

NEW MEXICO OFFICE OF THE STATE ENGINEER
FOOD SERVICES INDUSTRY WATER AUDITS

INSTRUCTION MODULE

June 2009



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Executive Summary

The New Mexico Office of the State Engineer (NMOSE), Food Service Industry Water Audit Instruction Module is specifically designed for restaurants and cafeterias within the utility's water supply systems. It provides instructions, questionnaires, evaluations, reporting information, and supplemental resources on how to conduct a food service industry water audit program within a utility.

Food Service Industry Water Audit Instruction Module is a product of the Bureau of Reclamation grant funded *Water Conservation Training Audits and Retrofits for Food Services* program. The grant program was based on a proven technologies and research that increases water efficiency within the commercial and industrial food businesses. NMOSE pilot tested during 2008-2009 with three New Mexico public utilities: the City of Gallup, Los Alamos County, and the City of Rio Rancho. The project involved pre-audit data analysis for each participating establishment, on-site water audits for both indoor and outdoor water use, analysis of on-site usage and post audit evaluation.

The Food Service Industry Water Audit Instruction Module incorporates all of the comments received and lessons learned during the grant project.

Why do Food Service Industry Audits?

New Mexico is a semi-arid state with limited water sources. These sources are subjected to increasing pressure of a growing population. Effective water demand management strategies, such as water conservation, can help stretch existing supplies. As a first step, drinking water suppliers should know exactly where their water is going. The NMOSE recommends completing the American Water Works Association's water audit¹ and the NMOSE's Gallons per Capita per day Calculator² to determine water use by sector and season. Once these baselines have been determined, the drinking water supply can implement various programs, targeting high water use areas such as commercial use.

Commercial water use, which includes restaurants, can have a significant effect on local water demands. This impact increases in New Mexico's popular tourism areas. For the drinking water supplier, targeting restaurants can have dual impact: saving water within the commercial sector, and providing educational opportunities to the public they serve. For the restaurants, water conservation programs can reduce business costs through reduction of water, wastewater and energy bills. For maximum effect, combine the water audit program with other programs such as energy audits or commercial toilet rebates.

Water audits can be tailored to meet the needs of both the water provider and the food service provider. They can be a one time, simple overview of the establishment's water use or an intricate long-term program with multiple layers. It can include hardware changes or simple changes in behavior. Either way it is an active, community based program that provides multiple outreach opportunities. By combining this with other active and passive water conservation programs, the utility is helping to ensure sufficient water supplies for present and future generations.

¹ <http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=47846&navItemNumber=48155>

² http://www.ose.state.nm.us/wucp_pws.html

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Getting Started

Prior to starting an audit program, the utility will need to decide what type of audit program to implement. Who will the program focus on? Will retrofits (pre-rinse spray nozzles or faucet aerators) be included as part of the site visit? Will any follow up be provided by utility? Does the utility have any programs that compliment the audits, (i.e. commercial toilet retrofit)? Is this an on-going program or a one-time offer? Is the media going to be involved?

Let's start with who to include in the program. There are two main options, focus on high end users or open to anyone. Each option of course has multiple variations. If there is limited time and limited money, the utility may decide to focus on the high end users. This has potential for the largest water savings. If the plan is to provide audits as an on-going program, the utility may decide to open it as a first come-first served basis. This provides willing participants for the utility's learning curve. Either plan can be bundled into a short time frame or partitioned out, providing only a couple audits month, depending on time and money. Also consider whether the establishment has a separate meter. All participants will benefit from the audits, but separate meters allow for analysis a usage data and simpler pre and post audit comparisons. Establishments that share meters, such as strip malls, will be harder to analyze. Finally, decide which establishments will be included. The food service industry includes: fast food, traditional restaurants, cafeterias, schools, and hospitals. If the audits are open to schools and hospitals, will areas besides the kitchens be included in the audit? For more information on other types of commercial audits, see the [WaterSmart Guidebook](#) listed in the resource section, Appendix I.

Next the utility must decide whether to include retrofits or hardware as part of the audits. The most common retrofits are the pre-rinse spray nozzle and the faucet aerator. This decision will be based mainly on budget available and the skill set of the auditor. If the auditor is comfortable replacing these items, simple retrofits are a good idea. They will provide immediate water savings and are relatively inexpensive. If the auditor does not feel comfortable replacing fixtures, the utility can leave them for staff to replace. However, there is no guarantee that they will be installed. If the utility decides not to purchase or install fixtures, a list of suggested replacements can be included in the final report.

Deciding whether to provide follow up assistance depends largely on staff time and if the utility has additional programming to offer. If the utility has a commercial toilet retrofit program, a follow up visit to replace the toilet would be the logical next step. Other options include hand delivering final report, checking on retrofits or replacements made during the audit, following up the final report with a phone call or site visit to see if the establishment has questions, or making a formal presentation of the Certificate of Participation. The final option provides opportunity for media coverage that benefits both the establishment and the utility.

Depending on the publicity desired, the press can be invited to participate at any stage. It is recommended that a press release be distributed at the beginning of the project (see Appendix A for an example). Be sure to include an invitation to the press to attend one or more of the

on-site audits. This will need to be cleared prior to the visit with the participating restaurant. Some will want the publicity, others will not.

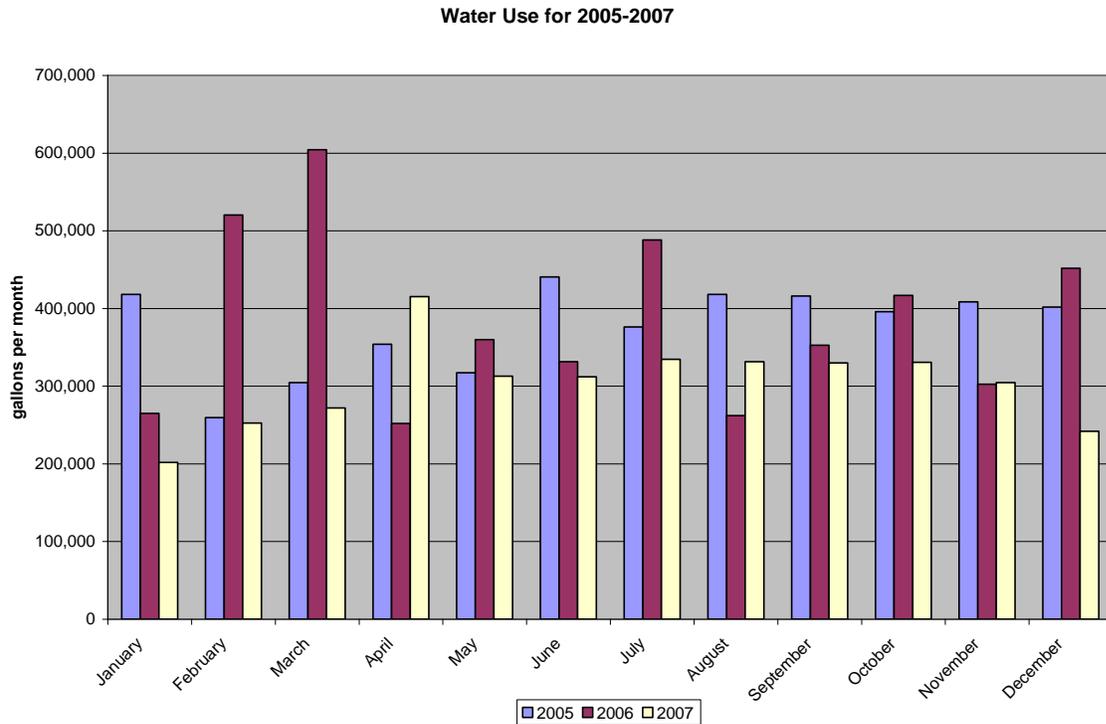
Pre-Audit Analysis

Gathering pre-audit data

Prior to conducting on-site commercial water audits, the utility should analyze the water use for each establishment. Collect monthly water meter readings for a minimum of 1 year for the analysis; three years of data is recommended.

Analyzing data

Calculate annual, seasonal and daily averages to assess the establishment's actual water use. Seasonal averages of summer use (traditionally June, July, and August) and winter use (traditionally December, January, February) water use will provide an understanding of how much water is being used for outdoor irrigation versus indoor uses. Look for substantial changes over the three year period and spikes that might indicate leaks. Below is a simple bar graph showing monthly billed water usage for an establishment for a three year time period.



This graph shows an unusual spike in Feb-March 2006. This could be a leak or an unusual high customer count. Bring this up with management prior to or during the visit to see if there is a logical explanation. Otherwise, the data is relatively consistent by season, suggesting that there is little or no outdoor water use in the summer.

Soliciting Participation

If the utility has decided to focus on the high end users, direct contact with each establishment works best. Identify which establishments use the most water and approach the management through an introductory letter and follow up phone call. Be clear with the management that this is a voluntary program designed to benefit the establishment. The letter should include: a history of the billing data, the analysis of the establishment's data, any retrofit or hardware offers, and the range of potential savings. If the utility also provides energy, any energy savings that results from water savings can also be included. During the follow up phone call, the utility should assess interest level, answer questions and if ready schedule the audit.

If the utility is opening the audits to anyone who would like to participate, a marketing plan will need to be implemented. This can include letters or flyers sent to all food service establishments or advertisements in local newspapers. An example letter and flyer have been included in Appendix B. Keep in mind the limits of the utilities time and money when advertising the audits. Either limit participation on a first-come first-served basis until all the time slots are full or schedule only a couple a week until everyone that requested an audit has been served.

Scheduling Visits

It's best to avoid prime time restaurant hours: breakfast (7 – 9 AM), lunch (11 AM – 1 PM) and dinner (5 – 9 PM). The audit will take approximately 1.5 hours on site, smaller restaurants and fast food establishments take considerably less. Be sure to coordinate with a manager or owner to accompany the auditor for the entire audit. They will be able to answer the necessary questions and provide access to all areas. When scheduling the visit, be clear about the access needed to kitchens, dishwashing areas, mop closets, bathrooms, irrigation control rooms, and outdoor areas. Also, be clear about any installations or retrofits that are offered. Provide retrofits as an option that comes with the audit. It is not a mandate that these fixtures be replaced in order to receive the audit. Get permission from management prior to the visit for any fixture changes.

A sample audit schedule is provided in Appendix C. This example is for a concentrated one-time offer for 16 food service establishments.

