BEATTY WATER & SANITATION DISTRICT
WATER CONSERVATION PLAN

November 2008

PREPARED FOR:
Beatty Water & Sanitation District
1300 A Avenue North
P.O. Box 99
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(775) 553-2931

ENGINEER:
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December 10, 2008

Ericka Que-Gresham Trappe
FARR WEST ENGINEERING
5442 Longley Lane, Suite B
Reno, NV 89511

Dear Ms. Trappe:

This office has finished the review of the draft water conservation plan for the Beatty Water & Sanitation District. The plan contains all the statutory elements required under Nevada Revised Statutes (NRS) chapter 540. Please submit a final hard copy version of the water conservation plan for our records, as well as a PDF version on a compact disk that can be posted on the Division of Water Resources website.

The next update to the water conservation plan will be due in 2013as required by NRS § 540.131(4a).

If you have any questions, please call me at (775) 684-2817.

Sincerely,

K. Hickenbottom P.E.

Kelvin Hickenbottom, P.E
Deputy State Engineer

INTRODUCTION (NRS 540.121)

This water conservation plan has been prepared for the Beatty Water & Sanitation District Public Water System (BWSD). The purpose of the water conservation plan is to continue to encourage a more efficient use of water within the BWSD service area and comply with Nevada Revised Statutes 540.121 through 540.151. BWSD supplies water for municipal and domestic purposes and by state law (***as indicated in bold/italics throughout this report***) is required to submit a water conservation plan for its service area.

> ***NRS 540.121 "Supplier of water" defined.***
> ***As used in NRS 540.121 to 540.151, inclusive, "supplier of water" includes, but is not limited to:***
> ***1. Any county, city, town, local improvement district, general improvement district and water conservancy district;***
> ***2. Any water district, water system, water project or water planning and advisory board created by a special act of the Legislature; and***
> ***3. Any other public or private entity,***
> ***that supplies water for municipal, industrial or domestic purposes. The term does not include a public utility required to adopt a plan of water conservation pursuant to NRS 704.662. (Added to NRS by 1991, 520)***

The small rural community of Beatty is located within Nye County, approximately 115 miles north of Las Vegas, Nevada. BWSD supplies residents of this community with their water and wastewater needs. The community is predominately residential with three Hotel/Casinos, two motels, and numerous local attractions nearby (Scotty's castle, Death Valley, etc).

BWSD currently has 373 residential connections and 68 commercial connections serving approximately 1,133 persons. Water is supplied via three drilled underground wells, three storage tanks, and distribution pipelines of various sizes. The water system and the distribution pipelines are very old (pre-1965) and was originally constructed with Asbestos Cement Pipe (ACP). BWSD does not currently have a water treatment facility within its system; however, a Preliminary Engineering Report is currently in the works to determine a method for the treatment of arsenic and fluoride. It is anticipated that, in the near future, a treatment facility will be needed to bring the arsenic and fluoride levels within the new EPA regulations. Wastewater collected from the area is currently managed through a series of Rapid Infiltration Basins (RIB) and Evaporation Ponds which were recently relined (April 2007). BWSD currently treats its wastewater through this system of aeration and evaporation ponds and eventually the wastewater infiltrates and recharges the groundwater. Currently, BWSD does not reclaim any of the wastewater for "direct" reuse (golf courses, alfalfa fields, parks, etc).

Population in the BWSD service area is expected to grow, in the near future, and may unduly burden the water capabilities of the BWSD water system. This will result in an increased water demand over time. As the demand for water increases, new facilities will need to be constructed/maintained and new sources of water will need to be developed. Financial savings may be possible through water conservation (if upgrades or new infrastructure can be deferred).

The primary water conservation goals for BWSD are listed below. Some of these goals involve ongoing efforts and others are one-time projects that will improve the abilities of BWSD to manage available water and reduce the amount of water waste.

- BWSD will increase public awareness of the limited supply of water in Nevada and the need to conserve water. BWSD will dedicate a small spot on its user's monthly water bill for "Water Conservation Tips." BWSD will also include water conservation mailers/flyers on a semi-annual basis in its bills.
- BWSD will encourage the reduction in lawn sizes and the use of native plants/drought tolerant plants. To prevent water waste from irrigation overspray, BWSD will educate users in practical locations and sizes for turf in order to avoid areas that are difficult to water (narrow, strip, or odd shaped turf.)
- BWSD will strive to reduce water waste and reduce consumption by 5% by the year 2013 (savings of 4,000,000 gallons per year.)
- BWSD will strive to maintain accurate water pumping and usage records in order to identify and reduce water leakages and inaccuracies in the water system (distribution lines, water meters, etc.)
- At such time that it proves to be financially feasible for BWSD to treat its wastewater and the wastewater can be put to beneficial use, BWSD will provide a plan to reuse its effluent water. However, it is not anticipated to be feasible within the 5-year timeframe of this water conservation plan.
- BWSD will continue to discourage the "wasting of water" within its service area through reports by customers, BWSD personnel, and the Nye County Sheriff and Road Departments and the issuance of violation notices.
- BWSD will update its current drought contingency plan (last update was 1/1/2002) in order to maintain the most current list of emergency contact information, equipment available for emergencies, etc.
- BWSD will periodically review and evaluate water conservation measures and incentives for effectiveness and determine if revisions or continuations to the programs will be made.
- BWSD will train management and existing key personnel in water conservation measures, management practices, and techniques.
- All connections in the BWSD service area are currently on water meters. BWSD currently utilizes an increasing block rate water structure which, in itself, helps to conserve water by charging customers based on the amount of water that is actually used.
- BWSD will update the water conservation plan every five years (as required by NAS 540.131.4.c.)

This plan includes information to help water customers in the BWSD service area continue to conserve water. The plan can be used as a resource to implement and measure the effectiveness of conservation efforts and can provide a planning guide for future conservation. The following is included in this water conservation plan prepared for BWSD:

- Conservation Goals
- Existing and Planned Conservation Measures and Incentives
- Educational Materials/Examples

This plan is compliant with Nevada Revised Statutes (NRS) sections 540.121 through 540.151 and is available for public inspection at the following location:

Beatty Water & Sanitation District
1300 A Avenue North, P.O. Box 99
Beatty, Nevada 89003
(775) 553-2931

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

BWSD supplies water for municipal purposes and is required to submit a water conservation plan to the State for approval. BWSD's current water conservation plan was submitted to the State in 1992. This water conservation plan is an update to that plan (as required every five years.) Following is the code from the water conservation portion of the Nevada Revised Statutes and it's applicability to BWSD.

NRS 540.131 Plan of water conservation: Procedure for adoption and updating of plan; review of plan by Section; joint plans permitted by certain suppliers; duties of local governing body.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall, on or before July 1, 1992, adopt a plan of water conservation based on the climate and the living conditions of its service area in accordance with the provisions of NRS 540.141, and shall update the plan pursuant to paragraph (c) of subsection 4. The provisions of the plan must apply only to the supplier's property and its customers. The supplier of water shall submit the plan to the Section for review by the Section pursuant to subsection 3.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person, 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.

BWSD will provide an opportunity for any interested party to submit written views and recommendations on the plan. BWSD will have a public hearing on the water conservation plan and will notify the public of said hearing by posting the agenda in the normal locations to allow anyone interested in the water conservation plan to provide either written comment or personal testimony. BWSD will review all public comments and make any revisions it deems necessary.

3. The plan must be reviewed by the Section within 30 days after its submission and approved for compliance with this section and NRS 540.141 before it is adopted by the supplier of water.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water;

BWSD will keep this water conservation plan in its office during regular business hours for public viewing. Members of the public are encouraged to make written views and recommendations on the water conservation plan. These written views should be sent to the BWSD office.

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public; and

BWSD will revise this water conservation plan (as needed) to keep up with any changing needs and conditions of its service area. If any revisions are made to this water conservation plan, such revision will be made available for inspection by members of the public in the BWSD office during regular business hours.

(c) Must be updated every 5 years and comply with the requirements of this section and NRS 540.141.

BWSD will update this water conservation plan at least every 5 years (in order to comply with State requirements). The next update to the plan will need to be approved by the State and completed in 2013.

5. Suppliers of water:
(a) Who are required to adopt a plan of water conservation pursuant to this section; and
(b) Whose service areas are located in a common geographical area may adopt joint plans of water conservation based on the climate and living conditions of that common geographical area. Such a plan must comply with the requirements of this section and NRS 540.141.

This water conservation plan is intended solely for use within the BWSD service area boundaries and does not include a joint effort with any additional water suppliers.

6. The board of county commissioners of a county, the governing body of a city and the town board or board of county commissioners having jurisdiction of the affairs of a town shall:
(a) Adopt any ordinances necessary to carry out a plan of conservation adopted pursuant to this section which applies to property within its jurisdiction;

BWSD is within the jurisdiction of Nye County, and as such, **Nye County Code 19.40** (approved by the Nye County Board of County Commissioners July 17, 2007) pertaining to the "Prohibition of water wasting from any public water system within the county" is applicable to BWSD users (see **Appendix A**). BWSD will continue to discourage the "wasting of water" within its service area.

