

2.3 Water Survey for Single-Family and Multi-Family Customers

Applicability

This BMP is intended for a Municipal Water User Group (“utility”) that has 20 percent of homes and apartments constructed before 1995 and/or more than 10 percent of landscapes with automatic irrigation systems. If the utility is unaware of the number or percentage of customers using automated irrigation systems, a drive-by survey can be conducted of a sample of customers to develop an estimate of how many have automatic systems. Once a utility decides to adopt this BMP, the utility should follow the BMP closely in order to achieve the maximum water efficiency benefit from this BMP.

Description

A Water Survey Program can be an effective method of reducing both indoor and outdoor water usage. Under this BMP, the utility conducts a survey of single-family and multi-family customers to provide information to them about methods to reduce indoor water use through replacement of inefficient showerheads, toilets, aerators, clothes washers, and dishwashers. If the customer has an automatic irrigation system, the survey includes an evaluation of the schedule currently used and recommends any equipment repairs or changes to increase the efficiency of the irrigation system.

Surveys should be offered based on water use starting with the highest single-family and multi-family accounts, respectively. Multi-family accounts should be analyzed based on gallons per unit, although almost all multi-family customers would benefit by this survey if they have not already retrofitted plumbing fixtures. The irrigation component of the single-family survey should target single-family customers using more than a certain amount of water per billing period that could be considered excessive for the particular geographic area and other characteristics of the service area. Typically, this is around 20,000 gallons per month in summer since that could represent an outdoor use of more than 12,000 gallons per month. Surveying outdoor water use in homes with water use below 20,000 gallons per month does not usually provide as significant an opportunity for water reductions. Customer water use records can give the utility a snapshot of which neighborhoods have higher than average water use. The drive by survey should note which lawns have monoculture of a turfgrass species and/or visible irrigation heads indicating an automated sprinkler system.

Once the scope of services is determined, there are three options for conducting the survey: train utility staff to conduct an onsite survey; hire an outside contractor to conduct the onsite surveys; or provide a printed or online survey for customers to complete on their own. When conducting an onsite survey for a customer with an automatic irrigation system that is managed by an irrigation or maintenance contractor, it is beneficial to have the contractor present for the irrigation system survey.

For the indoor water use survey, a form can be used to provide the information on water reductions that would be achieved with each type of equipment change and the length of the payback period, taking into account any utility incentives that may be available. If it is an onsite survey, showerhead and faucet aerators can be changed during the survey.

A leak check should be conducted to determine if there are any toilet leaks occurring and any dripping faucets. If 1.6 gallons per flush toilets have already been installed, the flush volume should be checked and, if needed, the water level in the tank should be adjusted to restore the flush volume to 1.6 gpf. If after the water level in the tank is adjusted, the flush volume is still well above 1.6 gpf, it is likely that the toilet originally had an early closure flapper. Using the model number on the inside of the tank and the Flapper Table (see References for Additional Information), the flapper required to restore the flush volume to 1.6 gpf can usually be determined. If the flapper is one of several early models of closure flappers, the flapper should be replaced during the survey and the information on the correct replacement flapper should be provided to the customer.

Information on water use habit changes such as shorter showers, for example, should also be provided at the time of the survey. The customer should be provided information on climate-appropriate landscaping and about any programs the utility has for incentives to replace inefficient landscaping.

The survey of automatic irrigation systems should include a check of the entire system for broken, misdirected or misting heads and pipe or valve leaks. The customer's service line and meter box should also be checked for leaks. The system should be run to determine precipitation rates for typical zones. Each zone should be checked to be sure that rotors and spray heads are not on the same zone since they have greatly different precipitation rates. Head spacing should be checked to determine if proper heads are installed. The schedule on the irrigation controller should be checked and the customer queried about how the schedule is adjusted during the year. A schedule should be provided based on evapotranspiration ("ET_o")-based water-use budgets equal to no more than 80 percent of reference ET_o per square foot of irrigated landscape. The statewide Texas Evapotranspiration Network (<http://texaset.tamu.edu/>) should be consulted for historical evapotranspiration data and methodology for calculating reference evapotranspiration and allowable stress. More aggressive landscape conservation programs can utilize stress coefficients lower than 80 percent (See website). For larger water users, a uniformity analysis can be conducted. The customer should be provided a written report on the system repairs and equipment changes needed and the appropriate efficient irrigation schedule by month. The controller should be reset with the efficient schedule. If the system does not have a rain sensor, it should be installed as part of the survey if feasible or provided to the customer to be installed by a contractor. Information should be provided on the installation of dedicated landscape meters for multi-family customers if offered by the utility.