On-Site

What to bring

The list of materials, and supplies needed to conduct an audit include:

- Questionnaire, (Attachment C)
- Clip board
- Two copies of the results of the pre-audit data analysis (one to reference and one to leave with management)
- Replacement pre-rinse spray nozzle(s), plumber's tape, and two wrenches (if pre-rinse spray nozzles will be installed/replaced)
- Graduated flow rate measurement bag
- Drip gage cylinder
- Food coloring

- Replacement aerators of various sizes, plumber's tape, and wrench (if aerators will be installed/replaced)
- Timer or watch with second hand

What to look for

The water audit includes eight major sections:

1. General Information,
2. Background Information,
3. Kitchen Water Use,
4. Restroom Water Use,
5. Laundry Water Use,
6. Cooling Water Use,
7. Outdoor Water Use, and
8. Other Uses, Leaks, and Lost Water.

The on-site audit involves first sitting down with knowledgeable party to complete Section 1. General Information and 2. Background Information. This includes a history of the building and the establishment as well as information on the seating capacity, number of meals served per day, number of employees per shift and hours of operation.

The second part of the audit is doing a walk through of each area looking at all water uses and fixtures and inquiring about their use. There are five main areas of the establishment to review: kitchen, restrooms, laundry, cooling, and outdoor. Be on the look out for other potential uses of water. These can include brewing beer, conference centers, mop closets, or shower facilities. Also be aware of employee practices and restaurant policies. The questionnaire will guide the auditor through each section. Feel free to edit the questionnaire, depending on the type of establishment that is audited and on the areas of focus for the audit. In some cases items will be found that are missing from the audit questionnaire; writing, drawing and miscellaneous notes on the back side are encouraged.

Practices and Policies³

There are several practices within a restaurant that can be extremely water consumptive. Look for the following activities and provide recommendations for saving water.

- Instead of defrosting meat under running water try defrosting the meat in the refrigerator. This requires a little extra forethought but will make a huge difference in water use. If there is no choice but to use the running water, keep the flow at a minimum, just enough to circulate the water and make sure the faucet has an aerator.
- Instead of spray cleaning floors or mats, use a mop bucket or waterbroom instead.
- Instead of automatically serving water to guests, serve it only on request. It takes almost four times the amount of water to clean that extra glass then it does to fill it for the customer.

Faucets

³ Sustainable Food Services (www.sustainablefoodservice.com/cat/water-efficiency.htm)

Measure the flow rates and any leaks for each faucet encountered. Also make a note of the primary use for each faucet. Examples of uses include: hand washing, food preparation, dishwashing, water pitchers, etc. This will help determine whether a faucet aerator is appropriate or not. A hand washing sink would be a great spot for an aerator, however a water pitcher station will use the same amount of water to fill pitchers regardless of an aerator. To measure the flow rate, use a graduated flow rate measurement bags. To measure any leaks use a drip gauge cylinder. Both the flow rate bag and drip gauge cylinder are available by various water conservation supply companies for a total under \$5.

If aerators are part of the retrofits, install the aerators while on-site. Keep a supply of various flow rates and styles, along with plumber's tape, and wrenches. Be sure to install aerators only where it is appropriate and only with management's permission. Make sure that the aerator is installed correctly and is not creating a problem. Often the faucet is without an aerator because the connection is broken or warped. This will result in water going in multiple directions and can only be corrected by replacing the faucet. In this case, leave the aerator off and make the replacement of the faucet part of the recommendations in the final report.

Toilets

When auditing bathrooms, the auditor should record the type of toilet, any leaks, and the volume of the flush. A gravity tank toilet is similar to the toilet found in residential homes. They have a tank on the back and use the weight of the water or pressure assist to flush waste down the trap. These tanks will need to be check for leaky flappers. Place four to five drops of food coloring in the toilet tank. Wait ten minutes without flushing. If food coloring shows up in the toilet bowl, then the flapper is probably leaking. Any flapper leaks should be immediately replaced or reported in the final report. A flushometer or flush valve toilet is a commercial/ institutional type toilet. It will not have a tank, but will have a pipe containing a pressure valve connected to the wall. This will generate a flush by the opening of a valve directly connected to the pressurized water system. There is no simple way to check for leaks in the valve toilet.

There are several ways to check the volume of water used per flush. On tank and valve toilets, the volume should be printed behind the seat. This was the intended volume per flush and should be double checked to determine actual use. For a very general measure, time the flush. A flush that takes approximately 7 seconds is probably a 1.6 gallon flush; a 12 to 15 second flush is closer to 3.5 gallons. Anything longer than 20 seconds is at least 5 gallons. This method can be dependant on the water pressure. Systems with very low pressure may take longer to fill, even with low-flow toilet. Another option for tank toilets is to measure the tank dimensions and water levels. See side bar for details. Any toilet flushing over 1.6 gallons should be added to the final report as a recommended retrofit or replacement. When recommending toilet replacements, check the Environmental Protection Agency's (EPA) WaterSense listing or the Maximum Performance

Determine Volume by Tank Dimensions

- a. Measure the length of the tank.
- b. Measure the width of the tank.
- c. Measure the full water level in the toilet tank (depth 1).
- d. Flush the toilet and measure the drop at the lowest level (depth 2).
- e. Subtract depth 2 from depth 1. This will give you the "drop" measurement.
- f. Multiply the length times the width times the "drop" to determine the volume of cubic inches of water used per flush.
- g. Divide the volume by 231 to get the number of gallons per flush.

testing for toilets (MaPs) report. Appendix E contains additional information on low-flow and high efficiency toilets and Appendix J provides references for WaterSense and MaPs.

Toilets that are stamped as 1.6 gpf but are measuring a high volume flush have probably been incorrectly retrofitted. On tank toilets check the flapper to make sure it is the appropriate fit. This may require checking the manufacture's specifications on-line. On a valve toilet, check the diaphragm which is located in the pressure valve. The diaphragm should be stamped with its flow rate. Again you may need to check the manufacture's specification for the appropriate replacement diaphragm.

Pre-rinse spray nozzles

These nozzles are now regulated as part of Energy Policy Act of 2005. All units manufactured after January 1 2006 must have a flow rate of not more than 1.6 gallons per minute. Models made prior to the deadline had a flow rate of around 3 gallons per minute. By replacing these higher-volume models with the lower-flow, high-pressure model, each facility can save over 0.16 acre feet of water a year.⁴ This action alone will save money on water and energy for the facility and is designed to inspire the on-site decision makers to implement the additional audit recommendations. There are many high-efficiency, low-flow nozzles available for sale from multiple companies for about \$30.00 each, although per unit cost will depend on the quantity and quality of nozzles purchased.

Ice Machines

Ice machines either make flake/nugget or cube ice, and use either air or water to cool their compressors. Air-cooled, flake ice machines are the most energy- and water-efficient type of ice machine available. Flake/nugget ice machines use 20 gallons of water to make 100 pounds of ice, while cube ice machines use 30 or more gallons of water per 100 pounds of ice. Water cooled ice machines use an additional 72 to 240 gallons of water per 100 pounds of ice to cool the machine's compressor.⁵

When performing the audit check for the brand, make and model of the ice machine. Most machines can be identified on the Internet or with a little research. In general, a water cooled machine will take up less space than the air cooled machines. Air cooled machines need ventilation for the hot air. They will usually have a vent out the roof. However, these machines are becoming more efficient and newer models cannot always be identified by size. When recommending replacement machines, check for the EPA's Energy Star label. At this time, WaterSense is not labeling ice machines.

Water Cooled Ice machine ⁶

Air Cooled Ice machine

⁴ California Urban Water Conservation Council, "Rinse and Save: Final Report Summary," (February 2005)

⁵ East Bay Municipal Utility District, *Watersmart Guidebook*, (2008).

⁶ Pictures from <http://www.restaurantsource.com>



Outdoor Irrigation

For establishments with irrigated landscaping, the irrigation water should be assessed. This is usually evident in the pre-audit analysis. If summer months provide a significant spike in water usage, this can be due to outdoor irrigation. In some cases it is due to increased tourism, so discuss both possibilities with the owner prior to the site visit. If increase water use is due to irrigation, schedule a little extra time on-site for the irrigation portion of the audit.

For large turf areas with sprinkler systems, the Irrigation Association⁷ has established an auditing protocol to determine application rates and distribution uniformity. Contact the Irrigation Association to learn about a class in your area or to find a certified landscape audit specialist. For smaller areas, a simple walk through the grounds and a review of the irrigation schedule should suffice. For sprinkler systems, make sure sprinkler heads are appropriately placed and aligned (not watering the sidewalk), that they are providing head-to-head coverage, and that they are not clogged or leaking. For drip irrigation systems, check to make sure the emitters are appropriately placed in the drip line of the plants, that each plant has at least two emitters, and that the emitter rates are appropriate to the plants watering needs. If there is an automated timer, make sure that it is set for early morning or late evening, that it is adjusted by season, and if appropriate, that it is shut down every winter. To determine appropriate run times for irrigation systems, use the NMOSE New Mexico Landscape Irrigation “Smart” Controller that can be found on the NMOSE website at http://www.ose.state.nm.us/newtstweb/conservation_index.html. All findings and recommended adjustments should be included in the final report.

Reporting

What was found?

⁷ <http://www.irrigation.org/default.aspx>

The final report should provide the management with the details of the pre-audit analysis, what was replaced or done on-site, what was found while on-site, and what are the recommendations. Start the report with a review of their current water use, including an overview of any seasonal differences in water use or unusual spikes. Provide a legible copy of the completed audit questionnaire. This provides management with the details regarding all the fixtures and appliances that were tested or discussed. It also provides a baseline for any follow up or additional audits the establishment might undertake. In a letter or report format, provide the details regarding what was found, what if anything was done, and what the findings mean. For example, if a faucet aerator was installed what are the expected water savings in both gallons and dollar amounts per year. Other findings can include:

- leaky or high flow faucets,
- non-low-flow toilets,
- water cooled ice machines,
- irrigation system problems,
- non-native landscapes, and
- actions that waste water.

This should be followed up by any actions that the utility recommends for the establishment. Again, include what taking these actions would mean for the establishment. For example, if a water cooled ice machine was found, the recommendation would be to replace it with an air cooled unit that might have a pay back period of 2 years. Another example might be an irrigation timer that was not properly programmed, where a recommended schedule change would show immediate savings for the owners without any additional costs. This list should be very specific and should include any references or follow up information that might be needed to get the job done. Here is one final example:

It is recommended that the two high volume flush toilets (3.5 gpf) in the women's restroom be replaced with low-flow (1.6 gpf) or ultra-low-flow (1.3 gpf) toilets. At the current rate of \$3.24 per 1,000 gallons, a \$350 low-flow toilet will pay for itself in 19 months; an ultra-low-flow would pay for itself in 17 months. For a complete list of high performance toilets refer to the Maximum Performance testing of toilets published by California Urban Water Conservation Council at <http://www.cuwcc.org/>. For more information on commercial toilet rebates, contact your utility representative at 505-***-****.

Programs offered by utility

Be sure to include a listing of all water conservation or pertinent programs offered by the utility. This includes programs that were identified as relevant in the audit, such as a toilet rebate program but should also include complimentary programs, such as printed material available, and upcoming training programs or events. This would be a great place to mention the benefits any federal water programs or utility sponsored energy programs. An example of one utility's table tent program is provided in Appendix H. If the utility is planning any follow-up visits or post audit data analysis, include the details within the final report.

Cost Benefit Analysis

An example cost benefit analysis spreadsheet has been included in Appendix F. This worksheet illustrates how to estimate the conservation savings that would come from fixing leaks, reducing faucet flow rates, and pay back period for retrofitting fixtures such as toilets and ice machines.

As shown in the example cost-benefit analysis spreadsheet, a 3.5 gpf fixture is replaced with a 1.6 gpf fixture. It is assumed that the toilet is flushed 100 times per day. The example also uses a current volume based water rate of \$3.24 per 1,000 gallons. Therefore, it will take 1.6 years for the water bill savings to equal the cost of a \$350.00 replacement toilet. The pay back time will vary depending on the cost of water and the toilet purchased as well as the number of flushed per day.

Another example is replacing a water-cooled, cube-style ice machine (the least efficient type) that makes 250 pounds of ice per 24-hour period with an air-cooled, flake ice machine will lead to a savings of approximately 600 gallons of water each day. An air-cooled ice machine costs about \$1,000 more than a water-cooled ice machine, and a nugget/flake-ice machine costs between \$500 and \$1,200 more than a cube style ice machine. In this case and assuming that the current volume based water rate is \$3.24 per 1,000 gallons, it will take approximately two years for the water bill savings to repay the cost of a \$1,500 replacement ice machine.

Certificate of Participation

A Certificate of Participation is a simple way to show the utility's gratitude for the establishment's cooperation. It also allows the establishment to show their collaboration with the utility. Make sure the certificate is only highlighting the involvement in the audit, and does not promise that the establishment is low-water-use. The certificate should include your logo, the logo of any partners and the signature of someone in authority. If there is a little extra money, a nicely framed certificate would encourage the restaurant to put it on display. An example Certificate of Participation can be found in Appendix I.

Follow-up

The utility will need to decide at the beginning of the program, what kind of follow up assistance will be provided, if any. This will largely depend on staff time, financing and whether the utility provides any complimentary programming. Most programs end with the delivery of the final report. Potential follow up activities could include: an on-site visit to determine if all retrofitted or replaced items are properly working, an on-site check of installation items that qualify for rebates with the utility (toilets, ice machines, etc.), or sending an analysis of the post audit data one year after the audit.

Wrap Up

Throughout the process it is very important to keep good records of the work that is done. Record the participating establishments by name, date of audit, and account number. This

will allow for tracking the results of the program. It may also be beneficial to record any work that was done on-site (retrofits, leak repair, etc.). This is also a good opportunity for another press release. It can include participating restaurant and the estimates of water saved. One year or so after the final audit, the utility should repeat the AWWA water audit⁸ and the NMOSE's Gallons per Capita per day Calculator⁹ to determine how or if the audits impacted the utility's water use. This will be harder to pinpoint if several programs were running at the same time. However, with the account numbers and date of audit recorded, the utility can also pull specific records to determine the impacts of the audits.

⁸ <http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=47846&navItemNumber=48155>

⁹ http://www.ose.state.nm.us/wucp_pws.html

APPENDIX A: EXAMPLE PRESS RELEASE

NEWS RELEASE ARTICLE:

Restaurant Saving Money From Water Conservation Audits

The City of X is implementing a water audit program designed to reduce water use in commercial and institutional food sectors within City water supply systems. The City will target potential food service establishments having the most potential to save water. Currently, the City is inviting 15 food service industries to participate in this FREE money saving program.

The City's water supply is primarily from groundwater with wells. Obtaining new water supplies is becoming more expensive and harder to obtain. Water conservation is the least expensive way make our water last.

Similar water conservation training audits and retrofits for food services programs have already been implemented in California and Arizona and are predicted to save thousands of acre-feet of water every year. The audit program is based on a proven methods and technologies that increase water efficiency for commercial and industrial food businesses. The program will replace any existing inefficient dishwashing pre-rinse-nozzle with a new, efficient and money saving pre-rinse-nozzle fixture. By simply replacing a single high water use pre-rinse spray nozzle with the newer low flow model, a single food service establishment can save an estimated 50,000 gallons of water per year. This is an immediately realized reduction of water. The water savings provides an estimated savings of \$500 per year on a restaurant's water, sewer and energy bill.

The audit will look at all water uses within an establishment. Upon completion, management will receive a complete report of their establishment's water use, including a cost benefit analysis of any recommended replacements. The report will highlight recommended fixture and appliance replacements as well as alternative practices that can save water. Upon completion of the program, management will receive a Certificate of the Participation to hang in their establishment.

To participate and for additional details please call water conservation coordinator 505-***-****.

*Note: The City invites the media to participate in one or more of the scheduled audits. For information on photo opportunities and interviews, please contact water conservation coordinator 505-***-****.*

Actual Press Coverage

Operation conservation

Idea for saving water in local restaurants is first for N.M.

By Kevin Killough
Staff writer

GALLUP — Water conservation can make a lot of sense from a business perspective. Gigi Garcia, who co-owns Genaro's restaurant on Hill Street with her niece Roxanne Garcia, knows first hand. When she changed out her crushed ice machines, which ran water constantly, she saved \$700 to \$800 a month.

"A lot of people love crushed ice, but the water doesn't go back up into the machine. It just goes down the drain," she said.

Yesterday, Genaro's was one of 15 restaurants in the city participating in water training audits. The program is an innovative approach that helps restaurants by lowering their utility bills and helps the city by conserving its dwindling water sup-



Brian Leddy/Independent

ply. The audits show restaurants what actions they can take to conserve water, and in exchange for their participation, the city retrofits their dishwashers with low-flow pre-rinse spray nozzles.

"The audits will say that if you do X, Y, and Z, then you can save this much on your water bill," Cheri Vogel said.

Vogel is the water conservation coordinator for the Office of the State Engineer. She calls the audits

a "development training program." Three cities are to receive the audits with Gallup being the first. The other two have not been selected yet. After one year, the OSE will look at water usage rates to gauge the results of the program. The goal is to create a program that other cities can implement.

"It's a way to develop a program so other cities can do it on their own," Vogel said.

During the audits, a contractor interviews the owners about the number of customers, age of the building, and number of plates per customer.

"We get a feel for how much volume comes through the place," Vogel said.

The contractor also looks at dishwashers, ice machines, water cool-

See Water, Page 2

Continued from Page 1

ers, and any laundry facilities that are in use. From there, an assessment is made as to the best ways for the business to save water.

The first 15 restaurants were selected based on the records of their water use accounts.

"We took the restaurants that would get the biggest bang for their buck," said Elizabeth Barriga, water conservation coordinator for Gallup Joint utilities.

The program will be extended beyond the 15 restaurants to

include most of Gallup's eating establishments.

"The idea is that Elizabeth (Barriga) can later do the some 50 restaurants on her own," Vogel explains.

Garcia says she did it in part because she's the type of person that likes to learn as much as possible about how things are run. But she says she also knows the need for water conservation in the city.

"I know Gallup especially, we have a water situation," she said.

APPENDIX B: SOLICITATION LETTER AND FLYER

Utility A Example Letter:

Your Logo
HERE

Dear Restaurant Owner:

Restaurant owners in *city* can partake in a new water efficiency program for restaurants administered by Department of Public Utilities.

We would like to invite you to join other environmentally conscious members in the restaurant industry to reduce water consumption by 12 percent. You will reduce water use, lower costs and save energy. The following services are voluntary and will be provided at no cost to our customers:

- **Free** High-pressure rinse nozzles that use less water and are valued at over \$100.00
- **Free** Low flow faucet aerators (as needed)
- **Free** Toilet water volume displacement devices (as needed)
- **Free** Leak detection
- **Free** Training on other techniques to improve water efficiency
- **Free** Water conservation materials and information pieces

~Upon Completion~

- **Certification** as a participant in water efficient program that can be prominently displayed for patrons

I will be dropping in on restaurants the week of May 19th to 30th, after the lunch time rush and before dinner to discuss audits. If you would prefer to schedule a specific date and time please feel free to call me. I can be reached Monday through Friday, 8:30 am to 5 pm at ***-****.

I look forward to working with you,

Water and Energy Conservation Officer
Department of Public Utilities

Your Logo
Here

City of *****

Free Water Audits Restaurants

The City of ***** will be providing free water audits to the City of ***** commercial restaurants. The audit will take approximately 2 hours and require access to all areas of the restaurant, inside and out. All participating restaurants will receive a free pre-rinse spray nozzle installed by our professional auditor. Contact the City Utility office for more details and to reserve your spot

Highlights

- Receive free pre-rinse spray nozzle
- Estimate **% reduction in water use
- Pre and Post Audit water use analysis
- Certificate of Participation
- Scheduled at your convenience



Audits are being scheduled for February 2008. Call Utility for more details.