(b) Establish a schedule of fines for the violation of any ordinances adopted pursuant to this subsection; and

Nye County Code 19.40 "Wasting Water" states that any customer found in violation of the Ordinance for the first violation will be issued a written warning by an official representative of the public water system and a second violation constitutes a misdemeanor. **Appendix B** includes actual notices sent out by BWSD and a form that can be filled out to report the wasting of water.

(c) Hire such employees as it deems necessary to enforce the provisions of any ordinances it adopts pursuant to this subsection. (Added to NRS by 1991, 520; A 2005, 2570; 2007, 1253)

Due to the small size of the system, BWSD does not currently have personnel, procedures, or finances in place to monitor water waste full time; however, existing employees and individual members within the community report visible water wasting to the district's manager. BWSD does not have the financial capability of hiring employees for the sole purpose of water conservation; however, there is value in training key personnel in order for the conservation and drought sections in this plan to be effective. BWSD will train existing personnel in water conservation methods and water waste.

BWSD will implement public education programs to increase awareness of the limited supply of water in the State of Nevada and the need to conserve water (as required by NRS 540.141.) Following is the code from the water conservation portion of the Nevada Revised Statutes and it's applicability to BWSD.

NRS 540.141 ***Required provisions of plan or joint plan of water conservation; review by Section; posting of plans and joint plans on Internet website.***

1. A plan or joint plan of water conservation submitted to the Section for review must include provisions relating to:

(a) Methods of public education to:

(1) Increase public awareness of the limited supply of water in this State and the need to conserve water.

A key objective of this plan is to increase public awareness of the limited supply of water in Nevada and the need to conserve water. A successful educational program provides information to the public that helps to motivate water users in their efforts to conserve water. The BWSD will provide its customers with educational materials and resources including home & landscape guides, mailers, and links to conservation websites. Example water conservation brochures and pamphlets are included in **Appendix C**. Regardless of the type of educational resources that are used, the most important consideration is their content and if the information is disseminated successfully. Specific water conservation incentives are included in the NRS 540.151 section of this plan.

(2) Encourage reduction in the size of lawns and encourage the use of plants that are adapted to arid and semiarid climates.

Water usage is much higher in the summer than the winter due to the watering needs of landscaping. For this reason, a landscaping code is a fundamental part of an effective water conservation plan. Landscape codes regulate new landscapes and the replacement of existing landscapes. The intent of the code is not to limit landscaping options, but to help customers optimize the efficiency of landscape water use. BWSD does not have the authority to institute a landscaping code. BWSD, however, will encourage the reduction of the size of lawns and encourage the use of Xeriscaping™ methods and drought tolerant/native plants by providing education to its users through brochures in the monthly bills and conservation tips in its monthly newsletter. **Appendix D** gives a list of compatible shrubs, trees, and plants for the BWSD service area.

Education will encourage BWSD customers to become more conscious about the types of plants that can be purchased, that require the least amount of water, and the locations where the plants are most suited for planting. BWSD will encourage the reduction of lawn sizes within its service area through education. BWSD will consider implementing a watering schedule (i.e. even/odd schedule) and instituting times during the day when watering is not allowed (hottest times when water is most likely to evaporate).

(b) Specific conservation measures required to meet the needs of the service area, including, but not limited to, any conservation measures required by law.

Water conservation measures are defined as a device/behavioral practice that is implemented by a water system/user that will result in a quantifiable/measurable amount of water savings or a more efficient use of water. Water conservation measures include "hardware" devices/equipment or behavioral/management practices that will directly save water. Examples of water conservation measures are listed below and are included in **Appendix E**:

- Residential (Indoor)
  Hardware devices/equipment- installing low flow toilets, waterless and composting toilets and urinals, low-flow shower heads and faucets, water-efficient clothes washers and dishwashers, etc.
  Behavioral/management practices- not using toilets for trash disposal, shutting off faucets when brushing teeth or performing other duties, washing only full loads of clothes, dishes, etc.
- Landscaping
  Hardware devices/equipment- installing native/drought tolerant plants/landscaping (including Xeriscape™ techniques), drip irrigation, automatic shut-off hoses, rain sensors, etc.
  Behavioral/management practices- watering less frequently, utilizing water efficient landscape maintenance practices, etc.
- Commercial/Industrial/Institutional
  Hardware devices/equipment- using cooling towers with recycled water, reusing process water, leak repair within facility, etc.
  Behavioral/management practices- shutting off unused valves, sweeping a sidewalk rather than washing with a hose, use water-efficient equipment, not serving water automatically in restaurants, etc.
- Water utilities
  Hardware devices/equipment- leak detection and repair, hydrant capping, utilizing reused effluent, implementing water rate structures that promotes conservation, etc.
  Behavioral/management practices- regularly service and adjust system valves and connections, reduce high pressure locations, etc.

Water conservation measures that are applicable to BWSD are listed as follows:

BWSD Residential Hardware/Device Conservation Measures

BWSD is a small water system that has limited regulatory authority and finances. Conservation measures involving retrofitting equipment/devices are expensive; therefore, a cost-benefit analysis would need to be performed before implementation of any such program to evaluate its effectiveness. Most indoor water can be saved in the bathroom. Toilets, showerheads, and faucets are typically the biggest culprits of indoor water waste. BWSD will purchase dye tablets so that its users can determine if they have a leaky toilet. BWSD will include instructions on how to use the dye tablets and information on how much water/money can be saved if a leaky toilet is fixed. Typically retrofit of a leaking toilet can save between 0.5 to 1.5 gpf, depending on the type of retrofit device installed and the adaptability of a particular toilet to operate at reduced flows. In a household the water savings range form 2 to 4 gpcpd. BWSD can expect to save between 0 to 1,600,000 gallons of water per year if all of the toilets within its district were operating efficiently. BWSD will encourage the use of toilet retrofit devices within its system through education.

BWSD Residential Behavioral Conservation Measures

BWSD will use informational measures to educate its users of individual behavioral changes that can be made to save water. A small section on the monthly bill will be allocated to "Water Conservation Tips" and can include amounts of water saved each year by implementing behavioral conservation measures such as turning off the water when brushing your teeth, using other methods besides allowing the water to run to cool/heat the water that comes out of the faucet, taking shorter showers, only washing clothes/dishes when the machine is full, proper landscaping techniques, etc. BWSD will also strive to include water conservation pamphlets in the monthly bill on a semi-annual basis. BWSD is currently considering the feasibility of creating a website. If a website is set up for BWSD, it will include links to water conservation websites and additional water conservation tips. A successful educational program can change behaviors, resulting in long term water savings and a financial savings to the water user.

BWSD Commercial/Industrial Hardware & Behavioral Conservation Measures

There are only 68 commercial/industrial connections on the BWSD water system. Water conservation to these establishments can come from a variety of different methods. BWSD will provide educational materials to these establishments on the importance of fixing leaking toilets/sinks, proper landscape maintenance, etc. Education can result in both hardware and behavioral changes that will directly save water.

BWSD Water Utility Hardware & Behavioral Conservation Measures

BWSD will save water through the process of detecting and repairing leaks within its system. Detecting leaks within the system can be a time-consuming and costly process that may or may not result in the actual savings of a significant amount of water. Leaks within the system can contribute to high percentages of unaccounted-for water within the system. Based on historical records for pumping and water usage the amount of unaccounted-for water for BWSD is indicated in Table 1 below. Table 1 indicates that the total annual production (for both 2007 & 2006) were less than the total annual usage during the same year. A water system cannot pump less water than it uses, so these numbers are not accurate. Causes for the amount of water pumped to be less than the amount used are numerous: under-registering meters (in particular the main well meters), unbilled water that is estimated instead of metered, old meters that can get clogged with dirt and debris causing the meter not to register/under-register, leaking mains, dead meters, record keeping practices, un-metered uses, multiple users on single meters, etc. can all contribute to the problem. Some of the bigger meters have historically been known to get clogged with debris and not register the actual amount of water that was used.

TABLE 1
BEATTY WATER & SANITATION DISTRICT
UNACCOUNTED-FOR WATER

Year	Total Production (gallons)	Usage "Billed/Unbilled" (gallons)	Total "Billed & Unbilled" Usage (gallons)	Unaccounted-For Water[1] (gallons/%)	Estimated Total Annual Water[2]
2007	75,046,927	74,484,900/37,812,321	112,297,221	37,250,300/+33%	123,526,943
2006	91,709,860	77,977,380/47,668,120	125,645,500	33,935,640/+27%	138,210,050

Notes: 1. 2007 & 2006 #'s indicate that more water was used than was pumped (which is typically indicative of under-registering or non-functional source meters on the District's wells, major commercial meters, etc.)

2. Estimated Annual Water Usage based on increasing the Total (Billed & Unbilled) by a conservative amount to account for some system losses (10%).

All water systems will lose some amount of water and, on average; an efficient system typically has 10% or less of unaccounted-for water. Without accurate pumping and water usage it is difficult to determine how much water is actually being wasted through the distribution system. BWSD will draft, initiate, and set up a meter replacement schedule for its main wells in order to be able to accurately determine how much water is being pumped. The accuracy of the well meters are needed in order to be able to compare the amount of water being used (billed and unbilled) versus the amount pumped. BWSD started a meter replacement program for its residential meters approximately 10 years ago, and estimates that the residential meters are within 5 years old. The meter replacement program didn't account for the commercial accounts and BWSD could be losing revenues to under-registering commercial accounts. BWSD will initiate a meter replacement program for its commercial accounts at such time that it is financially capable to do so. Currently, BWSD detects leaks within its distribution system through meter readings, billing records, day to day well logs, monthly audits, and customer reports.