Implementation

The utility should develop and implement a plan to market these surveys to both single-family and multi-family customers. Marketing should be done by ranking single-family customers according to water use on a monthly average and offer the program starting with those with the highest water use as a means of increasing cost effectiveness and water savings rapidly. Multi-family customers should be ranked by water use per unit. The survey can be offered by mail, telephone calls, email or through utility bill stuffers or other appropriate methods of communication. The Showerhead, Aerator, and Toilet Flapper Retrofit BMP outlines a method for determining the number of homes and apartments constructed before 1995.

The customer incentive to participate can be reduced utility costs and also recognition as a water efficient customer. If the utility has incentive programs for 1.6 gpf toilets, efficient clothes washers, irrigation systems upgrades, or water efficient landscape, the survey should include this information in the report to the customer.

Once a customer agrees to participate, the utility should collect the following information in the survey:

- 1) Calculation of the ratio of summer to winter use based on a review of the customer water bills;
- 2) Pressure on the customer's side of the meter;
- 3) Number and flush volume for each toilet;
- 4) If any 1.6 gpf toilets are flushing at greater than 1.6 gpf due to replacement of early closure flapper with standard flapper;
- 5) If any toilets are leaking around the flapper or over the overflow tube;
- 6) Showerhead and aerator flow rates in gallons per minute ("gpm") when valve is fully open;
- 7) Estimated capacity of current clothes washer. If it is a top loading inefficient model, use 41 gallons per load as an estimate;
- 8) If customer has a swimming pool, the frequency and duration of backflow. Check fill valve and float to determine if working properly. Turn fill valve off at the start of survey to see if any drop in water level is noticed. Ask customer if they have noticed any leakage from pool;
- 9) Irrigation schedule as indicated on the controller. Ask customer who is responsible for changing the schedule and how often that occurs, if the system is turned off in winter months and if turfgrass areas are over seeded in winter.

The changes that can be made immediately at the time of the survey include:

- 1) If needed, installation of showerheads using 2.0 gpm or less; kitchen faucet aerators using 2.2 gpm or less and bathroom faucet aerators using 1.5 gpm or less;

- 2) Resetting the toilet tank water levels to the correct level. Replacement of leaking flappers or flappers that cause the toilet to flush above the design flush volume.
- 3) Determination of irrigation system precipitation rate for representative zones or all zones if needed;
- 4) Resetting controller with efficient schedule based on ET and measured precipitation rates;
- 5) Providing the customer a copy of the twelve months irrigation schedule and attach a copy near the controller;
- 6) Showing the customer how to use the controller so they can adjust controller throughout the year;
- 7) Installing a rain sensor on the irrigation system if needed and feasible;
- 8) Explaining to customer any incentives that the utility offers and how to take advantage of these incentives; and
- 9) Providing customers a brief report on estimated savings for each item listed in the report and the estimated payback for each item.

The changes that may need to be done after the survey by either a contractor for the utility or by the customer include:

- 1) Replacing inefficient toilets with 1.6 gpf models;
- 2) Restoring correct flush volume of existing 1.6 gpf toilets by installation of early closure flapper correctly matched to the model of toilet;
- 3) Fixing faucet leaks;
- 4) Replacing the inefficient clothes washer with a new efficient model;
- 5) If needed, repairing the fill valve on the swimming pool;
- 6) Replacing damaged portions of the irrigation system;
- 7) Installing a new controller if warranted such as an ET based irrigation controller;
- 8) Installing a rain sensor; and
- 9) Installing a pressure reduction valve if needed.

To assure that the water savings measures recommended during and after the survey are achieved, the utility should follow up with the customer to determine which were actually implemented. The utility should begin a notification program to remind customers of the need for maintenance and adjustments in irrigation schedules as the seasons change and to check toilets and faucets for leaks.

Schedule

- 1) The scope of this BMP should be realized within five years of the date implementation commences.
- 2) Develop and implement a plan to target and market water-use surveys to all residential customers using more than 20,000 gallons per month in summer

months and all multi-family customers in the six months of the first year after implementing this BMP.

- 3) Repeat marketing efforts until the goals are reached.