City of *****
address

Phone: 505-***-****

Email *****

Other sponsor

Other sponsor logos

APPENDIX C: EXAMPLE SCHEDULE

AUDIT SCHEDULE

X = CONFIRMED Restaurant Audit Time

O = TENTATIVE Restaurant Audit Time

TIME	Applebees Feb. 25	Cracker Barrel Feb. 25	Furr's Feb. 25	Earl's Feb. 25	Denny's Feb. 26	Denny's Feb. 26	Roosevelt School Cafeteria Feb. 26	Genero's Restaurant Feb. 26
8:30 am -10:00am	X				X			
10:15am-11:45am		X				X		
LUNCH 12:00am -1:00pm								
1:30am-3:00pm			X				X	
3:15pm -4:45pm				X				X
TIME	Golden Corral Feb. 27	McDonald's Feb. 27	Wendy's Feb. 27	Don Diegos Feb. 27	El Sombrero Feb. 28	Pizza Hut Feb. 28	Sonic Drive-In Feb. 28	Val's Feb. 28
8:30 am -10:00am	O				X			
10:15am-11:45am		X				X		
LUNCH 12:00am -1:00pm								
1:30am-3:00pm			X				X	
3:15pm -4:45pm				X				O

APPENDIX D: QUESTIONNAIRE

3. Kitchen water use

Dishwasher description and use (number of loads washed each day) _____

Is the dishwasher rinse water reused? Yes No

Number of kitchen faucets _____

Type:	Usage:	Aerator Yes/No	Flow rate (gpm)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Ice machine Brand _____ Model number _____

Pound capacity _____ Cooling method (water or air?) _____

Is a garbage disposal used? Yes No If so, number of minutes used per day _____

Is there a water softener? Yes No If so, list the Brand _____

Model number _____

Percent discharged _____

Does the water softener run on a *timer*? or on *measured flow*?

Describe cleaning methods and equipment (for floors, etc.) _____

Discuss any other kitchen water use _____

4a. Men's Restroom water use

Toilets: *Gravity tank*: Number _____ Volumes _____

Flush valve: Number _____ Volumes _____

Urinals: Number _____ Volumes _____

Have any toilets or urinals been retrofitted with lower flow models? Yes No

If so, how many? _____ When? _____

Lavatory sinks: Number _____ Estimated flow _____

How many faucets have aerators installed? None All Number _____

4b. Women's Restroom water use

Toilets: *Gravity tank:* Number _____ Volumes _____

Flush valve: Number _____ Volumes _____

Have any toilets been retrofitted with lower flow models? Yes No

If so, how many? _____ When? _____

Lavatory sinks: Number _____ Estimated flow _____

How many faucets have aerators installed? None All Number _____

5. Laundry water use

Are any clothes washing machines used on-site? Yes No

If so, list the type, brand, model number, and capacity for each:

Brand:

Model number:

Capacity:

_____	_____	_____
_____	_____	_____
_____	_____	_____

Number of laundry loads washed daily? _____ Is the rinse water reused? Yes No

6. Cooling water use

Cooling Units:

Number

Size

Evaporative cooler

Refrigerated air

Other _____

If evaporative cooling is used, do the cooling units recirculate water? Yes No

How many days per year is the cooler used? _____ How long each day? _____

7. Outdoor water use

Area of irrigated landscape: _____

Landscape materials:

Plant type _____ Percentage of total area _____

Plant type _____ Percentage of total area _____

Plant type _____ Percentage of total area _____

Watering/irrigation system description _____

Irrigation schedule: Time of day _____ Seasonal adjustment _____

Describe scheduler management: _____
(how/when scheduler is read, adjusted)

Number of days per week _____ Number of weeks per year _____

Condition of landscape (maintained, mulched, abandoned, etc.) _____

Is any water used to clean sidewalks/hose down parking lots? Yes No

Describe any other outdoor water uses. _____

8. Other uses, leaks, and lost water

Method of floor mat cleaning: _____

If sprayed, estimate the number of minutes per day. _____

Describe any wait station water use. _____

Describe any janitor closet water use. _____

List any quantifiable leaks and estimated rates and locations. _____

Are there any showers on-site? Yes No If so:

Number _____ Use frequency _____ Estimated flow _____

Describe any other water uses. _____

APPENDIX E: FIXTURE AND APPLIANCE INFORMATION

- EPA WaterSense® High Efficiency Toilets
- Food Service Technology Center Low-Flow Pre-Rinse Spray Valves
- Alliance for Water Efficiency Introduction to Ice Machines
- Alliance for Water Efficiency Introduction to Coolers

EPA WaterSense® High Efficiency Toilets

Find a WaterSense® Labeled High-Efficiency Toilet*

Last updated: 3/10/2009

Please note: Many high-efficiency toilets are sold in two parts, with the tank and bowl sold separately. When components combine to make a WaterSense labeled product, tanks should include the words "When used in combination with [bowl model number/name]" in close proximity to the label, and similarly with bowl labeling. Only the combinations listed below have been certified to bear the WaterSense label.



WaterSense retailers commit to making WaterSense products available in stores. However, products may not be available in all markets. For a complete list of WaterSense retail and distributor partners, please go to: <http://www.epa.gov/watersense/partners/partners.htm#retail>

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
American Standard	Cadet 3 FloWise Elongated Toilet	2832.128	4021.128	3014.128
American Standard	Cadet 3 FloWise Right Height Elongated Toilet	2835.128	4021.128	3016.128
American Standard	Cadet 3 FloWise Round Front Toilet	2829.128	4021.128	3011.128
American Standard	Cadet FloWise Pressure Assist EL Toilet	2462.100	4142.100	3481.100
American Standard	Cadet FloWise RH EL Pressure Assist Toilet	2467.100	4142.100	3483.100
American Standard	Cadet3 FloWise Compact EL One-piece Complete Toilet	2568.128		
American Standard	Cadet3 FloWise RH EL 12" Complete Toilet	3305.128	4021.128	3016.128
American Standard	FloWise	2073.014	4023	3018
American Standard	FloWise Cadet3 1-pc	2403.128		
American Standard	FloWise Dual Flush	2479.216	4035.216	3067.216
American Standard	FloWise Dual Flush Elongated Toilet, Lined Tank	2479.516	4035.516	3067.216
American Standard	FloWise Dual Flush Right Height Elongated Complete Toilet Lined Tank	2566.516	4035.516	3073.216
American Standard	FloWise Dual Flush Right Height Elongated Toilet	2480.216	4035.216	3073.216
American Standard	FloWise Dual Flush Right Height Elongated Toilet	2566.216	4035.216	3073.216
American Standard	FloWise Dual Flush Right Height Elongated Toilet Lined Tank	2480.516	4035.516	3073.216
American Standard	Mainstream FloWise RF Complete Toilet	3468.128	4061.428	3061.428
American Standard	NH EL Dual Flush Combo Toilet	2476.216	4035.216	3067.316
American Standard	NH EL Dual Flush Complete	2779.516	4035.516	3067.316

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
American Standard	NH EL Dual Flush Lined Combination	2476.516	4035.516	3067.316
American Standard	RH EL Dual Flush Combination	2484.216	4035.216	3073.316
American Standard	RH EL Dual Flush Complete	2778.516	4035.516	3073.316
American Standard	RH EL Dual Flush Lined, Combination	2484.516	4035.516	3073.316
American Standard	Yorkville FloWise PA Toilet	2876.100	4142.100	3701.100
American Standard	Yorkville FloWise RH PA Toilet	2878.100	4142.100	3703.100
Aquasenses	ES22114		ES3214	ES2214
AquaSource (a Lowe's brand)	AquaSource	005905		
Briggs	Conserver	4207	4484	4370
Briggs	Conserver	4208	4484	4375
Briggs	ProFlo		PF9212	PF9201
Briggs	ProFlo		PF9212	PF9200
Caroma	Adelaide 270 Cube		814790	834000
Caroma	Adelaide 270 Cube EH		814790	825500
Caroma	Adelaide 270 Standard		814328	834000
Caroma	Adelaide 270 Standard EH		814328	825500
Caroma	Bondi 270		726350	609159
Caroma	Bondi 270 EH		726350	607177
Caroma	Bondi 270 Elongated		726350	609100
Caroma	Bondi 270 Elongated EH		726350	609120
Caroma	Bondi 305		726350	609151
Caroma	Bondi 305 Elongated		726350	609130
Caroma	Brisbane 270		810266	833900
Caroma	Caravelle 270		629435	609159
Caroma	Caravelle 270 EH		629435	609177
Caroma	Caravelle 270 EH Elongated		629435	609120
Caroma	Caravelle 305		629435	609151
Caroma	Caravelle Elongated 270		629435	609100
Caroma	Caravelle Elongated 305		629435	609130
Caroma	Caravelle One Piece	989646		
Caroma	Caravelle One Piece EH	989668		
Caroma	Colonial 270		625070	605310
Caroma	Colonial 270 EH		625070	605320
Caroma	Profile Smart 305		840420W	609151A
Caroma	Royale 270		624530	609159
Caroma	Royale 270 EH		624530	609177
Caroma	Royale 270 EH Elongated		624530	609120
Caroma	Royale 270 Elongated		624530	609100
Caroma	Royale 305		624530	609151
Caroma	Royale 305 Elongated		624530	609130
Caroma	Sydney 270		622320	609159
Caroma	Sydney 270 EH		622320	609177
Caroma	Sydney 270 EH Elongated		622320	609120
Caroma	Sydney 270 Elongated		622320	609100
Caroma	Sydney 305		622320	609151A
Caroma	Sydney 305 Elongated		622320	609130

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
Caroma	Sydney Low Profile 270 EH		622330	609177
Caroma	Sydney Low Profile 270 EH Elongated		622330	609120
Caroma	Sydney Low Profile 270 Elongated		622330	609100
Caroma	Sydney Low Profile 270 Round		622330	609159
Caroma	Sydney Low Profile 305		622330	609151A
Caroma	Sydney Low Profile 305 Elongated		622330	609130
Caroma	Sydney Smart 270		622322	609159
Caroma	Sydney Smart 270 EH		622322	609177
Caroma	Sydney Smart 270 EH Elongated		622322	609120
Caroma	Sydney Smart 270 Elongated		622322	609100
Caroma	Sydney Smart 305		622322	609151A
Caroma	Sydney Smart 305 Elongated		622322	609130
Cascadian	Toscano		T901	C930
CEU		6810H	T-6810H	X-6810H
CEU		6810H-S	T-6810HS	X-6810HS
CEU		6811H	T-6811H	X-6811H
CEU		6811H-S	T-6810HS	X-6811HS
Crane	Eco Opus III	31692	31542	31562
Crane	Eco Opus III	31693	31543	31562
Crane	EcoGalaxy/Cranada	31007	31590	3352
Crane	EcoGalaxy/Cranada	31008	31590	3372
Crane	EcoGalaxy/Cranada	31067	31593	3352
Crane	EcoMiser	38370	31500	3827
Crane	EcoMiser	38400	31500	3830
Crane	EcoMiser BigFoot	38335	31500	31124
Crane	EcoMiser BigFoot	38345	31500	31125
Crane	EcoMiser BigFoot ADA	38355	31500	31128
Crane	Economiser One	31884	31612	31124
Crane	Economiser One BigFoot	31885	31612	31125
Crane	Economiser One BigFoot	31888	31612	31128
Crane	EcoSaratoga	31970	31960	3352
Crane	EcoSaratoga	31972	31964	3352
Crane	EcoSaratoga	31973	31964	3372
Crane	EcoSaratoga	31976	31966	3352
Crane	EcoSaratoga	31980	31960	3372
Crane	EcoSaratoga	31986	31966	3372
Duravit	2nd Floor Wall Hung Toilet		111.335	220509
Duravit	Caro Wall Hung Toilet		111.335	015609
Duravit	D-Code Two-Piece Toilet		092720	011701
Duravit	Darling Wall Hung Toilet		111.335	020709
Duravit	Foster Wall Hung Toilet		111.335	017509
Duravit	Happy D Two-Piece Toilet		091010	017009
Duravit	Happy D Wall Hung Toilet		111.335	017109
Duravit	Starck 2 Wall Hung Toilet		111.335	016009
Duravit	Starck 3 Two-Piece Toilet		092010	012809

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
Duravit	Starck 3 Wall Hung Toilet		111.335	220009
Duravit	Starck X Wall Hung Toilet		111.335	220409
Duravit	Vero Floor Standing Toilet		109.304	211709
Duravit	Vero Two-Piece Toilet		090910	211609
Duravit	Vero Wall Hung Toilet		111.335	221709
Foremost		TL-6100-EWN		
Foremost		TL-7600HC-HET-W	T-7600-HET-W	LL-7600HC-HET-W
Foremost		TL-7600HC-HET-WL	T-7600-HET-WL	LL-7600HC-HET-W
Foremost		TL-7600HC-HETR-W	T-7600-HET-W	LL-7600HC-HETR-W
Foremost		TL-7600HC-HETR-WL	T-7600-HET-WL	LL-7600HC-HETR-W
Foremost		TL-7700HC-HET-W	T-7700-HET-W	LL-7700HC-HET-W
Foremost	AIO	AIO1000-EW	AIOT1000-W	AIOB1000-EW
Foremost	AIO	AIO1000-RW	AIOT1000-W	AIOB1000-RW
Foremost	Plaza	TL-7107-WL	T-7107-WL	LL-7107-W
Foremost	Total	TT-2000E-WL	T-2000-WL	LL-2000E-W
Foremost	Total	TT-2010-WL	T-2010-WL	LL-2010-W
Gerber	Ultra Flush	DF-21-302	DF-28-380	21-342
Gerber	Ultra Flush	DF-21-304	DF-28-384	21-342
Gerber	Ultra Flush	DF-21-310	DF-28-380	21-374
Gerber	Ultra Flush	DF-21-312	DF-28-380	21-372
Gerber	Ultra Flush	DF-21-314	DF-28-384	21-372
Gerber	Ultra Flush	DF-21-318	DF-28-380	21-377
Gerber	Ultra Flush	DF-21-324	DF-28-384	21-377
Gerber	Ultra Flush	DF-21-325	DF-28-380	21-375
Gerber	Ultra Flush	EF-21-302	EF-28-380	21-342
Gerber	Ultra Flush	EF-21-304	EF-28-384	21-342
Gerber	Ultra Flush	EF-21-310	EF-28-380	21-374
Gerber	Ultra Flush	EF-21-312	EF-28-380	21-372
Gerber	Ultra Flush	EF-21-314	EF-28-384	21-372
Gerber	Ultra Flush	EF-21-318	EF-28-380	21-377
Gerber	Ultra Flush	EF-21-324	EF-28-380	21-375
Gerber	Ultra Flush	EF-21-325	EF-28-380	21-375
Glacier Bay (a Home Depot brand)		331-725 (BT6001)		
Glacier Bay (a Home Depot brand)	Elongated HET	331-725	N2225T	N2225EB
Glacier Bay (a Home Depot brand)	Round Front HET AIO	779-923	779-923T	779-923B
Greentide	GT 6810H		666-2	
Greentide	GT 6810H-S		666-1	
Greentide	GT 6811H		666-2	
Greentide	GT 6811H-S		666-1	
Jacuzzi	Espreo	EZ36959		
Kohler	Barrington	K-3652	K-4484	K-4327
Kohler	Cimarron	K-3609	K-4421	K-4309
Kohler	Cimarron EcoSmart	K-3496-HE	K-4634-HE	K-4286
Kohler	Escale	K-3588	K-4472	K-4308
Kohler	Fountainhead	K-3524		

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
Kohler	Highline Pressure Lite	K-3519	K-4484	K-4304
Kohler	Kelston	K-11453	K-4469	K-4306
Kohler	Persuade	K-3654	K-4419	K-4322
Kohler	Saile	K-3564		
Kohler	San Raphael Power Lite	K-3393		
Kohler	San Raphael Pressure Lite	K-3597		
Kohler	Wellworth Pressure Lite	K-3531	K-4484	K-4303
Mansfield	704 Prestigio	704		
Mansfield	EcoQuantum	144-119	119	144
Mansfield	EcoQuantum	146-119	119	146
Mansfield	EcoQuantum	147-119	119	147
Mansfield	EcoQuantum	148-119	119	148
Mansfield	EcoQuantum	149-119	119	149
Mansfield	Maverick 1.28	111-112	112	111
Mansfield	Quantum	144-153	153	144
Mansfield	QuantumOne	146-153	153	146
Mansfield	QuantumOne	147-153	153	147
Mansfield	QuantumOne	148-153	153	148
Mansfield	QuantumOne	149-153	153	149
Medyag	6810H			
Medyag	6810H-S			
Medyag	6811H			
Medyag	6811H-S			
Niagara	1.0 PA	N2310	N2310T	N2310B
Niagara	Cottage	N2228	N2228T	N2228B
Niagara	Eco-Logic		N2225EB	N2225T
Niagara	Eco-Logic		N2225RB	N2225T
OPS		T/X-6688	X-6688	T-6688
OPS		T/X-6688E	X-6688	T-6688E
OPS		T/X-6688H	X-6688	T-6688H
ORION	Green Sense EL		51299	50320
ORION	Green Sense RD		51299	50299
Pegasus (a Home Depot brand)	Cottage	840-565	N2228T	N2228B
ProFLO (a Ferguson brand)	HET Dual Flush ADA		PF9312	PF9303
ProFLO (a Ferguson brand)	HET Dual Flush EF		PF9312	PF9301
ProFLO (a Ferguson brand)	HET Dual Flush RF		PF9312	PF9300
ProFLO (a Ferguson brand)	HET Gravity Flush EF		PF9412	PF9401
ProFLO (a Ferguson brand)	HET Gravity Flush RF		PF9412	PF9400
ProFLO (a Ferguson brand)	HET Single Flush ADA		PF9412	PF9403
ProFLO (a Ferguson brand)	HET Single Flush EF		PF6112HE	PF6101HE
ProFLO (a Ferguson brand)	HET Single Flush EF		PF6212HE	PF6201HE
Quality Craft	Alexis HET	30013K	3003	3001
Quality Craft	Alexis HET Dual Flush	30014K	3004	3001
Seasons (a HD Supply brand)	Seasons		SE10039	SE10041
Seasons (a HD Supply brand)	Seasons		SE10039	SE10040
Seasons (a HD Supply brand)	Seasons	SE10042		
Sterling (a Kohler company)	Karsten EB	402028	402023	402026
Sterling (a Kohler company)	Karsten PB	402025	402023	402021
Sterling (a Kohler company)	Rockton EB	402027	402022	402026
Sterling (a Kohler company)	Rockton PB	402024	402022	402021
Sterling (a Kohler company)	Stanton	402040		
Swell	22114		3214	2214

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
Tangshan Ayers Bath	Dofiny HET		UAT1302-AA	UAC1301BS-AA
TOTO	Aquia	CST414M	ST413M	CT414
TOTO	Aquia II	CST416M	ST416M	CT416
TOTO	Aquia III	CST464M	ST464M	CT464
TOTO	Aquia IIIUH	CST464MF	ST464M	CT464F
TOTO	EcoClayton	CST784EF	ST784E	C784EF
TOTO	EcoDartmouth	CST754EF	ST753E	C754EF
TOTO	EcoDrake	CST743E	ST743E	C743E
TOTO	EcoDrake	CST744E(G)	ST743E	C744E
TOTO	EcoDrake	CST744EL	ST743E	C744EL
TOTO	EcoGuinevere	MS974224CEF(G)		
TOTO	EcoNexus	CST794EF	ST794E	CT794EF
TOTO	EcoPromenade	CST423EF	ST423E	C423EF
TOTO	EcoPromenade	CST424EF(G)	ST423E	C424EF(G)
TOTO	EcoSupreme	MS863113E		
TOTO	EcoSupreme	MS864114E		
TOTO	EcoUltramax	MS853113E		
TOTO	EcoUltramax	MS854114E		
TOTO	EcoUltramax	MS854114EL		
TOTO	EcoWhitney	CST754EFN	ST754E	C754EF
TOTO	Gwyneth	CST454CEF(G)	ST454E	C454CEF(G)
TOTO	Gwyneth	MS604114CEF(G)		
TOTO	Neorest 550	MS980CMG		
Tynan	Avoca	4344	1344	0344
Tynan	Cascade ADA	4354	1312	0354
Tynan	Cascade EF	4353	1312	0353
Tynan	Cascade RF	4352	1312	0352
Tynan	Foyle	4345	1345	0345
Tynan	MacLair	4347	1342	0347
Tynan	MacLair EF	4343	1342	0343
Tynan	MacLair RF	4342	1342	0342
Tynan	Nore	4346	1346	0346
Villeroy & Boch	AVEO		7724 U1 XX	6614 10 XX
Villeroy & Boch	Subway		7723 U1 XX	6610 10 XX
VitrA	Evergreen		5055	5076
VitrA	Evergreen		5066	5065
VitrA	Evergreen		5055	5074
VitrA	Evergreen		5402	5195
VitrA	Evergreen		5402	5196
Vortens	Dali	5928	5201	5101
Vortens	Delfos	3130	3130	3130
Vortens	Hurricane		3473	3140
Vortens	Hurricane EL		3473	3137
Vortens	Hurricane RF		3473	3213
Vortens	Loretto ADA		3475	3140
Vortens	Loretto EL		3475	3137
Vortens	Loretto RF		3475	3213
Vortens	Rhodas DF		3436	3123
Vortens	Tornado		3468	3138

Brand Name	Model Name	Model Number		
		HET	Tank	Bowl
Vortens	Tornado ADA		3468	3134
Vortens	Vienna ELX		3436	3113
Vortens	Vienna ELX		3420	3113
Vortens	Vienna RF		3420	3208
Vortens	Vienna RF		3436	3208
Vortens	Vienna Victory		3436	3209
Vortens	Vienna Victory		3420	3209
WaterRidge	360380 Two Piece Toilet	C21075C	C600137	C531082
WaterRidge	Grace Dual Flush One Piece Toilet	C22055C	C520093	C540552
Zurn	EcoVantage Dual Flush Round Front Toilet	Z5577	Z5562-TNK	Z5575-BWL
Zurn	EcoVantage Dual Flush, Elongated Toilet	Z5572	Z5562-TNK	Z5570-BWL
Zurn	EcoVantage Dual Flush, Elongated, ADA Toilet	Z5562	Z5562-TNK	Z5560-BWL
Zurn	EcoVantage Elongated ADA Toilet	Z5561	Z5561-TNK	Z5560-BWL
Zurn	EcoVantage Elongated Toilet	Z5571	Z5561-TNK	Z5570-BWL
Zurn	EcoVantage Round Front Toilet	Z5576	Z5561-TNK	Z5575-BWL

***Disclaimer of Endorsement:** Reference herein to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government.

Low-Flow Pre-Rinse Spray Valves



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Downloaded 6/1/2009 from <http://www.fishnick.com/equipment/sprayvalves/>

A low-flow pre-rinse spray valve is one of the easiest and most cost effective energy saving devices available to the foodservice operator.

In addition to minimizing water consumption, water heating energy and sewer charges are also reduced. Replacing a typical spray valve that flows up to three gallons of water per minute (gpm) with a low-flow unit can yield the following results:

Hours of Spray Valve Usage	Water Savings gallons/day	Waste Water Savings gallons/day	Gas Savings therms/day	Annual Dollar Savings
1 hour/day	60 gallons	60 gallons	0.5 therms	\$300 - \$350
2 hours/day	120 gallons	120 gallons	1.0 therms	\$600 - \$700
3 hours/day	180 gallons	180 gallons	1.5 therms	\$900 - \$1050

Table shows results based on spray valve water savings of 1 gallon per minute, water cost of \$2.00 per unit (748 gallons), sewer cost of 3.00 per unit (748 gallons), and gas cost of \$1.00 per therm.

The FSTC recommends a pre-rinse spray valve with a flow rate of 1.6 gallons per minute or less, and with a cleanability performance of 26 seconds per plate or less, based on the ASTM *Standard Test Method for Performance of Pre-Rinse Spray Valves*.

The following pre-rinse spray valves have been verified by the FSTC to meet these criteria. Results of testing can be found at <http://www.fishnick.com/>.

- BK Resources PRV-1
- Bricor B064 PRV
- Bricor B074 PRV
- Bricor B084 PRV
- Bricor B094 PRV
- Bricor B095NS
- Encore KN50-Y002-12
- Fisher Ultra-Spray 2949
- Krowne Metal Water Saver 21-129
- Niagara N2180

- Strahman Kwik-Clean II
- T&S B-0107
- T&S B-0107-C
- T&S Equip 5SV
- T&S Equip 5SV-C
- T&S JetSpray B-0108
- T&S JetSpray B-0108-C
- T&S B-2108
- Zurn Z80000-PR1

The FSTC has supported the California Urban Water Conservation Council (CUWCC) to actively promote low-flow pre-rinse spray valves through its Rinse & Save program. Details of the program can be found on the CUWCC website.

The Federal Government has also issued guidelines for its facilities when purchasing pre-rinse spray valves. These guidelines, published by the Federal Energy Management Program (FEMP) can be followed by any facility interested in energy efficiency and conservation.

The FEMP pre-rinse spray valve recommendation is at <http://www.eere.energy.gov/femp/pdfs/prerinsenozzle.pdf>.

Also see the FSTC pre-rinse spray valve calculator at <http://www.fishnick.com/saveenergy/tools/watercost/>.



The Food Service Technology Center program is funded by California utility customers and administered by Pacific Gas and Electric Company under the auspices of the California Public Utility Commission.



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Downloaded 6/1/2009 from <http://www.fishnick.com/equipment/sprayvalves/>

Ice Machines Introduction

From Alliance for Water Efficiency (June 1, 2009)

http://www.allianceforwaterefficiency.org/Ice_Machines.aspx

Ice makers use more water than just the water contained in the ice. This equipment can often be very inefficient in water use. The typical icemaker uses 2 or 3 times more water than needed to make the ice we consume. These water using machines can be found everywhere; hospitals account for 39.4 percent of all commercial ice-maker purchases, followed by hotels (22.3 percent), restaurants (13.8 percent), retail outlets (8.5 percent), schools (8.5 percent), offices (4.3 percent) and grocery stores (3.2 percent).



There are two basic equipment designs: air-cooled refrigeration units and water cooled refrigeration units. The air-cooled units are usually more water efficient; while the water cooled units are usually more energy efficient. Both types vary greatly in water efficiency, even within its own design type. The water efficiency is measured by the industry in “gallons of water per 100 lbs of ice”. Perfect water efficiency would equate to 11.97 gallons of water to produce 100 lbs of ice. Most ice makers’ water use ranges between 18 to 200 gallons of water per 100 lbs of ice. This represents a water efficiency range of 66% to only 5%. Thus, 34% to 95% of the water used is dumped down the drain. The water varies for several reasons.

As the ice is formed in the freezing trays, minerals in the water collect in the equipment. These minerals must be occasionally rinsed off the freezing trays and the water reservoirs. Ice makers have a variable setting to initiate a rinse cycle at desired frequencies. The frequency of rinse is to be determined by local water quality and site requirements. Some new models actuate the rinse cycles based on sensor readings of minerals. Often the ice maker is set to rinse more often than necessary, resulting in water waste.

The “quality” of the ice can also affect water use. Some ice makers are designed to produce clearer and smoother ice by using a repeated freezing and partial thawing cycle while the ice is produced. This results in ice cubes that are smoother, without air bubbles and more crystalline like. Unfortunately, this aesthetic quality wastes a lot of water and serves no useful purpose; frosty ice cools just as well as clear ice.



Water cooled ice makers are often the most inefficient in water use, although sometimes providing significant energy savings at the point of use. It is important to note that there are many air-cooled ice machines **more** energy efficient than some water-cooled ice machines. Water cooled machines generally use potable water to remove heat from the refrigeration equipment. In years past, most of these machines used single-pass cooling – dumping the water into the sewer as it exited the machine. Fortunately, many manufacturers are started to abandon this wasteful design. Some newer designs re-circulate the water after it passes through a cooling tower or heat exchanger, but these still require large amounts of make up water. While air-cooled machines generally have a water efficiency of 40% to 66%, water cooled machines are usually less than 15% water efficient.

The water efficiency of most makes and models can be obtained by downloading “Certified Automatic Commercial Ice Makers Directory from the Air-conditioning and Refrigeration Institute” at www.aridirectory.org.

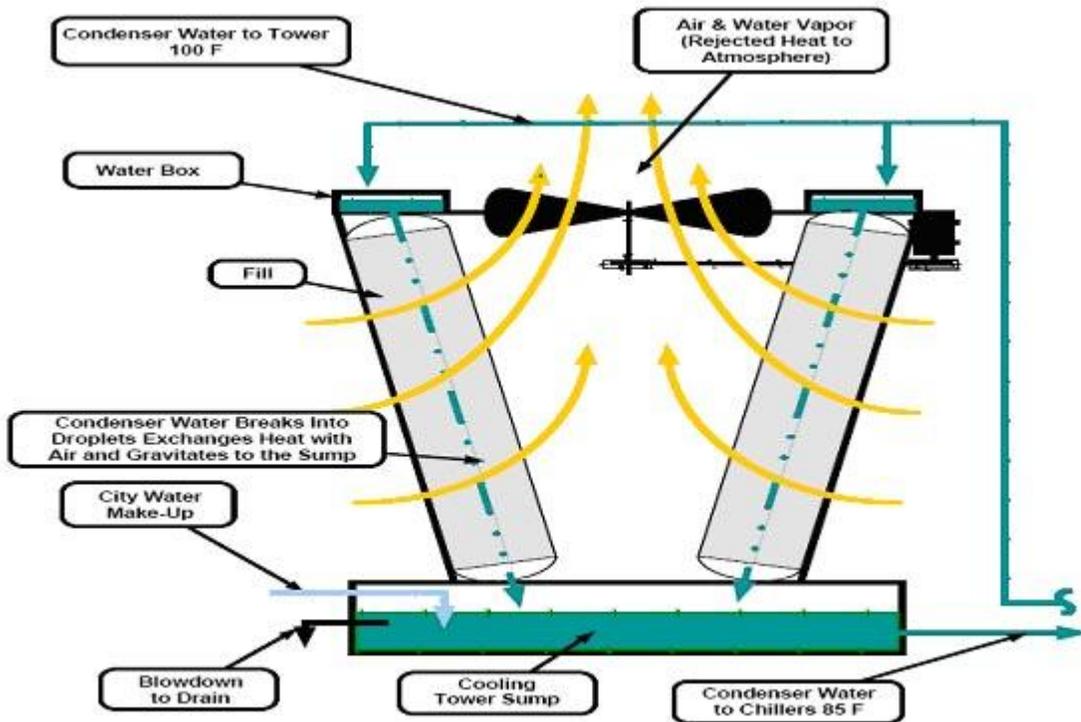
Introduction to Cooling Towers

From Alliance for Water Efficiency (June 1, 2009)

http://www.allianceforwaterefficiency.org/Ice_Machines.aspx

Cooling towers are used in a variety of applications; from the 400 foot tall towers at nuclear power plants to small 4 foot cooling boxes used by neighborhood dry cleaners. The most common use is in large building central cooling systems, but also used for refrigeration, cold storage facilities, dry cleaning, medical equipment, manufacturing and industry. Cooling towers are generally the most efficient means to remove large amounts of heat from air and equipment. Unfortunately, cooling towers use large amounts of water when properly maintained, and can waste greater amounts of water when not maintained properly through wasteful practices, inefficient equipment and leaks.

Cooling systems transfer heat from one source or medium to another, often using water. In a cooling system with a cooling tower, cool water is pumped away from the cooling tower and is circulated through hot equipment (often chillers used to cool large buildings). The cool water (typically 85F) absorbs heat from the equipment and becomes warmer. The warmed water (typically 100 F) then returns back to the cooling tower. In the cooling tower the warmed water is sprayed downward, and air is blown upward with a fan. As the warm water droplets contact the air, some of the water droplets evaporate, and the air absorbs the heat released from this evaporation—thereby lowering the temperature of the remaining water. This cooling effect of the remaining water is called the latent heat of evaporation. During this process, some water is lost to the air from evaporation and some water is lost by the misting effect (called “drift”) into the air.



An outside source of water (usually from the local water utility), commonly referred to as “makeup water,” adds more water to the system to make up for evaporation and drift. Then, the water is re-circulated back to the heat exchanging equipment and the process is repeated.

Every water source has various levels of minerals, known as dissolved solids. When water evaporates from the system, these solids are left behind, causing the remaining water to become more concentrated in minerals. In order to maintain the same volume of water in the cooling system, more source water needs is added to the system. Again, this source water contains additional dissolved solids. Although the source water helps to somewhat dilute the concentration of minerals in the cooling system water, source water also contains some solids results in a net increase in concentration of solids in the system water. Therefore, as the system re-circulates the water in the cooling tower, some water evaporates leaving the minerals behind; the water’s impurities become more and more concentrated. As the system water increases in solids and minerals, the solids become more prone to attaching themselves to the pipe walls and other parts of the system. Concentrated solids can build up in the form of scale, causing blockages and corrosion to the cooling system materials. This scaling can cause catastrophic failure and damage to the system.

Most cooling towers purposefully remove some of the old water in the system and replace it with fresh water. To stay below this maximum acceptable concentration and to maintain the tower’s water balance, new water needs to be added to the cooling tower (called makeup water) and a portion of the concentrated cooling tower water needs to be discharged from the cooling tower (called blow-down or bleed). The amount of bleed needed depends on the system use and the quality of the fresh water supply. Often excessive bleed-off occurs due to improper adjustments made by the system operator.

Prescribed water levels must be maintained in the system to prevent catastrophic damage to the equipment; thus, automatic refill valves are installed to replace any water losses from evaporation, drift, bleed-off and leaks. Unfortunately, this allows leaks to often go unnoticed and continue for months or even years.

There are many measures that are needed to assure a cooling tower system is operating in a water efficient manner. At minimum the system should have: a) a dedicated water meter that is read daily by the local maintenance staff, and b) a TDS meter/controller to maintain proper bleed-off rates. In addition, acid treatment controllers and filtering equipment can greatly reduce water use while properly maintaining the equipment.

APPENDIX F: EXAMPLE COST BENEFIT ANALYSIS

Leak savings example

Leak rate (gallons/day)	Potential conservation savings (gallons/month)	Monthly water rate (\$ per 1,000 gallons)	Monthly savings due to fixing this leak (\$)	Annual savings due to fixing this leak (\$)
10	300	3.24	0.97	11.64

Reduced flow rate savings example (due to replacing a pre-rinse spray nozzle or installing/replacing aerators)

Starting flow rate (gals/min)	Resulting flow rate (gals/min)	Faucet use each day (minutes)	Potential conservation savings (gals/day)	Potential conservation savings (gals/month)	Monthly water rate (\$ per 1,000 gallons)	Monthly savings due to reduced flow rate (\$)	Annual savings due to reduced flow rate (\$)
3	1	120	240	7,200	3.24	23.33	279.96

Ice cream dipper well savings example

Starting flow rate (gals/min)	Resulting flow rate (gal/min)	Dipper well use each day (hours)	Dipper well use each day (minutes)	Potential conservation savings (gallons/day)	Potential conservation savings (gals/month)	Monthly water rate (\$ per 1,000 gallons)	Monthly savings due to reduced flow rate (\$)	Annual savings due to reduced flow rate (\$)
0.5	0.3	12	720	144	4,320	3.24	14.00	168.00

Toilet retrofit example

Flush volume of the existing fixture (gals/flush)	Flush volume of the new fixture (gals/flush)	Potential conservation savings due to fixture retrofit (gals/flush)	Estimated number of flushes per day	Potential conservation savings (gallons/day)	Potential conservation savings (gals/month)	Monthly water rate (\$ per 1,000 gallons)	Monthly savings due to toilet retrofit (\$)	Annual savings due to toilet retrofit (\$)	Cost of new toilet (\$)	Fixture pay-back period (years)
3.5	1.6	1.9	100	190	5,700	3.24	18.47	221.64	350.00	1.6

**Ice machine retrofit
example**

Volume of ice produced each day (pounds/day)	Potential conservation savings due to ice type (gallons/100 pounds) ^a	Potential conservation savings due to compressor cooling method (gallons/100 pounds) ^b	Total potential conservation savings (gal/day)	Total potential conservation savings (gals/month)	Monthly water rate (\$ per 1,000 gallons)	Monthly savings due to ice machine retrofit (\$)	Annual savings due to ice machine retrofit (\$)	Cost of new ice machine (\$)	Fixture pay-back period (years)
250	0	240	600	18,000	3.24	58.32	699.84	1,500.00	2.1

Notes:

^a If the existing ice machine makes flake/nugget ice, enter 15 in the space below. If the existing ice machine makes cube ice, enter 0 in the space below (changing to a flake/nugget ice machine will conserve 10 gallons of water for every 100 pounds of ice that is made).

^b If the existing ice machine is air-cooled, enter 0 in the space below. If the existing ice machine is water cooled, enter 240 in the space below (changing from a water - to an air-cooled ice machine will conserve between 72 and 240 gallons of water for every 100 pounds of ice that is made).

APPENDIX G: EXAMPLE REPORT

This example report is from a small BBQ restaurant with limited seating.

Addressee

Re: Restaurant Water Audit Summary

Dear :

The City of X would like to thank you for your participation in the Commercial Water Audit Project. The goal of this project was to reduce commercial water use; 10 City of X establishments participated in the project, and the City plans to continue conducting additional restaurant water audits in the future.

Three years of data were evaluated for your establishment prior to conducting the site visit. A figure showing billed water use for the *Establishment 1* location for 2006, 2007, and 2008 is enclosed. Average monthly water use by *Establishment 1* for these three years was 40,111 gallons (average daily water use was 1,337 gallons per day (gpd) during this period). This does not include October thru December 2007 when the establishment was closed for renovations and water use was less than 10,000 gallons per month.

In 2008, summer water use (the average of June, July, and August) was approximately 2.5 times the amount of water used that was used in December. The restaurant used 67,000 and 61,000 gallons during August and September respectively. These monthly totals are approximately double the average monthly water use during the other 7 months of operation in 2008.

The *Establishment 1* site visit was conducted on February 9, 2009. The existing pre-rinse spray nozzle was replaced, reducing the amount of water used by this fixture from 3.5 to 1.5 gallon per minute (gpm). Assuming that this fixture is used for a total of one hour per day, using the new fixture will conserve approximately 120 gallons of water per day or 3,600 gallons per month, resulting in a monthly water bill savings of approximately \$11.70 (current City of X commercial water rates are \$3.24 per 1,000 gallons). Other recommendations for how *Establishment 1* can conserve water follow.

City of X staff analyzed the hourly water use data for this location, and found a 25 gallon per hour base flow (water use never goes to zero). A 600 gallon per day (18,000 gallons per month) leak is expected, but was not found as a part of the audit. This leak is likely located underground, somewhere between the sidewalk and building, and we recommend that a plumber be called to look for it. A loss of 18,000 gallons per month accounts for approximately \$60.00 per month on the water bill.

The ice machine at *Establishment 1* is a Hoshizaki Model KM-250BWE. This is a water cooled, cube style ice machine, which is the least energy- and water-efficient type of ice machine available. Cube ice machines use 30 or more gallons of water to make 100 pounds

of ice, while flake/nugget ice machines use 20 gallons of water per 100 pounds of ice (EBMUD, 2008). In addition to the amount of water used to make ice, water cooled ice machines also use between 72 and 240 gallons of water per 100 pounds of ice to cool the machine's compressor (EBMUD, 2008). Should this ice machine need to be replaced in the future, we recommend that an air-cooled, flake-ice machine be chosen instead. An air-cooled ice machine reduces water use by between 72 and 240 gallons per 100 pounds of ice produced (EBMUD, 2008). A nugget/flake-ice machine reduces water use by about 15 gallons per 100 pounds of ice produced (EBMUD, 2008). The existing ice machine can make 250 pounds of ice per 24 hour period. Assuming that the machine is working at capacity (producing 250 pounds of ice per day), this machine is using between approximately 190 and 640 gallons more each day than an air-cooled, flake-ice machine would. This is equivalent to between 5,700 and 19,200 gallons of water more per month, and between \$18 and \$62 per month on the water bill.

An air-cooled ice machine costs about \$1,000 more than a water-cooled ice machine, and a nugget/flake-ice machine costs between \$500 and \$1,200 more than a cube style ice machine. If *Establishment 1* were to replace the existing ice machine with an air-cooled, flake-ice machine costing between \$1,500 and \$2,200 more than the type of ice machine currently installed, the water bill savings alone would pay for the replacement ice machine within 3 to 7 years of its installation. Adding in energy savings would further decrease the pay back time.

The lavatory sink aerator in the men's restroom was replaced, reducing flow from 3 gpm to 1 gpm. Assuming that this faucet is used for 1 hour per day, this will lead to a savings of approximately 60 gallons of water per day and 1,800 gallons per month, leading to monthly water bill savings of approximately \$6.00. The lavatory sink aerator in the women's restroom was also replaced, reducing flow from 3 gpm to 1 gpm. This will lead to an addition \$6.00 per month savings. The valve under the sink in the men's restroom was leaking during the audit, and should be fixed as soon as possible. It was not possible to quantify this leak, but assuming that the leak amounts to 5 gallons per day, 150 gallons could be being wasted per month.

The men's and women's restrooms each have one toilet with a flush volume of 3.5 gallons per flush (gpf). These toilets should be replaced with low flow pressure assist toilets, reducing their flush volumes from 3.5 to 1.6 gpf. Assuming 20 flushes by each toilet each day, a total of 76 gallons per day or 2,280 gallons per month could be conserved due to the reduction in flush volume. This would lead to a monthly water bill savings of approximately \$7.40. New pressure assist toilets can be purchased for between approximately \$300.00 and \$350.00. At this cost, the water bill savings would pay for both replacement toilets within 8 years of their installation.

Establishment 1 does not use any water for outdoor irrigation, so no savings can be achieved by changing the landscaping practices.

In summary, total savings could be between \$1,300 and \$1,850 per year if all recommended conservation strategies are incorporated (Table 1).

Table 1. Establishment 1 Estimated Conservation Savings

Conservation Measure	Estimated Savings (gallons per month)	Estimated Savings (\$ per month)	Estimated Savings (\$ per year)
Replacement of the pre-rinse spray nozzle (completed)	3,600	\$11.70	\$140.40
Finding and fixing underground leak	18,000	\$60.00	\$720.00
Replacement of ice machine	5,700-19,200	\$18.00-\$62.00	\$216.00-\$744.00
Replacement of two restroom aerators (completed)	3,600	\$12.00	\$144.00
Replacement of two toilets (men's and women's restrooms)	2,280	\$7.40	\$88.80
Changes in landscaping irrigation and/or plant types	0	\$0	\$0
Total	33,180-46,680	\$109.10-\$153.10	\$1,309.20-\$1,837.20

Again, we appreciate your involvement in this project. Please contact me at (505) ***-**** if you have any questions.

Sincerely,

Water Conservation Specialist
City of X

Enclosure: Completed Audit Questionnaire from Establishment 1

City of Commercial Water Audit Questionnaire

Date of Audit 2/9/2009

1. General information

Business name _____ Phone (505) _____
Contact person name and title] _____
Physical address _____
Mailing address (if different) _____

2. Background information

Restaurant meter account # 6556373

Is all of the water billed to this account used by this restaurant? Yes No

Total water billed in 2008 (gallons)

Jan	<u>2,000</u>	Apr	<u>21,000</u>	Jul	<u>45,000</u>	Oct	<u>49,000</u>
Feb	<u>3,000</u>	May	<u>27,000</u>	Aug	<u>67,000</u>	Nov	<u>22,000</u>
Mar	<u>10,000</u>	Jun	<u>48,000</u>	Sep	<u>61,000</u>	Dec	<u>21,000</u>

Meter: Size 1-inch Type Badger AMR Installed February 1, 2007

Number of employees 5 Number of shifts per day 2

Number of meals served per day 50 on average

Days and hours of operation 6:30 a.m.-8 p.m. Monday-Friday, 6:30 a.m.-7 p.m. on Saturday, closed on Sunday

Date the facility was built 1983/1984 Size of the facility (square footage) ~1,500 ft²

Restaurant seating capacity 32

Date of last remodel None (they just opened on April 1, 2008)

Description of any existing water conservation measures They are very conscious of their water use. Dishes are washed by hand, using a gray tub (there aren't many dishes to be washed).

City of
Commercial Water Audit Questionnaire

3. Kitchen water use

Dishwasher description and use (number of loads washed each day) None (dishes are washed by hand).

Is the dishwasher rinse water reused? Yes No

Number of kitchen faucets 3

Type:	Usage:	Aerator Yes/No	Flow rate (gpm)
1 <u>Handwashing</u>	<u>Handwashing sink in the kitchen.</u>	<u>Yes</u>	<u>2.5</u>
2 <u>Pre-rinse spray nozzle</u>	<u>Used for dishwashing; nozzle was replaced with a low flow nozzle, reducing flow from 3.5 to 1 gallons per minute (gpm).</u>	<u>NA</u>	<u>3.5</u>
3 <u>Dishwashing</u>	<u>Dishwashing sink in the kitchen.</u>	<u>Yes</u>	<u>4</u>

Pressure on main line coming into the restaurant 92 pounds per square inch (psi) (measured at the hose bib behind the restaurant).

Ice machine Brand Hoshizaki Model number KM-250BWE

Pound capacity 250 lbs./24 hours Cooling method (water or air?) Water

Is a garbage disposal used? Yes No

Is there a water softener? Yes No

Describe cleaning methods and equipment (for floors, etc.) The floors are cleaned using a mop and bucket daily.

Discuss any other kitchen water use None

4a. Men's Restroom water use

Toilets: Gravity tank: Number 1 Volumes 3.5 gpf

Flush valve: Number 0 Volumes _____

Urinals: Number 0 Volumes _____

Have any toilets or urinals been retrofitted with lower flow models? Yes No

Lavatory sinks: Number 1 Estimated flow 3 gpm

City of
Commercial Water Audit Questionnaire

How many faucets have aerators installed? None All Number _____

The aerator on this lavatory sink was changed as a part of the audit, reducing its flow to 1gpm.

The valve under this sink is leaking.

4b. Women's Restroom water use

Toilets: Gravity tank: Number 1 Volumes 3.5 gpf

Flush valve: Number 0 Volumes _____

Have any toilets been retrofitted with lower flow models? Yes No

Lavatory sinks: Number 1 Estimated flow 3 gpm

How many faucets have aerators installed? None All Number _____

The aerator on this lavatory sink was changed as a part of the audit, reducing its flow to 1gpm.

5. Laundry water use

Are any clothes washing machines used on-site? Yes No

6. Cooling water use

Cooling Units:	Number	Size
Evaporative cooler	<u>2</u>	<u>55 cfm</u>
Refrigerated air	_____	_____
Other _____	_____	_____

If evaporative cooling is used, do the cooling units recirculate water? Yes No

How much of the year are the coolers used? June-September, on during the day and off at night

7. Outdoor water use

Area of irrigated landscape: None

The restaurant has one island containing juniper bushes, but it isn't watered.

City of Rio Rancho
Commercial Water Audit Questionnaire

8. Other uses, leaks, and lost water

Method of floor mat cleaning: The floor mats are taken to the car wash and power washed there.

Describe any wait station water use. None

Describe any janitor closet water use. None

List any quantifiable leaks and estimated rates and locations. City staff analyzed hourly data for this location, and found a 25 gallon per hour base flow (water use never goes to zero). A 600 gallon per day (18,000 gallons per month) leak is expected, but was not found as a part of the audit.

Are there any showers on-site? Yes No

Describe any other water uses. None

APPENDIX H: EXAMPLE UTILITY PROGRAMS

Table Tent

Water is Served Upon Request

Did you know it takes 4 glasses of water to clean just one?

That is why we only serve water when requested. The City of Gallup water comes from underground aquifers which are depleting 20 feet every year.

Please Save Our Water to help avoid serious water shortages.

Thank you for helping us conserve, preserve, and protect our limited, vital, drinking water for present and future generations.

Please Save Our Water. Every Drop Counts.

APPENDIX I: EXAMPLE CERTIFICATE OF PARTICIPATION



***Water Conservation Training Audits and
Retrofits for Food Services***
Certificate of Participation

Presented to:

Applebee's
1560 W. Maloney Ave
Gallup, NM

Cheri Vogel, NMOSE

Elizabeth Barriga, City of Gallup

APPENDIX J. RESOURCE LIST

- **Alliance for Water Efficiency**, <http://www.allianceforwaterefficiency.org/>
The Alliance for Water Efficiency is a stakeholder-based 501(c)(3) non-profit organization dedicated to the efficient and sustainable use of water. Located in Chicago, the Alliance serves as a North American advocate for water efficient products and programs, and provides information and assistance on water conservation efforts. A diverse Board of Directors governs the organization and has adopted a set of guiding principles and strategic plan.
- **American Water Works Association, Water Loss Control (Water Audit)**, <http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=47846&navItemNumber=48155>
Founded in 1881, AWWA is the authoritative resource on safe water, providing knowledge, information and advocacy to improve the quality and supply of water in North America and beyond. AWWA advances public health, safety and welfare by uniting the efforts of the full spectrum of the water community.
- **East Bay MUD: Water Smart Guide Book**, http://www.ebmud.com/conserving_&_recycling/non_residential/WaterSmart%20Guidebook/default.htm
The East Bay Municipal Utility District (EBMUD) supplies water and provides wastewater treatment for parts of Alameda and Contra Costa counties on the eastern side of San Francisco Bay in northern California.
- **Environmental Protection Agency, Energy Star**, <http://www.energystar.gov/>
ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.
- **Environmental Protection Agency WaterSense**, <http://www.epa.gov/watersense/>
WaterSense, a partnership program sponsored by the U.S. Environmental Protection Agency, makes it easy for Americans to save water and protect the environment. Look for the WaterSense label to choose quality, water-efficient products. Many products are available, and don't require a change in your lifestyle. Explore the links below to learn about WaterSense labeled products, saving water, and how businesses and organizations can partner with WaterSense.
- **Irrigation Association**, <http://www.irrigation.org/default.aspx>
The Irrigation Association® is the leading membership organization for irrigation equipment and system manufacturers, dealers, distributors, designers, consultants, contractors and end users. Originally founded in 1949, IA includes over 2,000 corporate and individual members and is dedicated to promoting efficient irrigation.

- **NMOSE Gallons per Capita per Day Calculator,**
http://www.ose.state.nm.us/wucp_gcpd.html
The New Mexico Office of the State Engineer (NMOSE) has developed a standardized methodology for gallons per capita per day (GPCD) calculations in New Mexico. “This methodology will be used by NMOSE to track municipal water use over time and manage the State’s water resources into the future,” said State Engineer John D’Antonio, Jr. P.E. In addition, the methodology will provide the drinking water supplier with a categorized baseline of historical and current water use. This data will assist both the State and the drinking water supplier in planning, tracking and reporting water uses.

- **NMOSE Landscape Irrigation “Smart” Controller,**
<http://irrcalc.ose.state.nm.us/irrcalc/>
The NM Landscape Irrigation Calculator will calculate the length of time and number of days per week that your landscape needs water. The easy-to-use site prompts the user for specific information about their landscape, including: plant type, irrigation system, and soil type. The information can be entered for each zone or area, tailoring the water needs for each portion of the landscape. The website includes drop down lists and help boxes to assist you in making the most correct choices for your situation.

- **Maximum Performance testing of toilet fixtures (MaP),**
<http://www.cuwcc.org/MaPTesting.aspx>
The Maximum Performance (MaP) testing project was undertaken in 2003 in order to identify how well popular toilet models perform using a realistic test media. A new testing protocol, cooperatively developed by water-efficiency and plumbing fixture specialists in the U.S. and Canada, incorporated the use of soybean paste as a test media, closely replicating the "real world demand" upon fixtures. Performance testing of 80 different toilet fixture models was completed and summarized in the Final Report (December 2003). Now in its FOURTEENTH EDITION, the current MaP testing report provides performance information on OVER 1,000 different toilet fixture models.