This conservation plan assumes that BWSD is losing 10% of its water to unaccounted-for-water. The amount of annual unaccounted-for-water for BWSD is estimated at 11,200,000 gallons (based on the total amounts of billed and unbilled water usages). BWSD will continue to detect leaks by meter readings, monthly audits, and customer reports. There is value in maintaining accurate pumping and usage records in order to estimate unaccounted-for water within the system. Obtaining/maintaining accurate pumping meters at both the source and user meters will allow BWSD to compare pumping and usage records to evaluate how much water is unaccounted-for annually (indicative of leaks within the system). BWSD will consider the feasibility of implementing a leak detection program if it is determined that the unaccounted-for-water percentage increases significantly and the District can do so financially.

(c) The management of water to:

(1) Identify and reduce leakage in water supplies, inaccuracies in water meters and high pressure in water supplies; and

Currently, BWSD's personnel will identify leaks in the water system through meter readings, billing records, monthly audits, and well logs. BWSD personnel currently compare the monthly bills from previous bills when a read meter indicates an unusual water usage. BWSD identifies leaks at the users end and inaccuracies in water meters through billing records and monthly audits. BWSD identifies leaks within the system through abnormal well logs and unusual pressure readings. BWSD's water system is old ACP pipelines and the pipes have had a history of leaks. BWSD's well meters have shown that they are not indicative of the amount of water that is being used (well meters are under-registering (water pumped is less than the billed water)). Due to under-registering well meters, it is difficult to determine how much water is leaking directly from the distribution system (due to the age and material of the pipeline, it is assumed that a considerable amount of water is leaking through the distribution system). The distribution system may need to be replaced in order to reduce this leaking of water.

BWSD will strive to reduce the amount of water extracted from the various sources versus the water actually delivered (billed) to customers through a system of identifying and reducing leaks in the water distribution system, instituting a meter maintenance/replacement program, connecting un-metered and multiple users, monitoring water usages that are not billed for, and servicing the system valves and connections are methods that can help BWSD reduce leaks.

An audit comparing water production with metered amounts will be performed prior to implementing incentives or measures. Additional audits will then be done every year thereafter.

Results from the initial audit will be compared with those of subsequent audits in order to determine the effectiveness of measures and/or incentives. BWSD will continue to detect leaks by comparing pumping and usage records to evaluate how much water is unaccounted-for annually. If the percentages increase significantly, BWSD will consider implementing a leak detection program.

(2) Where applicable, increase the reuse of effluent.

This plan will encourage good management practices for the reuse of effluent by those holding authority for its use. Note that BWSD currently has primary storage rights to its effluent. Wastewater collected from the area is currently managed through a series of Rapid Infiltration Basins (RIB) and Evaporation Ponds which were recently relined (April 2007). BWSD currently treats its wastewater through this system of aeration and evaporation ponds and eventually the wastewater infiltrates and recharges the groundwater. Currently, BWSD does not reclaim any of the wastewater for "direct" reuse (golf courses, alfalfa fields, parks, etc).

Currently, it is not feasible for BWSD to treat its wastewater and there are no future plans to "directly" reuse effluent. If it does become financially feasible for BWSD to treat its wastewater and the effluent can be put to beneficial use, BWSD will provide a plan to "directly" reuse the effluent water. However, treatment of BWSD wastewater is not anticipated to be financially feasible during the 5-year time frame of this water conservation plan.

(d) A contingency plan for drought conditions that ensures a supply of potable water.

BWSD will update its current contingency plan (last update was 1/1/2002) in order to maintain the most current list of emergency contact information, equipment available for emergencies, etc. The primary goal of water conservation is to insure that there is sufficient water for essential public health and safety needs at all times. The climate in Northern Nevada is arid and subject to periodic droughts that can vary in duration. It is important, therefore, to have a reserve on hand for such events. Conserving water during times of plenty can help to insure that such reserves are available for drought and emergency conditions. With recent water shortages becoming evident in other locations around the United States, maintaining an adequate supply of water is becoming a more vital component of providing the water that a community needs.

All water supplied by BWSD comes from groundwater sources. Because of this it is difficult to determine the effect of a drought year on the groundwater system and the consequences of a drought may not be detected in the water table until several years after the drought. In extreme instances, where a well can do longer provide the needed water, BWSD will consider options such as restricting water usage until the problem can be solved, increasing the depth of the existing wells, developing a new well site, and/or aggressively finding a new water source, etc.

(e) A schedule for carrying out the plan or joint plan.

The conservation measures and incentives in this plan will be implemented according to the schedule shown in Table 2.

TABLE 2
BEATTY WATER & SANITATION DISTRICT
CONSERVATION PLAN IMPLEMENTATION SCHEDULE

	2009	2010	2011
Measures			
Leak Detection Program	Monitor/Evaluate	Monitor/Evaluate	Monitor/Evaluate
Incentives			
Annual Production Audit	Ongoing	Ongoing	Ongoing
Monthly Consumption Audits	Ongoing	Ongoing	Ongoing
Conservation Training for Key Personnel	Draft	Implement	Ongoing
Conservation Educational Bill Inserts	Draft	Implement	Ongoing
Monthly Newsletter Conservation Tip Section	Draft	Implement	Ongoing
Update Drought Contingency Plan	Initiate	Draft	Implement
Meter Replacement Program (Source Meters)	Evaluate	Initiate	Draft
Meter Replacement Program (Comm. Meters)	Evaluate	Initiate	Draft

(f) Measures to evaluate the effectiveness of the plan or joint plan.

The annual production versus water usage audit will help determine if the schedule needs to be adjusted to accommodate the implementation of new measures or incentives or the discontinuation of old ones. Based on the total billed/unbilled water usage, "estimated" water usage (including a conservative loss of 10%) and a population of 1,133 persons, BWSD uses between 270-300 gallons per capita per day (gpcpd). The average water usage in the State of Nevada is 200 gpcpd. Southern Nevada (longer/hotter season) typically uses more water per person then the State average and Northern Nevada (shorter/cooler season) typically uses less water per person than the State average. A range is given for BWSD because the pumping records for both 2006 and 2007 are higher than the usage records (indicating that the actual annual water usage cannot be accurately determined with the existing data). Implementation of the measures/incentives in this plan and several years of data collection will be required in order to evaluate their effectiveness (a yearly analysis and/or water audit should be performed to compare the pumping & usage records to that of previous years).

(g) For each conservation measure specified in the plan or joint plan, an estimate of the amount of water that will be conserved each year as a result of the adoption of the plan or joint plan, stated in terms of gallons of water per person per day.

The implementations of measures/incentives described in this plan are anticipated to conserve water. Water conservation amounts based on the implementation of educational based incentives are difficult to quantify. Table 4 shows the potential water savings from educational incentives (based on different customer participation levels and assuming a Nye County estimated population of 1,133 (**Appendix F**)). Because it is difficult to determine the additional level of individual participation in educational conservation programs, a range is provided for an average water conservation reduction of 10 gpcpd. Conservation can be obtained through an increase in the residential customers becoming further educated and continually reminded on the value of conserving water.

TABLE 4
BEATTY WATER & SANITATION DISTRICT
RANGE OF WATER SAVINGS FROM RESIDENTIAL CONSERVATION

% of Users Consuming 290 gallons/day	New gpcpd Average	Amount Conserved Annually (million gallons)
0	300	0
25	297.5	1.03
50	295	2.07
75	292.5	3.10
100	290	4.14

For each conservation measure and incentive, the amount of water savings that is estimated to be conserved each year as a result of adoption of the plan is shown in Table 3. The conservation incentives for BWSD are described in the NRS 540.151 section of this plan. Table 3 includes a water savings for the conservation incentives based on the combination of incentives indicated in this plan. The estimates for leaks within the system are based on 10% of the annual billed. The distribution pipeline is old ACP and has known to leak. With existing data (pumping and billing records), it is difficult to determine just how much water can be saved annually) from the replacement of the pipelines within the distribution system (it is possible that a considerable about more than 11,200,000 gallons of water is leaking from the old pipes).

TABLE 3
BEATTY WATER & SANITATION DISTRICT
ESTIMATED ANNUAL WATER SAVINGS FROM CONSERVATION MEASURES

	Annual Water Savings (gallons) [gpcpd]
CONSERVATION MEASURES	
Toilet Dye Tablet and Education	(0-1,600,000) [0-3.9]
Leak Detections (Unaccounted-For Water)	(0 – 11,200,000) [0-27]
CONSERVATION INCENTIVES	
Combined Conservation Incentive Efforts (Including education through quarterly mailers and website links)	(0 – 4,140,000) [0-10]
TOTAL POTENTIAL FUTURE WATER SAVINGS	**(0-16,940,000) [0-40.9]**
ANNUAL GOAL (5% consumption reduction)	**(6,175,000) [14.9]**

2. A plan or joint plan submitted for review must be accompanied by an analysis of:
(a) The feasibility of charging variable rates for the use of water to encourage the conservation of water.

BWSD currently charges its users based on an increasing block rate schedule. The current water rates includes a monthly base rate of $17.50 per unit (includes 2,000 gallons of water usage). Additional charges for water above the 2,000 gallons included in the base rate are shown below in Table 5. Regardless of meter size or customer classification (residential, commercial, etc), all customers are charged the same commodity rate for additional water that is not included in the based rates.

TABLE 5
BEATTY WATER & SANITATION DISTRICT
EXISTING RATE SCHEDULE

Tier	Commodity Charge (per 1,000 gallons)	Gallons
1	0	0-2,000 (included in base rate)
2	$1.30	2,001-8,000
3	$1.85	8,001-15,000
4	$2.25	15,001-30,000
5	$3.00	30,000 +

Monthly Base Rate = $17.50 (per unit) + Commodity Charge

(b) How the rates that are proposed to be charged for the use of water in the plan or joint plan will maximize water conservation, including, without limitation, an estimate of the manner in which the rates will affect consumption of water.

Water rates, as a conservation incentive, work to increase awareness about the value of reducing water and can motivate users to implement water conservation measures. The multiple increasing blocks/tiered rate structure (currently utilized by BWSD) helps to encourage its users to become more conscious of the water that is being used by increasing the cost to use higher volumes of water. The existing BWSD water rates have been designed to charge users for the amount of water they actually use and to encourage conservation.

3. The Section shall review any plan or joint plan submitted to it within 30 days after its submission and approve the plan if it is based on the climate and living conditions of the service area and complies with the requirements of this section.
4. The Chief may exempt wholesale water purveyors from the provisions of this section which do not reasonably apply to wholesale supply.
5. To the extent practicable, the State Engineer shall provide on his Internet website a link to the plans and joint plans that are submitted for review. In carrying out the provisions of this subsection, the State Engineer is not responsible for ensuring, and is not liable for failing to ensure, that the plans and joint plans which are provided on his Internet website are accurate and current. (Added to NRS by 1991, 521; A 2005, 2571; 2007, 1254)

CONSERVATION INCENTIVES (NRS 540.151)

Water conservation incentives are defined as methods that motivate water users to implement conservation/efficiency measures. In itself, conservation incentives do not directly save a single drop of water; they increase the customer awareness about the value of reducing water. Increasing public awareness about the value of reducing water will lead to users making behavioral changes that will result in the increase implementation of conservation measures that directly save a quantifiable amount of water. Conservation incentives are classified into three categories: educational, financial, and regulatory. Examples of water conservation incentives are listed below:

- Educational
  Direct-mail literature, water bill inserts, adding historical water consumption on users bills, television and radio advertisements, media coverage, school curriculum, local workshops/training programs/"Water Fairs", etc.

- Financial
  Bill credits, rebates, conservation designed water rate structures, incentives or surcharge fees, developer rebates/compensations for water savings achieved, etc.

- Regulatory
  Water efficiency policies/ordinances/laws/plumbing codes, landscape design standards, irrigation scheduling (allowable days of week/times of day to irrigate), penalties for outdoor water waste, pollution prevention requirements, etc.

NRS 540.151 Supplier of water required to adopt plan to provide certain incentives; procedure for adoption of plan; adoption of joint plans permitted.

1. Except as otherwise provided in subsection 5, each supplier of water which supplies water for municipal, industrial or domestic purposes shall adopt a plan to provide incentives:

(a) To encourage water conservation in its service area;

Following are specific conservation incentive methods that are used or will be utilized by BWSD to increase public awareness on water conservation within its service area:

- BWSD will draft and implement a plan to mail water conservation flyers (on a semi-annual basis) with the monthly bill to inform BWSD users of the importance to conserve water. These mailings should be timed with water conservation issues for the upcoming months. For instance, landscaping conservation tips should go out in the May/June months and continue throughout the summer; whereas, indoor conservation tips should go out during the months of September/October, and extreme cold weather conservation tips (contact information for frozen pipes, etc.) should go out during December/January. Included in **Appendix G** are websites that BWSD can utilize to obtain valuable information on water conservation tips to pass on to its users.

- BWSD is considering the feasibility of creating a website for its company. If a website is completed it will contain water conservation information and links to conservation websites.

Appendix G shows websites that BWSD can provide links to from its website so that its users can obtain valuable information on water conservation.

- Detecting leaks, on the customer's side of the property, can help users to identify and fix water waste related to unnecessary leaks on their individual properties. Included in **Appendix H** is a description and examples on how to read a water meter and can be included in the monthly bill to inform users on how to detect a leak on their side.

- BWSD will include in its monthly newsletter a dedicate spot for water conservation tips that will encourage/educate its users about the needs to conserve water. This will include various water conservation topics/tips that are deemed pertinent to BWSD users.

(b) To retrofit existing structures with plumbing fixtures designed to conserve the use of water; and

BWSD will provide educational materials that will inform its users on the importance of water savings through the retrofitting of old plumbing fixtures. The most recent Federal and California plumbing standards are shown in Table 6. It is valuable to include California's standards for reference since in most cases California's requirements are more stringent. The comparison infers that there are plumbing fixtures available that exceed federal efficiency requirements and offer consumers alternatives that further improve conservation efforts. **Appendix I** lists EPA water usage benchmarks for typical residential uses.

TABLE 6
Federal and California Plumbing Standards

Device	FEDERAL ENERGY POLICY ACT (FEPA)		CALIFORNIA	
	Manufacture	Effective Date	Sale and Installation	Effective Date
Shower Heads	2.5 gpm*	1/1/94	2.5 gpm	3/20/92
Lavatory Faucets	2.5 gpm	1/1/94	2.2 gpm	3/20/92
Sink Faucets	2.5 gpm	1/1/94	2.2 gpm	3/20/92
Metering Faucets	*	1/1/94	†	7/1/92
Tub Spout Diverters	Not included in FEPA		0.1 to 0.3‡	3/20/92
Residential Toilets	1.6 gpf	1/1/94	1.6gpf	3/20/92
Flushometer Valves	1.6 gpf§	1/1/97	1.6 gpf	1/1/92
Commercial Toilets	1.6 gpf	1/1/97	1.6 gpf	1/1/94
Urinals	1.0 gpf	1/1/94	1.0 gpf	1/1/92

* Gallons per minute.
** 0.25 gal/cycle (pertains to maximum water delivery per cycle.
† Hot water maximum flow rate range from 0.25 to 0.75 gal/cycle and/or from 0.5 gpm to 2.5 gpm, depending on controls and hot water system.
‡ 0.1 (new), to0.3 gpm (after 15,000 cycles of diverting).
§ Gallons per flush.

(c) For the installation of landscaping that uses a minimal amount of water.

BWSD will encourage the reduction of lawn sizes within its service area through education, incentives. Regulatory conservation incentives that BWSD will draft and implement include an outdoor water irrigation scheduling (with watering days and times). A watering schedule (such as even/odd addresses) and times of the day when watering is not permitted will encourage

users to conserve water and install landscaping that utilizes a minimal amount of water. BWSD will include brochures on Xeriscaping™ methods, types of plants that grow well in the area, and the difficulty in watering small strips/odd shaped turf, etc. to encourage its users to become more conscious about the types of plants to purchase and locations to place them. The intent of water rules and regulations is to limit water use during water shortages and drought conditions, or to restrict use if it is found that water is being wasted. BWSD will continue to discourage the "wasting of water" within its service area through reports by customers, BWSD personnel, and the Nye County Sheriff and Road Departments and the issuance of violation notices.

The supplier of water may request assistance from the Section to develop its plan.

2. As part of the procedure of adopting a plan, the supplier of water shall provide an opportunity for any interested person to submit written views and recommendations on the plan.

3. The supplier of water shall file a copy of the plan with the Section for informational purposes.

4. The plan:

(a) Must be available for inspection by members of the public during office hours at the offices of the supplier of water; and

(b) May be revised from time to time to reflect the changing needs and conditions of the service area. Each such revision must be made available for inspection by members of the public.

5. Suppliers of water:

(a) Who are required to adopt a plan for incentives pursuant to this section; and

(b) Whose service areas are located in a common geographical area, may adopt joint plans. (Added to NRS by 1991, 522; A 2005, 2571)

Nye County, Nevada
County Code

This code was last updated by ordinance 342 passed July 17, 2007.

Note: The document for folder entries ( ) in the table of contents (TOC) may not have any text under the heading. To view a text document ( ) click on the folder in the TOC to reveal the documents within the folder. This process may be repeated until you locate the document you wish to view.

For additional information try Help.

Disclaimer:
This code is provided for informational purposes only. The formatting of this document varies from the official hard copy of the code. In the case of any discrepancy between this version and the official hard copy, the official hard copy will prevail. This web version of the code may not reflect all of, or the most current, legislation that has been passed.

CHAPTER 19.40
WASTING WATER

19.40.010: EFFECTIVE AREA:

This Chapter shall be effective within the town boundaries of the unincorporated town of Beatty. (Ord. 159, 1994)

19.40.020: DEFINITIONS:

The following definitions apply specifically to this Chapter:

CUSTOMER: Any person or entity who is an owner, occupant, manager or user of real property to which water is supplied by a public water system; any person or entity who uses water supplied by a public water system; any person or entity who is billed for the supply of water from a public water system; or any person or entity who otherwise has the right or permission to utilize water provided by a public water system, provided that "customer" does not include any firefighting department or agency.

PUBLIC WATER SYSTEM: Any publicly or privately owned network of pipes, conduits, wells, reservoirs, holding tanks and other components, including any combination thereof which supplies water to customers who are charged a fee of any kind or nature for such purpose of which is designed to supply water or is capable of supplying water to customers for a fee and includes any such system whether or not it is operated under the regulatory authority of the Nevada Public Service Commission, but does not include any irrigation company or district whose primary purpose is to supply water for farming.

TO WASTE WATER: The expenditure or application of water from a public water system that results in water:

A. Flowing into any gutter, sidewalk, swale, or storm drain, in a steady stream or flow during the course of a period of ten (10) or more continuous minutes; or

B. Collecting in pools or any depressed area in a public street, sidewalk, or right of way, to a depth of one inch (1") or more. (Ord. 159, 1994)

19.40.030: WASTING WATER UNLAWFUL:

A. In General: It is unlawful for any customer of a public water system to waste water, or to allow the waste of water, from real property owned, occupied, used or managed by said customer, in the unincorporated areas of the County.

B. Notice Of Violation: Any customer found to be in violation of this Chapter, for the first time, shall be issued a written warning by an official representative of the public

water system. That warning will describe the manner in which the water is being wasted and will warn the customer that it is unlawful to waste water.

C. Service Of Notice: The written warning shall be served upon the offending customer by one of the following means: 1) personal service upon the customer; 2) personal service upon a person of suitable age and discretion residing at the customer's residence or working for the customer at the place where the waste of water initiates; 3) posting such notice upon the premises where the waste of water initiates; or 4) mailing a copy of such notice to the customer at his, her or its address, as shown on the records of the public water system. (Ord. 159, 1994)

19.40.040: CRIMINAL PENALTIES:

Any second violation of this Chapter by a customer, after the proper service of written notice of a first violation, constitutes a misdemeanor. (Ord. 159, 1994)

19.40.050: AUTHORITY TO ISSUE CITATIONS:

The Nye County Sheriff and Sheriff's deputies are authorized to prepare, sign and serve misdemeanor citations, pursuant to Nevada Revised Statutes chapter 171, to enforce the provisions of this Chapter, and shall diligently prosecute the violation thereof. (Ord. 159, 1994)

19.40.060: OTHER PENALTIES:

Any person, group of persons, partnership, corporation or other business or governmental entity which furnishes water to persons within the unincorporated areas of the County for business, manufacturing or household use and is not a public utility regulated by the Public Service Commission of Nevada may reduce or terminate water service to any customer who wastes water, as defined by this Chapter. (Ord. 159, 1994)

APPENDIX B – BWSD WATER WASTER FORM AND VIOLATIONS

BEATTY WATER & SANITATION DISTRICT
1300 A Avenue North
Beatty, NV 89003-0099
phone 775-553-2931 fax 775-553-2168

NOTICE OF VIOLATION OF WATER WASTING ORDINANCE #159

Date: _____

Issued Against: _____

_____

_____

Account Number: _____

Please accept this document as official notice that on this date at _____ Beatty Water & Sanitation District personnel observed a violation of the above mentioned ordinance as follows:

_____

_____

_____

_____

_____

_____

Any second violation of this ordinance shall constitute a misdeamenor and a citation will be issued. A copy of said ordinance is enclosed.

Signed: _____
Manager

Received by: _____

Witness: _____

to be completed if hand delivered

Should you have any questions, contact District Office during regular business hours.

NOTICE OF VIOLATION OF WATER WASTING ORDINANCE #159

BEATTY WATER & SANITATION DISTRICT
1300 A AVENUE NORTH
P.O. BOX 99
BEATTY, NV 89003
775-553-2931

[redacted]

TO WHOM IT MAY CONCERN,

Please accept this document as an official notice of water wasting as stated in ordinance#159. After complaints from several individuals along with a notification from Nye County Sheriffs Department and the Nye County Road Department, Lorraine Eastman an employee of Beatty Water & Sanitation District, did go to [redacted] on [redacted] to find water flowing off pavement and lawn areas at the [redacted] into a dirt ditch along side an unpaved city street Becky Lane. There it overflowed the ditch and ran across the street in multiple places causing ruts in the road and mud puddles. Excessive watering has been observed of 4 times a day. The standing water on Becky Lane is attracting nuisances such as flies, mosquitoes, and burros to the area. Any second violation of this ordinance shall constitute a misdemeanor and a citation will be issued.

Sincerely,
James Weeks
District Manager

Temple

"Water Wasting Ordinance

"Warning"

1300 A Avenue North
702-553-2931
BEATTY WATER AND SANITATION DISTRICT
P.O. Box 99
BEATTY, NEVADA 89003

[redacted]

[redacted]

Dear Mr. [redacted]

In answer to a report received by this office today, our personnel went to the [redacted] and documented the report that water was running several blocks down to Cedar Street, and pooling at that point. Your manager on site was given a copy of the enclosed town ordinance. If violations of this ordinance continue in the future, we will have no choice but to pursue legal avenues.

Sincerely,

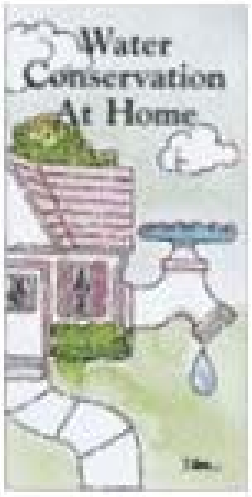
James C. Weeks
Manager

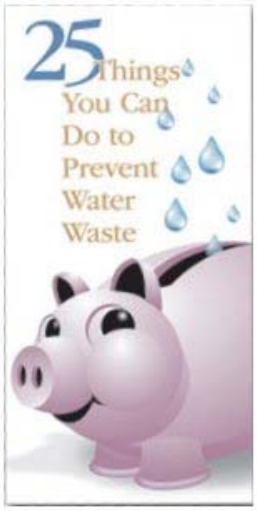
Enc.

APPENDIX C – AWWA CONSERVATION BROCHURES/PAMPHLETS EXAMPLES

The following pamphlets are available on the AWWA website at: www.awwa.org/bookstore

Figures 1.1, 1.2, 1.3



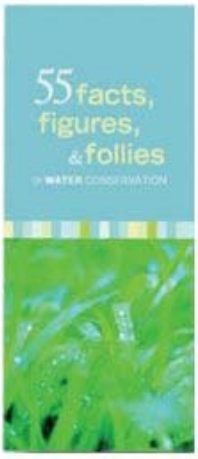


Water Conservation at Home discusses in-home conservation practices for bathroom, kitchen and outdoor water use (see Figure 1.1).

Landscaping to Save Water explains the seven principles in the Xeriscape(tm) concept that promotes attractive landscapes, conserves water, and protects the environment (see Figure 1.2).

25 Things You Can Do to Prevent Water Waste has 25 easy things people can do to conserve water inside and outside their homes (see Figure 1.3).

Figures 1.4, 1.5, 1.6



5 Basic Ways to Conserve Water provides 5 things people can do to cut water use by 25% (see Figure 1.4)

It's a Natural is an introduction to planning a water-conserving home landscape (see Figure 1.5)

55 Facts, Figure and Follies of Water Conservation is a list of 55 items that promote water conservation (see Figure 1.6).

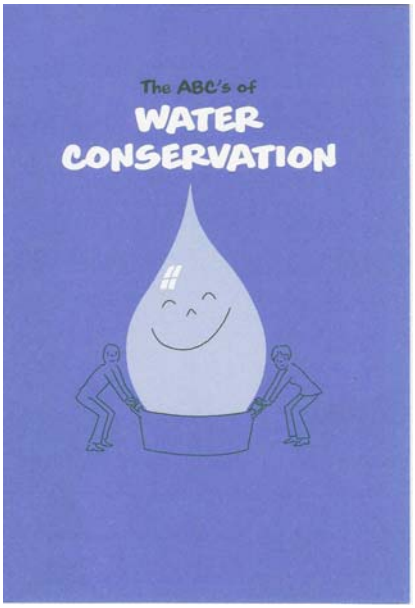
Figures 1.7, 1.8, 1.9

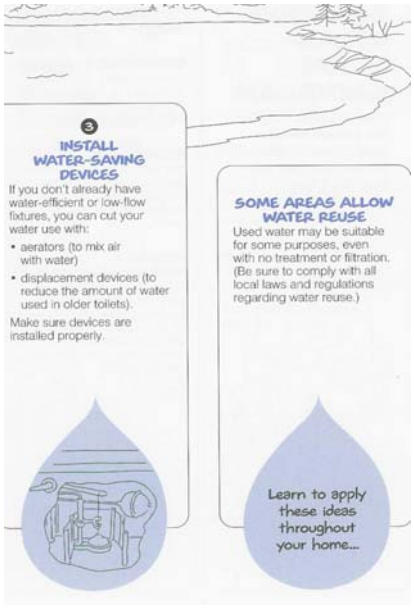
Let's Learn About…The Water Cycle diagrams the seven stages of the water cycle (see Figure 1.7)

A Consumer's Guide to Water Conservation the Inside Story gives eight ways to reduce water waste inside the home (see Figure 1.8).

A Consumer's Guide to Water Conservation the Outside Story gives eight ways to reduce water waste in landscaping (see Figure 1.9).

Pershing County Water Conservation Guide and Sample Page:





APPENDIX D – LANDSCAPE GUIDES

The following list is taken from the Truckee Meadows Water Authority (TMWA) website. More information on these plants, including color photos can be found at **www.tmwalandscapeguide.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/Bubblegum Mint (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

Dianthus 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 hybirds/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

Calmagrostis 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

Rhus 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

Philadelphus virginalis/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 fructicosa/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

Thuja 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

Ailanthus 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 hybirds/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

Ginko 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 tulipfera/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

Thuja 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 E – EXAMPLES OF WATER CONSERVATION MEASURES

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. These measures are suggestions and can only be enforced if included as part of an ordinance.

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
Bathroom/Kitchen Fixtures	
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
High Efficiency Appliances	
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.1.1.3 Additional Measures. The sample pamphlets in Section 5.1 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
Landscape Materials	
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.
Irrigation Equipment	
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 shut-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 shuts 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 then 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” shut 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 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.

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 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, of 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 incidence 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 CONSERVATION MEASURES

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

HOME BEHAVIORS

1. 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.

2. Evaporative coolers require a seasonal maintenance checkup. For more efficient cooling, check your evaporative cooler annually.

3. Run your washing machine and dishwasher only when they are full and you could save 1000 gallons a month.

4. Use the garbage disposal sparingly. Compost instead and save gallons every time.

5. 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. Check your water meter and bill to track your water usage.

7. Wash your produce in the sink or a pan that is partially filled with water instead of running water from the tap.

8. Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.

9. If your shower can fill a one-gallon bucket in less than 20 seconds, then replace it with a water efficient showerhead.

10. Collect the water you use for rinsing produce and reuse it to water houseplants.

11. We're more likely to notice leaky faucets indoors, but don't forget to check outdoor faucets, pipes, and hoses for leaks.

12. 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.

13. Time your shower to keep it under 5 minutes. You'll save up to 1000 gallons a month.

14. Install low-volume toilets.

15. 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.

16. 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.

17. Plug the bathtub before turning the water on, and then adjust the temperature as the tub fills up.

18. Designate one glass for your drinking water each day. This will cut down on the number of times you run your dishwasher.

19. Don’t use running water to thaw food.

20. Grab a wrench and fix that leaky faucet. It’s simple, inexpensive, and can save 140 gallons a week.

21. When doing laundry, match the water level to the size of the load.

22. Teach your children to turn the faucets off tightly after each use.

23. 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.

24. Soak your pots and pans instead of letting the water run while you scrape them clean.

25. 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.

26. 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.

27. Make sure your toilet flapper doesn’t stick open after flushing.

28. Make sure there are aerators on all of your faucets.

29. 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.

30. Cut back on rinsing if your dishwasher is new. Newer models clean more thoroughly than older ones.

31. Bathe your young children together.

32. Winterize outdoor spigots when temps dip to 20 degrees F to prevent pipes from bursting or freezing.

33. Insulate hot water pipes so you don’t have to run as much water to get hot water to the faucet.

34. Drop that tissue in the trash instead of flushing it and save gallons every time.

35. 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.

36. Install water softening systems only when necessary. Save water and salt by running the minimum number of regenerations necessary to maintain water softness.

37. Wash clothes only when you have a full load and save up to 600 gallons each month.

38. Listen for dripping faucets and toilets that flush themselves. Fixing a leak can save 500 gallons each month.

39. Cook food in as little water as possible. This will also retain more of the nutrients.

40. Turn the water off while you shampoo and condition your hair and you can save more than 50 gallons a week.

41. Choose new water-saving appliances, like washing machines that save up to 20 gallons per load.

42. Select the proper size pans for cooking. Large pans require more cooking water than may be necessary.

43. Turn off the water while you shave and you can save more than 100 gallons a week.

44. To save water and time, consider washing your face or brushing your teeth while in the shower.

45. 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.

46. Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent from using the garbage disposal.

47. Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.

48. When you are washing your hands, don't let the water run while you lather.

49. Pre-treat stains before washing clothes to avoid re-washing.

50. Use the shortest wash cycle for lightly soil cloths.

51. Check washing machine hoses regularly for leaks.

52. Do not pre-rinse dishes except in cases of sticky or burn-on food.

53. Scrape off food with a utensil or used paper napkin when pre-cleaning for dishwasher.

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.

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. Use a commercial car wash that recycles water.

4. Don’t buy recreational water toys that require a constant flow of water.

5. 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.

6. When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.

7. Make sure your swimming pools, fountains, and ponds are equipped with re-circulating pumps.

8. Bathe your pets outdoors in an area in need of water.

9. While staying in a hotel or even at home, consider reusing your towels.

10. When backwashing your pool, consider using the water on your landscaping

APPENDIX F – NYE COUNTY POPULATION ESTIMATES

NYE COUNTY

DEPARTMENT OF PLANNING
PREPARED AT: TONOPAH OFFICE
07-120CB(M)Population.doc

MEMORANDUM

TO: Interested Parties

FROM: Cheryl Beeman, AICP – Assistant Planning Director Steve Osborne, AICP Digitally signed by Steve Osborne, AICP DN: CN = Steve Osborne, AICP, C = US, O = NYE COUNTY, OU = PLANNING DEPARTMENT Date: 2007.07.25 14:55:22 -07'00'

SUBJECT: Nye County Population Estimates Through the Second Quarter, 2007

DATE: July 25, 2007

I am pleased to bring you population estimates through the second quarter of 2007 (June 30, 2007) for Nye County and its communities prepared by the Nye County Planning Department. Please note that these estimates have been benchmarked to the year 2000 Census through our recalibrated spreadsheet, and are considered "Census Consistent."

Our estimates indicate that the population of Nye County at the end of this period was 46,427 and the population of our communities—as defined by Nye County's procedures—was as follows:

• Pahrump	38,431
• Amargosa Valley	1,386
• Beatty	1,133
• Tonopah	2,870
• Smoky Valley	1,767
• Gabbs	386
• Reese River Valley	114
• Northeast Nye	340

Note that there are now zero (0) persons permanently residing on the Nevada Test Site (NTS) and Tonopah Test Range (TTR) as was determined by the 2000 Census. Our spreadsheet uses only active residential customer data from the various electrical utilities multiplied times the average number of persons per household (per the Census) for each area, which have been scaled to the estimated number of households per residential electrical meter (example: Gabbs–for the first quarter, 2000–had 168 residential hookups times 2.37 persons per household times .958 [95.8 households per every 100 residential meters] = 381 population).

For this recalibration we have also converted the quarterly count of persons in group quarters (e.g., nursing homes and detention facilities) to a trending factor that was indicated over the previous decade. These trended counts will now be monitored on an annual basis by conducting annual telephone interviews to measure consistency.

Nye County uses its population estimates to monitor and assess baseline conditions for the Yucca Mountain Project, to prepare baseline projections for the County and its communities, to provide a basis for comparison with the estimates of others, and for public and private agency planning and management purposes. Nye County's procedure uses formulas benchmarked to the 2000 Census of Population and Housing; and these formulas include factors that, for each Nye County community, relate utility connection counts to the number of households and persons per household.

Should you have any questions or require additional information please contact me.

CB/kh

Attachment as noted

"CENSUS CONSISTENT" POPULATION ESTIMATES FOR NYE COUNTY AND ITS COMMUNITIES											
Community	2004Q4	2005Q1	2005Q2	2005Q3	2005Q4	2006Q1	2006Q2	2006Q3	2006Q4	2007Q1	2007Q2
NYE COUNTY	40,123	40,681	41,455	42,226	43,197	44,437	44,580	45,223	45,703	46,041	46,427
In Households	39,824	40,378	41,146	41,912	42,875	44,106	44,248	44,886	45,362	45,698	46,081
In Group Quarters	299	303	309	314	322	331	332	337	341	343	346
Percentage Growth per Quarter	1.3%	1.4%	1.9%	1.9%	2.3%	2.9%	0.3%	1.4%	1.1%	0.7%	0.8%
Percentage Growth per 4 Quarters	6.9%	6.8%	6.9%	6.6%	7.7%	9.2%	7.5%	7.1%	5.8%	3.6%	4.1%
NORTHERN NYE COUNTY	5,375	5,345	5,337	5,413	5,394	5,401	5,482	5,519	5,522	5,469	5,477
In Households	5,156	5,123	5,111	5,183	5,159	5,159	5,239	5,273	5,273	5,218	5,224
In Group Quarters	219	222	226	230	235	242	243	246	249	251	253
Percentage Growth per Quarter	0.1%	-0.6%	-0.1%	1.4%	-0.4%	0.1%	1.5%	0.7%	0.1%	-1.0%	0.1%
Percentage Growth per 4 Quarters	1.4%	1.2%	-0.2%	0.8%	0.4%	1.0%	2.7%	2.0%	2.4%	1.3%	-0.1%
GABBS	374	374	381	374	367	372	376	372	383	383	386
In Households	374	374	381	374	367	372	376	372	383	383	386
In Group Quarters	0	0	0	0	0	0	0	0	0	0	0
Percentage Growth per Quarter	0.5%	0.0%	1.9%	-1.8%	-1.9%	1.4%	1.1%	-1.1%	3.0%	0.0%	0.8%
Percentage Growth per 4 Quarters	1.9%	1.9%	2.4%	0.5%	-1.9%	-0.5%	-1.3%	-0.5%	4.4%	3.0%	2.7%
REESE RIVER VALLEY	114	114	114	111	111	111	111	111	114	114	114
In Households	114	114	114	111	111	111	111	111	114	114	114
In Group Quarters	0	0	0	0	0	0	0	0	0	0	0
Percentage Growth per Quarter	0.0%	0.0%	0.0%	-2.6%	0.0%	0.0%	0.0%	0.0%	2.7%	0.0%	0.0%
Percentage Growth per 4 Quarters	-4.2%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	-2.6%	0.0%	2.7%	2.7%	2.7%
SMOKY VALLEY	1,726	1,700	1,698	1,716	1,716	1,698	1,745	1,778	1,780	1,757	1,767
In Households	1,726	1,700	1,698	1,716	1,716	1,698	1,745	1,778	1,780	1,757	1,767
In Group Quarters	0	0	0	0	0	0	0	0	0	0	0
Percentage Growth per Quarter	-1.5%	-1.5%	-0.1%	1.1%	0.0%	-1.0%	2.8%	1.9%	0.1%	-1.3%	0.6%
Percentage Growth per 4 Quarters	1.5%	-0.1%	-3.2%	-2.1%	-0.6%	-0.1%	2.8%	3.6%	3.7%	3.5%	1.3%
TONOPAH	2,867	2,861	2,850	2,897	2,883	2,899	2,917	2,924	2,905	2,877	2,870
In Households	2,648	2,639	2,624	2,667	2,648	2,657	2,674	2,678	2,656	2,626	2,617
In Group Quarters	219	222	226	230	235	242	243	246	249	251	253
Percentage Growth per Quarter	1.1%	-0.2%	-0.4%	1.6%	-0.5%	0.6%	0.6%	0.2%	-0.6%	-1.0%	-0.2%
Percentage Growth per 4 Quarters	1.6%	2.0%	1.4%	2.2%	0.6%	1.3%	2.4%	0.9%	0.8%	-0.8%	-1.6%
NORTHEAST NYE COUNTY	294	296	294	315	317	321	333	334	340	338	340
In Households	294	296	294	315	317	321	333	334	340	338	340
In Group Quarters	0	0	0	0	0	0	0	0	0	0	0
Percentage Growth per Quarter	0.0%	0.7%	-0.7%	7.1%	0.6%	1.3%	3.7%	0.3%	1.8%	-0.6%	0.6%
Percentage Growth per 4 Quarters	0.7%	2.1%	0.7%	7.1%	7.8%	8.4%	13.3%	6.0%	7.3%	5.3%	2.1%
SOUTHERN NYE COUNTY	34,748	35,336	36,118	36,813	37,803	39,036	39,098	39,704	40,181	40,572	40,950
In Households	34,668	35,255	36,035	36,729	37,716	38,947	39,009	39,613	40,089	40,480	40,857
In Group Quarters	80	81	83	84	87	89	89	91	92	92	93
Percentage Growth per Quarter	1.5%	1.7%	2.2%	1.9%	2.7%	3.3%	0.2%	1.5%	1.2%	1.0%	0.9%
Percentage Growth per 4 Quarters	7.8%	7.7%	8.0%	7.5%	8.8%	10.5%	8.3%	7.9%	6.3%	3.9%	4.7%
BEATTY	1,075	1,100	1,080	1,080	1,090	1,090	1,104	1,118	1,120	1,125	1,133
In Households	1,054	1,079	1,058	1,058	1,067	1,067	1,081	1,094	1,096	1,101	1,109
In Group Quarters	21	21	22	22	23	23	23	24	24	24	24
Percentage Growth per Quarter	0.2%	2.3%	-1.8%	0.0%	0.9%	0.0%	1.3%	1.3%	0.2%	0.4%	0.7%
Percentage Growth per 4 Quarters	3.9%	4.1%	0.0%	0.7%	1.4%	-0.9%	2.2%	3.5%	2.8%	3.2%	2.6%
AMARGOSA VALLEY	1,290	1,288	1,316	1,323	1,351	1,362	1,369	1,365	1,365	1,379	1,386
In Households	1,290	1,288	1,316	1,323	1,351	1,362	1,369	1,365	1,365	1,379	1,386
In Group Quarters	0	0	0	0	0	0	0	0	0	0	0
Percentage Growth per Quarter	1.3%	-0.2%	2.2%	0.5%	2.1%	0.8%	0.5%	-0.3%	0.0%	1.0%	0.5%
Percentage Growth per 4 Quarters	3.0%	1.9%	4.3%	3.8%	4.7%	5.7%	4.0%	3.2%	1.0%	1.2%	1.2%
PAHRUMP	32,383	32,948	33,722	34,410	35,362	36,584	36,625	37,221	37,696	38,068	38,431
In Households	32,324	32,888	33,661	34,348	35,298	36,518	36,559	37,154	37,628	38,000	38,362
In Group Quarters	59	60	61	62	64	66	66	67	68	68	69
Percentage Growth per Quarter	1.6%	1.7%	2.3%	2.0%	2.8%	3.5%	0.1%	1.6%	1.3%	1.0%	1.0%
Percentage Growth per 4 Quarters	8.2%	8.1%	8.4%	7.9%	9.2%	11.0%	8.6%	8.2%	6.6%	4.1%	4.9%
NTS & TTR Group Quarters	0	0	0	0	0	0	0	0	0	0	0

NYE COUNTY DEMOGRAPHICS

Population

	1999	1990	1980	1970
County	33,550	17,781	9,048	5,599

Source: Nevada State Demographer

Population Projections

	2001	2002	2003	2004
County	38,969	41,243	44,032	46,714

Source: Nevada State Demographer

Age (1999)

0-17	25.1%
18-34	19.1%
35-54	29.8%
55-64	11.7%
65-74	8.6%
75 and over	5.7%

Nye County's Median Age: 39.7 (1999)

Source: Nevada State Demographer

Race and Hispanic Origin (1999)

White	83.3%
Black	1.4%
American Indian, Eskimo, or Aleut	2.9%
Asian or Pacific Islander	1.2%
Hispanic Origin (of any race)	11.2%

Source: Nevada State Demographer

Labor: (Sept. 1999) - Non-agricultural

Industry	Employment	Avg. Wkly. Wage Nye Co.	Avg. Wkly. Wage Statewide
Total	9,780	$633	$595
Mining	1,090	969	1039
Const.	570	478	727
Mfg.	260	390	695
TCPU	300	714	682
Trade	1,300	319	456
FIRE	190	432	721
Service	4,010	681	549
Gov't	2,070	641	744

Unemployment figures: 4.8% (1999)

Per capita income: $20,402 (1997)

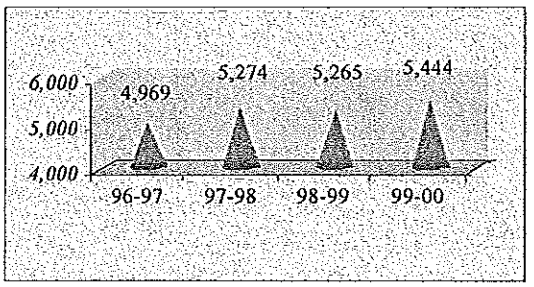
Source: Labor Market Summary

Major Employers

Bechtel Nevada Corp.	1,000 employees
Round Mountain Gold Corp.	799 employees
EG & G Special Projects Inc.	500 employees
Mt View Recreation Center	200 employees
Wachenhut Services	200 employees
Lockheed Martin Corporation	100 employees
Barrick Bullfrog Inc	100 employees
Valley Electric Association	100 employees
Ponderosa Dairy	100 employees
Pahrump Valley Vinyards, Inc.	100 employees

Source: State of Nevada, Department of Employment, Training & Rehabilitation
http://www.state.nv.us/detr/lmi/data/top_003.htm

EDUCATION:



Source: NV Dept of Education

ACT & SAT Scores (School Year 1997 - 1998)

Comparison	Nye County	United States
SAT (Verbal)	497	505
SAT (Math)	491	512
ACT (Comparison)	20.0	20.8

NV Dept of Edu www.nsn.k12.nv.us/nvdoe/reports/districtsandschools9798/sec9798e.pdf
USA Dept of Edu SAT: http://nces.ed.gov/fastfacts/display.asp?id=53
USA Dept of Edu ACT http://nces.ed.gov/pubs2000/digest99/d99t138.html

High School(s):	Beatty High	9-12
	Pahrump High	9-12
	Gabbs High	7-12
	Round Mtn. High	7-12
	Tonopah High School	9-12
Middle School 6-8: (Pahrump)	Rosemary Clarke Middle School	6-8
Elementary School(s):	Amargosa Vly	K-8
	Manse (Pahrump)	K-8
	Beatty	K-8
	Mt. Charleston	1-5
	Duckwater	K-8
	Round Mountain	K-6
	Gabbs Ele.	K-6
	Silver Rim (Tonopah)	K-5
	Johnson (Pahrump)	1-5
	Tonopah	K-8

Number of Students per Teacher: 17:1

Average Salaries of Teaching Personnel: $40,066

Dropout Rate in Nye County (9-12): 6.1%

Source: NV Edu www.nsn.k12.nv.us/nvdoe/reports/districtsandschools9798/sec9798e.pdf

Community College of Southern Nevada

Location(s):	Tonopah, Beatty, Pahrump & others Main Campus- Las Vegas, NV (775) 482-2031
Cost per credit:	$42.50 (Fall 2000)
Contact:	Office of Admissions 3200 E. Cheyenne Avenue Las Vegas, NV 89030 (702) 643-6060

http://www.nevada.edu/

TRANSPORTATION:

Nye County is unique in that all of its communities have strong transportation links to California. A transportation system stretching through central and southern Nevada, Nye County is an ideal location from which to transport goods.