Scope

To accomplish this BMP, the utility should:

- 1) In the first year, implement the program and complete a survey of at least 1 percent of eligible single-family customers and 1 percent of multi-family customers;
- 2) In years two through five, complete a survey of at least 5 percent of eligible single-family customers and at least 5 percent of multi-family customers;
- 3) Within 5 years, complete water-use surveys for at least 25 percent of eligible single-family customers and 25 percent of multi-family customers; and
- 4) Follow up on each survey completed within three months of completion and then annually thereafter to encourage implementation of survey recommendations.

Documentation

To track this BMP, the utility should gather the following documentation:

- 1) Number of residential customers,
- 2) Number of single family customers using more than 20,000 gallons per month in summer months;
- 3) Number of multi-family customers;
- 4) Number of surveys offered and number of surveys completed by customer type; and
- 5) Measures installed during the customer surveys or completed after the survey and verified through a follow-up phone call.

Determination of Water Savings

Saving should be based on measures implemented by each customer. Savings are calculated by multiplying the number of each type of measure implemented by the savings for that measure as listed below.

- 1) Single-Family Home
 - Irrigation Audit: Actual utility survey results or 26 gallons per day (“gpd”)¹ per house.
 - Showerhead and aerator replacements: 5.5 gpd per person
- 2) Multi-Family Community

- Irrigation Audit: Actual utility survey results or 15 percent² of outdoor water use or 208 gpd¹
- Showerhead and aerators: 5.5 gpd per person

Savings for resetting toilet tank levels, toilet leak repair, flapper replacement and installation of rain shut-offs should be estimated during the water survey. The rain shut-off savings depend both on the ET of the customer as well as the setting on the rain shut-off switch which can be set to shut off after rainfall of ¼ to 1 inch. If the survey results in toilet and clothes washer replacements, these savings can be included in either this BMP or the Toilet Retrofit or Efficient Clothes Washer BMP if the utility has adopted those BMPs.

Cost-Effectiveness Considerations

Surveys can be performed by utility staff or by contractors. The labor costs range from \$50 to \$150 for a SF survey and start at \$100 for a MF survey and go up from there depending on the efficiency in scheduling and the scope of the survey.

If water efficient plumbing fixtures are distributed during the survey, the costs of that equipment should be considered. High quality showerheads purchased in bulk are available starting at less than \$2 each with aerators costing less than \$1 each. Flappers range in cost from \$3 to \$10.

There may be other one-time costs such as purchase of leak detection equipment and meters. Marketing and outreach costs range from \$5 to \$15 per survey. Administrative and overhead costs range from 10 to 20 percent of labor costs.

References for Additional Information

- 1) *Project Review of the Irvine ET Controller Residential Reduction Study*, Irvine Ranch Water District, November 2003.
<http://www.irwd.com/Conservation/R3ProjectReview.pdf>
- 2) *CUWCC BMP No. 5: Large Landscape Program and Incentives*.
http://www.cuwcc.org/m_bmp5.lasso
- 3) *WaterWise Council of Texas*. <http://www.waterwisetexas.org/>
- 4) *Austin Green Gardening Program*. <http://www.ci.austin.tx.us/greengarden/>
- 5) *Texas Cooperative Extension for El Paso County*.
<http://elpasotaex.tamu.edu/horticulture/xeriscape.html>
- 6) *San Antonio Water System Conservation Program*.
<http://www.saws.org/conservation/>
- 7) *City of Corpus Christi Xeriscape Landscaping*.
<http://www.cctexas.com/?fuseaction=main.view&page=1047>
- 8) *EWEB Home Water Survey Database: PowerPoint Presentation*, Jill Hoyenga, Eugene Water and Electric Board, Water Sources Conference Proceeding, 2004.

- 9) *CUWCC Cost Effectiveness Models, BMP 1 Water Surveys.*
http://www.cuwcc.org/ce_spreadsheets.lasso
- 10) *Toilet Flappers: A Weak Link in Conservation in Water Conservation*, John Koeller,
http://www.cuwcc.org/Uploads/product/Flappers_Weak_Link.pdf
- 11) *Tampa Bay Water List of Toilets and Replacement Flappers*, Dave Bracciano,
Tampa Bay Water, Tampa, Florida
- 12) *CUWCC BMP No. 5: Large Landscape Program and Incentives.*
http://www.cuwcc.org/m_bmp5.lasso
- 13) *Turf and Landscape Irrigation Best Management Practices*, Water Management
Committee of the Irrigation Association, February 2004.
http://www.irrigation.org/gov/pdf/IA_BMP_FEB_2004.pdf
- 14) *Waste Not, Want Not: The Potential for Urban Water Conservation in California*,
Pacific Institute, November 2003.
http://www.pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf