into partial synch with the ASME/CSA harmonized national standard. Mods will add change flush volume. Flushometer valve/bowl combinations: Specification in development	No specification	
Residential Lavatory (Bathroom) Faucets		1.5 gpm/ 5.7 Lpm proposed by efficiency advocates	WaterSense: 1.5 gpm & 8.8 gpm minimum at 20 psi	No change to existing specification is planned	No specification	
Residential Kitchen Faucets	2.2 gpm at 60 psi		WaterSense: No specification	No specification proposed at this time	No specification	
Residential Showerheads	2.5 gpm at 80 psi		WaterSense: 2.0 gpm with spray force & coverage requirements	No change to existing specification is planned	No specification	

*EPA 1992 standard for toilets applies to both commercial and residential models.

*EPA 1992 standard for faucets applies to both commercial and residential models.

DOE: Department of Energy EPA: Environmental Protection Agency EPA 1992: Energy Policy Act of 1992 EPA 2005: Energy Policy Act of 2005	SE: energy factor WF: water factor gallons per flush gallons per minute	gallons per flush kWh kilowatt hour gal. gallons MWh: modified energy factor MWh: maximum performance	NAECA: National Appliance Energy Conservation Act pvt: pounds per square inch Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
2014 Alliance for Water Efficiency/Koeller & Co. Page 11			



National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances (Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)

Fixtures and Appliances	Federal Standard: from EPA 1992, EPA 2005, "Energy Independence and Security Act of 2007", NAECA updates, other sources		WaterSense® or Energy Star®		Consortium for Energy Efficiency (CEE)	
	Current Standard	Proposed/Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Residential Clothes Washers	MEF ≥ 1.28 1.6 kWh/cycle (Standard front- and top-loading models only) WF ≤ 9.5 gal/cycle ¹ Note: MEF measures energy consumption of the total laundry cycle (wash + dry). The higher the number, the greater the energy efficiency	DOE has published a proposed rule for machines made between March 7, 2015 and Jan. 1, 2018 as follows: For STANDARD washers of ≤ 1.6 ft ³ : (a) front loading: MEF ≥ 1.84 & WF ≤ 4.7 (b) top loading: MEF ≥ 1.28 & WF ≤ 8.4 For SMALL (compact) washers of ≤ 1.6 ft ³ : (a) front loading: MEF ≥ 1.33 & WF ≤ 8.3 (b) top loading: MEF ≥ 1.50 & WF ≤ 12.0	Energy Star (DOE) Effective February 1, 2013 for 1.6 to 6.0 ft ³ MEF ≥ 2.0 WF ≤ 6.0 gal/cycle ¹ New: Energy Star Most Efficient (Tier 2 Energy Star) DOE has also published a proposed rule for machines made after Jan. 1, 2018: For STANDARD washers of ≤ 1.6 ft ³ : (a) front loading: MEF ≥ 1.84 & WF ≤ 4.7 (b) top loading: MEF ≥ 1.27 & WF ≤ 6.5 For SMALL (compact) washers of ≤ 1.6 ft ³ : (a) front loading: MEF ≥ 1.33 & WF ≤ 8.3 (b) top loading: MEF ≥ 1.50 & WF ≤ 12.0	Energy Star will likely modify the current specification on or before March 7, 2015. Effective Jan 1, 2011 Tier 1: MEF ≥ 2.0 1.6 kWh/cycle; WF ≤ 6.0 gal/cycle ¹ Tier 2: MEF ≥ 2.2 1.6 kWh/cycle; WF ≤ 4.5 gal/cycle ¹ Tier 3: MEF ≥ 2.4 1.6 kWh/cycle; WF ≤ 4.0 gal/cycle ¹		

DOE: Department of Energy EPA: Environmental Protection Agency EPA 1992: Energy Policy Act of 1992 EPA 2005: Energy Policy Act of 2005	SE: energy factor WF: water factor gallons per flush gallons per minute	gallons per flush kWh kilowatt hour gal. gallons MWh: modified energy factor MWh: maximum performance	NAECA: National Appliance Energy Conservation Act pvt: pounds per square inch Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
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Appendix G – National Efficiency Standards for Fixtures and Appliances

	National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances <i>(Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)</i>					
Fixtures and Appliances			WaterSense® or Energy Star®		Consortium for Energy Efficiency (CEE)	
	Current Standard	Proposed/Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed/Future Specification
Standard Size and Compact Residential Dishwashers	Final Rule of DOE, effective 5/30/2013: STANDARD Size Models: Energy: ≤ 307 kWh/year WF ≤ 1.8 gallons/cycle COMPACT Models: Energy: ≤ 222 kWh/yr WF ≤ 1.5 gallons/cycle		Energy Star v.5.0 (DOE) EH Jan. 20, 2012: STANDARD Size Models: Energy: ≤ 295 kWh/year WF ≤ 4.25 gallons/cycle COMPACT Models: Energy: ≤ 222 kWh/year WF ≤ 1.5 gallons/cycle	A second, more efficient, tier may be developed.	Effective Jan. 20, 2012: Standard size models (8 place settings or more): EF ≥ 0.75 cycles/kWh; and 295 max kWh/year; WF ≤ 4.25 gallons/cycle Compact size models (hold fewer than 8 place settings): EF ≥ 1.0 cycles/kWh; 222 max kWh/year; WF ≤ 1.5 gallons/cycle	Could adjust tiers when new Energy Star becomes effective

*Standard models: capacity is greater than or equal to eight place settings and six serving pieces; Compact models: capacity is less than eight place settings and six serving pieces

DOE: Department of Energy EPA: Environmental Protection Agency EPCA 1992: Energy Policy Act of 1992 EPCA 2005: Energy Policy Act of 2005	EF: energy factor WF: water factor gal: gallons kWh: kilowatt-hour gal: gallons kWh: kilowatt-hour MWh: million watt-hour max: maximum performance	gal: gallons per flush kWh: kilowatt-hour gal: gallons kWh: kilowatt-hour MWh: million watt-hour max: maximum performance	NAECA: National Appliance Energy Conservation Act Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
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National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances <i>(Compiled from information provided by the Alliance for Water Efficiency, U.S. EPA Office of Water, U.S. Dept. of Energy, Energy Star, Consortium for Energy Efficiency, and other sources)</i>						
Fixtures and Appliances	WaterSense® or Energy Star®			Consortium for Energy Efficiency		
	Current Standard	Proposed/ Future Standard	Current Requirements	Proposed/Future Requirements	Current Specification	Proposed Future Specification
Commercial Toilets (Water Closets)	1.6 gpf/6.8 Lpf Except blow-out fixtures: 1.5 gpf/13 Lpf (Note: Some states prohibit blow-out at 1.5 gpf)	1.28 gpf - 4.8 Lpf proposed by some efficiency advocates (bowl- type only)	WaterSense – Tank-type toilets only 1.28 gpf (4.8L) with at least 350 gram bulk waste removal Flushometer valve/bowl combinations No WaterSense specification	Flushometer valve/bowl combinations: WaterSense specification in development. Release expected in 2014.	No specification	
Commercial Urinals	1.8 gpf	0.8 gpf - 1.9 Lpf proposed by efficiency advocates	WaterSense – Flushing urinals only 0.8 gpf/1.8 Lpf (Note: non-water urinals not covered by WaterSense)	No change to existing specification is planned	No specification	
Commercial Faucets	ANSI Standard: Private (single-user) faucets, including residential within commercial bldg 2.2 gpm @ 60 psi ^a All other commercial (except residential) per ANSI standard: 0.5 gpm at 60 psi ^a Metering (auto shut off) faucets 0.25 gallons per cycle ^a (no maximum flow rate)		No specification	Creating a WaterSense draft specification is currently under consideration; no spec is under development, however.	No specification	

^aEPA 1992 standard for urinals applies to both commercial and residential models.

In addition to EPCA requirements, the American Society of Mechanical Engineers/Canadian Standards Association standard for public urinals: Urinals is 0.5 gpm at 60 psi (ANSI A11.1.3.2, CSA B12.1.3). This maximum has been incorporated into the national model plumbing code for all except private applications, unless being defined as residential, hotel guest rooms, and health care patient rooms. All other applications subject to the 0.5 gpm/2.3 lpm flow rate maximum.

DOE: Department of Energy EPA: Environmental Protection Agency EPCA 1992: Energy Policy Act of 1992 EPCA 2005: Energy Policy Act of 2005	EF: energy factor WF: water factor gal: gallons kWh: kilowatt-hour gal: gallons kWh: kilowatt-hour MWh: million watt-hour max: maximum performance	gal: gallons per flush kWh: kilowatt-hour gal: gallons kWh: kilowatt-hour MWh: million watt-hour max: maximum performance	NAECA: National Appliance Energy Conservation Act Lpf: Liters per Flush Rev. March 21, 2014 – by John Koeller
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APPENDIX H – GUIDE TO WATERING AND LAWN CARE



Your lawn is more than just grass. It's one of the things that makes a house a home. We walk on it, play on it, and even lie down on it to watch the clouds roll by on a summer day. It also helps the environment by trapping many pollutants before they can get into the ground water.

Imagine the perfect lawn. A green velvet carpet that's cool on your feet and springs back when you walk on it.

This can be your lawn and with less water—more than 20 percent less—than you may already be using.

We've developed a system that will let you water less and still have an attractive lawn. It will show you how to use just the right amount of water to replace moisture that is lost from the soil and grass.

We call it "EvapoTranspiration"-ET for short.

The ET method of lawn watering helps us save Nevada's most precious resource—water. ET also helps improve water quality. By watering less, you avoid runoff. Overwatering causes more water to run off than soak in. This runoff could carry pollutants from the gutter into our surface water supply.

The two key ingredients to using water efficiently are knowing how much water your sprinkler system puts on your lawn and how much water your lawn needs.

This manual explains how you can determine both, through the ET system.

By using ET, you can save water, time and money and still enjoy:

- A cool, green lawn
- Cheaper water
- The pride of knowing you are making a difference.

Turf Tip #1 Check Your Sprinklers

Good watering practices begin from the ground up, so let's start with the sprinklers.

First, check your sprinkler system. This will tell you if you're getting even water distribution. Dry, brown spots and wet, swampy areas in your lawn are the most obvious signs that there's a problem with your sprinklers.

Another sign is water constantly draining from the sprinkler system and running into the gutter. This could indicate a broken line, a plugged valve or stuck automatic drain valve.

Even a well-designed sprinkler system needs regular checkups and necessary corrections

Turf Tip #3 Take the ET Test

You are now ready to take the ET test. This will determine how long and how often to water your lawn. First, you will need these items:

- 10 or more straight-sided cups or cans (We recommend coffee cups or soup cans, at least 4" to 6" deep, all with the same diameter)
- A pencil
- A ruler
- A calculator

Now, just follow these simple steps to take the ET test:

Step One: On a calm day (early morning is best), distribute the cans randomly around your front yard.

Step Two: Run the sprinklers for 15 minutes. If the water begins to puddle or run off the lawn before the 15 minutes are up, write the number of minutes the sprinkler ran before runoff occurred. If runoff occurs wait for an hour, then turn the sprinklers back on long enough to complete the 15 minutes. Record the length of time the sprinklers ran here: _____. This is the longest you can run this set of sprinklers at a time, as we'll explain on Page 9.

Pause for a moment. Note the amount of water in the cans. There should be about the same amount in each can. You may need to make some minor sprinkler adjustments, such as turning the screws in the center of a nozzle to restrict or increase the water spray. However, if the water levels are more than 50 percent different (for example, one can contains 3/4" water and another 1/4"), you might need some major repairs. If so, call in a professional.

Often an area is irrigated by a second station, and the spray pattern is needed to complete the coverage for the area. In this case, randomly place the cans over the area covered by both stations and run the water for 15 minutes for each station. Pick up the cans and continue to Step Three.