Highway 95 (North-South) -

	Tonopah	Pahrump*
Northbound		
Reno	236 miles	401 miles
Sacramento..	361 miles	526 miles
Boise	571 miles	736 miles
Southbound		
Las Vegas	207 miles	52 miles
Phoenix	494 miles	339 miles

* Access to Hwy 95 via State Route 160

Highway 6 (East-West) - Mileage from Tonopah

Westbound	
Los Angeles ..	377 miles
San Diego	502 miles
Eastbound	
Salt Lake City	408 miles
Denver	912 miles

Motor Freight Companies -

Local trucking companies provide daily service to 80 percent of the 11 state western region. United Parcel Service and Federal Express also serve the area.

Rail System -

The nearest rail service for Nye County is located in Clark County. Freight service is provided by Union Pacific Railroad Company.

Union Pacific Railroads - (800) 272-8777
Amtrak (Passenger) ------ (800) 872-7245

Airport(s) -

Beatty: Runway - 5,600 by 75; paved & lighted
Pahrump: Runway - 15-33: 5,325 by 50; partially paved; lighted
Round Mountain: Runway - 6,750 by 60; paved (122.9 unicom)
Tonopah: Runway - 15-33: 7,160 by 80; paved & lighted
Runway - 11-29: 6,000 by 60; paved

Tax Structure

Sales and Use Tax	6.75% (None on grocery items)
Property Tax -	Assessment is 35% of full cash value
Gabbs	$3.64 per $100 assessed value
Amargosa	$3.64 per $100 assessed value
Beatty	$3.55 per $100 assessed value
Manhattan	$3.64 per $100 assessed value
Pahrump	$3.31 per $100 assessed value
Round Mountain	$3.64 per $100 assessed value
Tonopah	$3.64 per $100 assessed value
Corporate Income Tax	NONE
Personal Income Tax	NONE
Unitary Tax	NONE
Inventory Tax	NONE
Franchise on Income Tax	NONE

Source: Nevada Department of Taxation FY 2000-2001 Property Tax Rates

Public Utilities

Electricity:

Tonopah , Gabbs & Round Mountain areas
Sierra Pacific Power Company
985 Erie Main
Tonopah, NV 89049
Phone: (775) 482-6808

Pahrump, Beatty & Amargosa Valley
Valley Electric Association, Inc.
800 East Hwy 372
Pahrump, NV 89041
Phone: (775) 372-5215

Gas & Propane: (main providers)

Amerigas
113 South Main
Tonopah, NV 89049
Phone: (775) 482-3303

Pro-Flame Gas of Pahrump
P.O. Box 373
Pahrump, NV 89041
Phone: (775) 727-5116

Suburban Propane
421 Depot
Tonopah, NV 89049
Phone: (775) 482-6252

Tippin Gas
565 N. Main
Tonopah, NV 89049
(775) 482-8585

Valley Propane
622 Brucite
Gabbs, NV 89409
(775) 285-4094

Telecommunications:

Pahrump, Beatty, Gabbs & Round Mtn. areas:
Nevada Bell
1450 Vassar
Reno, NV 89502
Phone: (775) 811

Tonopah/Manhatten area:
Citizens Communications
111 W. Front Street
Elko, NV 89801
Phone: (775) 482-6242

Water & Sewer:

Provided by the municipalities
County - Individual wells and septic tanks.
In Pahrump, provided by private companies or individual wells and septic tanks.

QUALITY OF LIFE:

From Pahrump's well-maintained golf courses to the historic Berlin mining ghost town and Ichtyosau State Park, there's something for everyone in Nye's desert playgrounds. Here you will discover sweeping vistas and back roads that attract professionals to the Nevada 500, Vegas to Reno and other off-road vehicle events held each year. From haunting Death Valley to the high country of the Toiyabe and Alta Toquima Wilderness Areas, recreational opportunities are virtually unlimited.

Compiled by NCED Research
Revised 11/2000

APPENDIX G – WATER CONSERVATION WEBSITES

WATER

- www.amsa-cleanwater.org
- www.energystar.gov

DROUGHT

- DroughtMonitor@ndmc.unl.edu

LANDSCAPE

- www.usda.gov/news/garden.htm
- www.tmwalandscapeguide.com/landscape_guide/interactive/index.php

EDUCATION

- www.wateruseitwisely.com
- www.washoeet.dri.edu/

INSTITUTIONAL

- www.douglascountynv.gov/sites/main/index.cfm
- www.lvvwd.com
- www.snwa.com
- www.co.washoe.nv.us/water_dept/rwpc/regionalplm
- www.tmh20.com
- www.cabq.gov
- www.ci.phoenix.az.us/WATER/wtrteach.html
- www.owue.water.ca.gov/leak/faq/faq.cfm

LEAK DETECTION

- www.who.int/docstore/water_sanitation_health/leakage/begin.html

APPENDIX H – METER READING INSTRUCTIONS

HOW TO READ YOUR WATER METER

Locate Your Meter

Most water meters will be located outside in front of your house next to the curb on the street under a steel or concrete lid.

Reading Your Meter

There are two basic types of meters; a dial with a needle that measures in tenths of a cubic foot and a digital meter that measures from 100,000 down to 1 cubic foot. Most meters also have a small triangle on the face called a flow indicator. It will move when there is water passing through it. Read your meter from left to right.

Measuring Water Use Activities

It is possible to measure the water use of certain activities. These activities include but are not limited to the following:

- Shower or bath use.
- Watering the lawn.
- Washing clothes or dishes.
- Flushing a toilet
- Washing a car

To measure the water use of an activity, do the following (in order):

1. Make sure all water off. This includes all faucets (inside and out), appliances, swamp coolers, or icemakers.

2. Write down the meter reading to two decimal places.

3. Perform the activity. Be sure to measure the amount of time in minutes that the activity required.

4. At the end of the activity read the meter again. Subtract the first meter reading from the second one. The result is the amount of water used for the activity in cubic feet. To convert to gallons multiply the result by 7.48. To determine how many gallons per minute were used divide the gallon amount by the number of minutes the activity required. You should now have the water used amount in *gallons per minute.*

Detecting Leaks

1. Make sure all water off. This includes all faucets (inside and out), appliances, swamp coolers, or icemakers.

2. Write down the meter reading and time of day to the minute.

3. Wait at least an hour before reading the meter a second time. Make sure no water is used during the test. Read the meter at the end of the test and record the time to the minute. If the flow indicator is moving during the test you may have a leak.

4. Subtract the first meter reading from the second. Multiply the remainder by 7.48. The result is the amount of water in gallons that passed through the meter during the test period. Also record the time duration of the test.

5. Divide the amount of water by the number of minutes in the test. The result is the amount of water that went through the meter in *gallons per minute.*

6. To measure amount lost over time multiply the gallons per minute by the following:

    - 1,440 for gallons per day.
    - 43,920 for gallons per month.
    - 527,040 for gallons per year.

7. Locating a leak is a process of elimination. Shut off one toilet at a time at the wall. Go to the meter and check to see if the flow indicator (triangle) is still moving. If the triangle has stopped you have discovered the leak. If not go on to the next one and repeat the above steps.

8. Check your sprinkler system. Shut off the system at the anti siphon valve and check the meter.

9. Check your main service line. You will need to shut off the valve between your house and the meter. If the meter stops the leak is between the meter and the valve.

10. These steps can be repeated for every fixture and fitting in your home. In the event you cannot locate the leak, you should call a professional plumber to find and fix it.

APPENDIX I – EPA RESIDENTIAL BENCHMARKS

Type of Use	Likely Range of Values
INDOOR USES	
Average household size	2.0 – 3.0 persons
Frequency of toilet flushing	4.0 – 6.0 flushes per person per day
Flushing volumes	1.6 – 8.0 gallons per flush
Fraction of leaking toilets	0 – 30 percent
Showering frequency	0 – 1.0 showers per person per day
Duration of average shower	5 – 15 minutes
Shower flow rates	1.5 – 5.0 gallons per minute
Bathing frequency	0 – 0.2 baths per person per day
Volume of water	30 – 50 gallons per cycle
Washing machine use	0.2 – 0.5 loads per person per day
Volume of water	45 – 50 Gallons per cycle
Dishwasher use	0.1 – 0.3 Loads per person per day
Volume of water	10 – 15 gallons per cycle
Kitchen faucet use	0.5 – 5.0 Minutes per person per day
Faucet flow rates	2.0 – 3.0 gallons per minute
OUTDOOR USES	
Average lot size	5000 – 8000 square feet
Average house size	1200 – 2500 square feet
Landscape area	4000 – 5000 square feet
Fraction of lot size in turf	30 – 50 percent
Water application rates	1 – 5 feet per year
Homes with pools	10 – 25 percent
Pools evaporation losses	3 – 7 feet per year
Frequency of refilling pool	1 – 2 times per year