Step Three: For easier figuring, pour the water into one of the cans used in the test. It may take more than one can to collect all the water.

Step Four: Next, place these cans of water on a level surface. With your ruler, measure the depth of water in each can and record the amount. Using your calculator, add the figures and divide by the number of cans used in the test. This will determine the average inches of water your sprinkler system applied. Record the average water depth here: _____

Step Five: To determine how much and how often you need to water, check the ET charts on pages 10 and 12. For example, you have done the cup test on your lawn and your average water depth is .5 (1/2"). Look on Chart 1, (twice a week watering) and under average can depth find .5" (from Step Four). In the column directly under it, go down to where the cross column reads June. It tells you to water your lawn 22 minutes on each watering day in June. Record this number here for future reference.

Check the ET chart each month to make sure you're using the right amount of water on your lawn. Adjust your clock accordingly. If it rains during the week and the amount of moisture adds up to the amount you would be applying on your next watering day, skip watering that day and resume on the next watering day.

Step Six: Repeat Steps One through Five for the side yards and back yard to get the average water depths for those areas. These water depths may be different than your front yard.

Record these numbers for future reference.

Side Yard: _____ Back Yard: _____

If puddling or runoff occurs before the 15 minutes used in the test, break up your watering time. For example, if your required watering time is 12 minutes but runoff begins after 6 minutes, water twice—6 minutes each cycle—one or two hours apart. Allow the water to soak in. Remember: Water and Wait!

If you water with a hose you still need to do a can test. Place the cans in the front yard and turn on the water for 15 minutes using the sprinkler you normally use for watering the lawn. If you have more than one setting to cover the front yard, place the sprinkler at each spot and run the water for 15 minutes for each location. Take the average from the ten cans and use the charts.

Turf Tip #4 Water Early in the Morning

During the summer, water early in the morning when it's calm. Here are some reasons why:

- Less water is lost from evaporation
- Spray drift caused by wind is reduced
- Water soaks deep into the soil and is there when it's most needed—in the heat of the day

Turf Tip #5 Shape Up Your Turf

Problem #1 Thatch: If you're still experiencing water runoff or if dry spots won't go away, your lawn may have developed too much thatch. To check for thatch, take a sample of grass and soil 2" wide by 2" deep. If the spongy area between the grass and soil is more than 1/2" thick, you probably have a thatch problem. This may be due to overwatering or overfertilizing.

- To remove the thatch, use a power rake or hire a professional.
- Before dethatching, mark your sprinkler heads to avoid damaging them. Rakecheck your irrigation system after power raking to be sure it's still okay.

Problem #2 Compacted Soil: Your lawn may have developed compacted soil. This soil will not allow water and nutrients to soak down to the roots. Aeration (or coring) in the spring and fall is a way to open up compacted soil and reduce water runoff. It also helps to reduce thatch buildup. Coring is done by inserting hollow tubes 1/2" wide by 4" deep and spaced 4" to 6" apart into the ground. Cores of soil come out of the tubes to allow water, air and fertilizer to penetrate deep into the soil.

Leave these cores on the grass—your mower will break them up and they will filter back into the soil. Purchase a hand soil aerator (about \$20) to do the aerating or rent a coring machine from a local garden outlet. To make the job easier, have it done professionally.

Aerating and dethatching:

- Improve water penetration
- Reduce water runoff on slopes
- Increase fertilizer effectiveness
- Loosen thatch and compaction
- Help grass root growth
- Relieve compaction

Turf Tip #6 Fertilize Less to Save Water

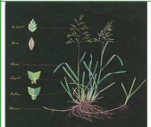
You still need to fertilize your lawn but do it in the spring and autumn when it's cool to promote root growth not top growth. Reduce or even eliminate fertilization during the summer. By fertilizing less, you'll slow down grass growth and use less water.

Select a balanced, slow-release lawn fertilizer with iron and especially with potassium to build in heat and cold resistance, stimulate root growth and increase disease protection.

Follow the instructions on the package and apply only the amount needed. Water immediately after applying the fertilizer to promote quick absorption. However, avoid overwatering to prevent runoff and pollution of our water supply.

Sprinkler Problem	Solution
Clogged sprinkler heads.	Clean sprinkler heads by removing and blowing them out. If you can't unclog them, replace them.
Broken, worn or leaking sprinkler heads.	Replace them with the same kind of sprinkler heads. This will ensure the same rate of water application. Never try to mix sprinkler head brands on the same circuit.
Crooked or tilted sprinklers.	Straighten the sprinklers to their upright positions.
Sunken sprinkler or grass growing around the heads.	Raise the sprinkler by adding a "riser" or install a taller pop-up head; or trim the grass around the head so it doesn't interfere with water distribution.
Poor overlapping spray pattern.	Check the spray pattern of the sprinklers. Each sprinkler must throw water to the adjacent sprinklers

Turf Tip #2 Get to Know Your Grass

Kentucky Bluegrass forms a dense, tightly-knit turf that withstands wear and has the ability to mend when damaged. The grass blades are narrow and dark green.	Tall Fescue is a grass with wide, coarse blades. The Turf-type Improved Tall Fescue is more desirable because it grows lower, denser, is deep rooted and has finer grass blades	Perennial Ryegrass is a grass with a medium to fine texture. It is fast germinating and because of tough veins in the leaf blades, it often has a ragged appearance when mowed. It is often used in a seed mix.
		

LAWN WATERING CHART 1 FOR NORTHERN NEVADA GRASSES

AVERAGE WATER DEPTH FROM CAN TEST<DIV>C<TD>							
TENTHS OF INCH	.25"	.31"	.375"	.44"	.50"	.56"	.625"
FRACTION OF INCH	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
AMOUNT NEEDED PER WEEK	MINUTES TO WATER EACH WATERING DAY (twice a week watering)<DIV>C<TD>						
April .98"/week	29	23	20	17	15	13	12
May 1.18"/week	35	28	24	20	18	16	14
June 1.45"/week	43	35	29	25	22	20	17
July 1.60"/week	47	38	32	28	24	22	19
August 1.50"/week	46	37	30	26	23	20	18
September 1.12"/week	34	27	23	20	17	15	13
October .96"/week	29	23	19	17	15	13	12

Use the chart to determine the amount of water needed, frequently. For example, water for 10 minutes each instead of once per 20 minutes, allowing water to soak in between cycles.

Minutes based on a 15 minute cup test and ET data. If runoff occurs, water more frequently. For example: Water twice for 10 minutes each instead of once for 20 minutes, allowing water to soak in between cycles.

LAWN WATERING CHART 1 FOR CARSON CITY GRASSES

TENTHS OF INCH	AVERAGE WATER DEPTH FROM CAN TEST						
	.25"	.31"	.375"	.44"	.50"	.56"	.625"
FRACTION OF INCH	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
AMOUNT NEEDED PER WEEK	MINUTES TO WATER EACH WATERING DAY (twice (3x) a week watering)						
April .98"/week	15	12	10	9	8	7	6
May 1.18"/week	18	14	12	10	9	8	7
June 1.45"/week	22	18	15	13	11	10	9
July 1.60"/week	24	19	16	14	12	11	10
August 1.50"/week	23	19	15	13	12	10	9
September 1.12"/week	17	14	12	10	9	8	7
October .96"/week	15	12	10	9	8	7	6

Minutes based on a 15 minute cup test and E.T. data. If runoff occurs, water more frequently. For example: Water 15 minutes each instead of once a week. If runoff occurs, water more frequently.

Minutes based on a 15 minute cup test and ET data. If runoff occurs, water more frequently. For example: Water twice for 10 minutes each instead of once for 20 minutes, allowing water to soak in between cycles.



Turf Tip #7 Mow Sharp and by the Chart

Keep your mower blades sharp. Mowing with dull blades or when the grass is wet can result in a ragged-looking lawn and stressed turf.

Mowing heights affect water conservation. Mow your lawn according to the chart below. Follow the recommended height to use less water while still keeping a healthy and attractive lawn. Mow when the grass has grown one-third taller, and leave the clippings on the lawn.

Grass Type	Mowing Heights For Northern Nevada Grasses (In Inches)
Grass Type	Preferred Cut
Bluegrass	2" - 2 1/2"
Tall Fescue	2 1/2" - 3"
Improved Fescue	1 1/2" - 2"
Perennial Ryegrass	1/2" - 2 1/2"

Finally, Keep an Eye on Your Lawn

This manual will help you to monitor your lawn's health with more precision. By keeping an eye on your lawn and your sprinklers, you will get a feel for the many components that go into good lawn care. ET helps you water your lawn by its need, using your sprinkler clock, calendar and scientific information to apply water right and life.

If you have any questions about the ET method or lawn care in general, just ask us. We'll be happy to help. Call: University of Nevada Cooperative Extension 784-4444 (Washoe County) or call The Water Conservation Hotline 688-5503 (Wooten).

The Scientific Facts

If you're wondering how we came up with the figures on the ET charts, they're based on a University of Nevada Cooperative Extension research project—the first study of its kind in northern Nevada.

University scientists use a weather station in the Truckee Meadows to collect the data. The station keeps track of temperature, relative humidity, solar radiation and wind speed.

The information is then fed into a computer. The results? Accurate figures that help you know just how much water to apply to your lawn at any given time during the year.

These figures are provided as a public service to homeowners and commercial turf managers to help everyone water more efficiently.



AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association

Water Audit Report for: **Hawthorne Water System**Audit Year: **2024** Jan 01 2024 - Dec 31 2024

Calendar

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)To access definitions, click the [input name](#)

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

[Water Supplied Error Adjustments](#)

choose entry option:

WATER SUPPLIEDVOS
WI
WE

Volume from Own Sources: 233.551 MG/Yr
Water Imported: MG/Yr
Water Exported: MG/Yr

 17.50% percent

[under-registration](#) VOSEA
WIEA
WEEA

WATER SUPPLIED: 283.092 MG/Yr**AUTHORIZED CONSUMPTION**BMAC
BUAC
UMAC
UUAC

Billed Metered: 243.448 MG/Yr
Billed Unmetered: 0.000 MG/Yr
Unbilled Metered: 0.140 MG/Yr
Unbilled Unmetered: 0.133 MG/Yr

choose entry option:

 0.133 MG/Yr**AUTHORIZED CONSUMPTION:** 243.721 MG/Yr**WATER LOSSES**

39.371 MG/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE Systematic Data Handling Errors: 0.609 MG/Yr
CMI Customer Metering Inaccuracies: 4.971 MG/Yr
UC Unauthorized Consumption: 0.609 MG/Yr

default
 percent
 default

[under-registration](#)

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 6.188 MG/Yr**Real Losses****Real Losses:** 33.183 MG/Yr**WATER LOSSES:** 39.371 MG/Yr**NON-REVENUE WATER****NON-REVENUE WATER:** 39.644 MG/Yr**SYSTEM DATA**

Lm Length of mains: 51.1 miles (including fire hydrant lead lengths)
Nc Number of service connections: 1,984 (active and inactive)
Service connection density: 39 conn./mile main
Lp Are customer meters typically located at the curbstop/property line?
Average length of customer service line has been set to zero and a data grading of 10 has been applied
AOP Average Operating Pressure: 80.0 psi

COST DATA

CRUC Customer Retail Unit Charge: \$3.31 \$/1000 gallons (US)
VPC Variable Production Cost: \$487.94 \$/Million gallons
Total Annual Operating Cost
\$1,232,515 \$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:***** The Water Audit Data Validity Score is in Tier III (51-70). See Dashboard tab for additional outputs. *****[go to dashboard](#)

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

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

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

1: Volume from Own Sources (VOS)
2: Variable Production Cost (VPC)
3: Billed Metered (BMAC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses: gal/conn/day
Unit Apparent Losses: gal/conn/day
Unit Real Losses^a: gal/conn/day
Unit Real Losses^b: gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)