Tackling WaterSense®

Sanitary Fixtures and Equipment

Andrea Schnitzer
ENERGY STAR®

Tara O'Hare
WaterSense

Amber Hicks
Nor'Wood Development Group

Frank Kinder
Colorado Springs Utilities

January 28, 2016

Tackling WaterSense

- WaterSense and ENERGY STAR are hosting a joint webinar series throughout 2016 to help you tackle your facility's water use
- It's easy to include water in your existing energy management efforts to achieve great returns

Tackling WaterSense – Outdoor Water Use	**March 30th**
Tackling WaterSense – Mechanical Systems	**May 10th**
Let's Go on an Energy and Water Treasure Hunt	**July 12th**
Tacking WaterSense – Commercial Kitchens	**September 20th**

Agenda

- Introduction to WaterSense
- Restroom water use and savings opportunities
- Laundry equipment and water-efficient practices
- Case study
- WaterSense resources

Introduction to WaterSense

- WaterSense is a voluntary program launched by EPA in 2006 that provides a simple way to identify water-efficient:
  - Products
  - Homes
  - Programs
  - Practices
- All products are independently certified to meet water efficiency **and** performance standards

WaterSense Labeled Products

Flushing Urinals

Lavatory Faucets

Irrigation Controllers

More than 16,000 product models have earned the WaterSense label

Tank-Type Toilets

Showerheads

Pre-Rinse Spray Valves

New! Flushometer-Valve Toilets

EPA

Just add water!

- Include water in existing energy management efforts
- Track water usage in Portfolio Manager
- Measure water use with properly installed meters and sub-meters
- Conduct a facility water audit and include leak detection in regular assessments

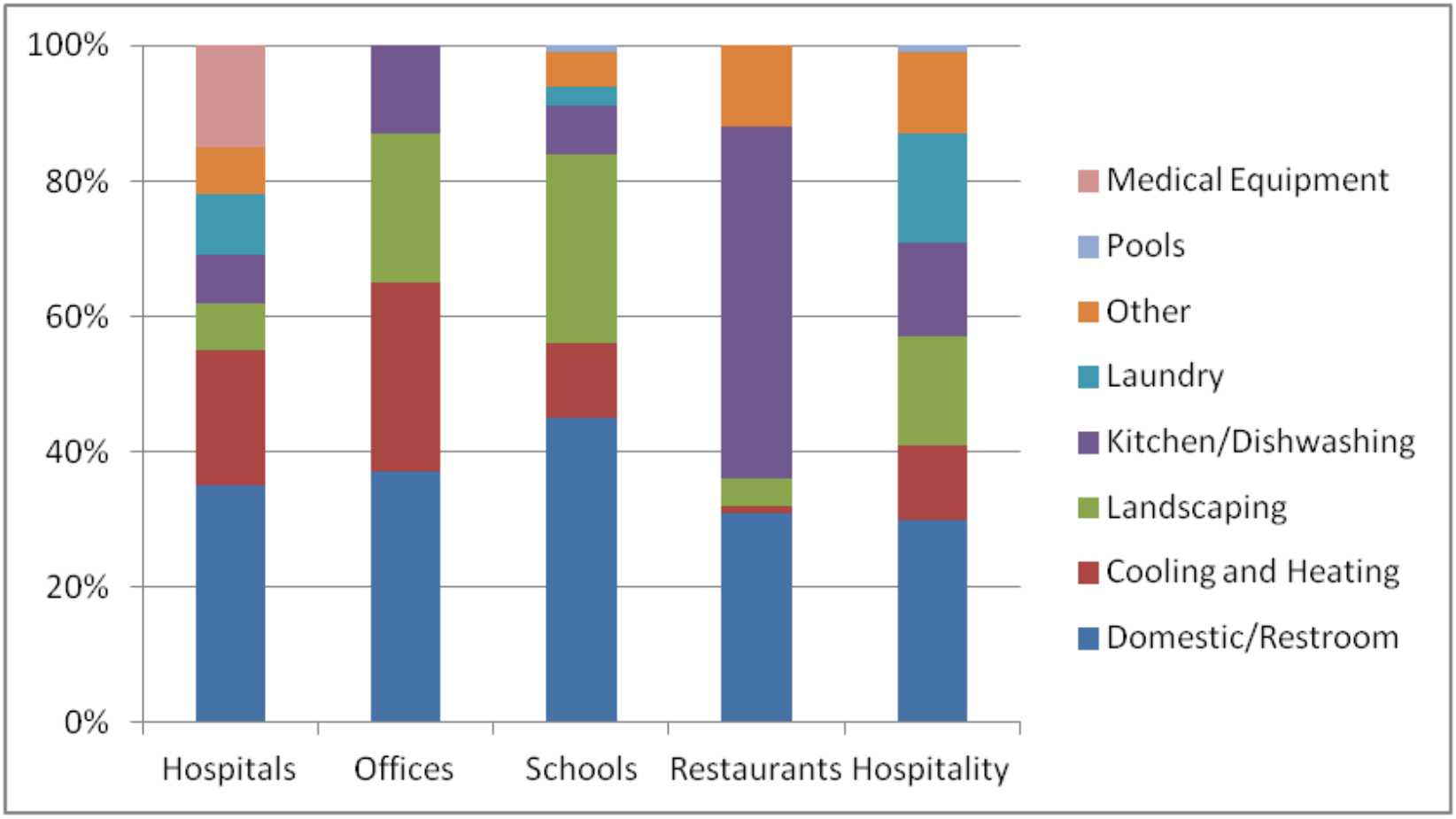
Saving Water Saves Energy

- Evaluating water and energy efficiency together provides the greatest resource and cost savings for any project
- Eight percent of the energy used in commercial buildings is used to heat water so significant savings can be found wherever hot water is used
- Incorporate water efficiency into Standard Operating Procedures, procurement language, and policies just like ENERGY STAR
- Many water and energy utilities also provide rebates to reduce the cost of water-efficient fixture replacements and other efficient projects

Agenda

- Introduction to WaterSense
- Restroom water use and savings opportunities
- Laundry equipment and water-efficient practices
- Case study
- WaterSense resources

Water Use Profiles of Commercial Facilities



Created by analyzing data from: New Mexico Office of the State Engineer, American Water Works Association (AWWA), AWWA Research Foundation, and East Bay Municipal Utility District

Water Savings in Restrooms

- Restrooms can account for up to 40% of water use
- Older fixtures installed before 1994 use 3-5 times more water than newer efficient models
- Water savings depend on user behavior just like energy
- Educate users on proper use to achieve greatest savings
  - Signage at point-of-use can prompt correct use
  - Newer technology like dual-flush fixtures should be installed with signs with simple instructions
  - Add maintenance contact information for users to report problems and leaks

EPA

Water Use in Commercial Building Restrooms

- Public and employee restrooms
  - Toilets (flushometer-valve or tank-type)
  - Urinals
  - Faucets
  - Showerheads
- Private and guestroom bathrooms
  - Likely tank-type toilets
  - Showerheads
  - Faucets

Toilet Efficiencies

3.5 to 7.0 gallons per flush (gpf)
Models installed before 1994

1.6 gpf
EPAct 1992 requirement

≤ 1.28 gpf
WaterSense labeled models

WaterSense labeled models
- Flush at 1.28 gpf or less
- Meet waste removal/flush performance requirements

Tank-Type Toilets: Retrofits and Replacements

- Periodically check tank-type toilet fill valves and tank water levels
- Use dye tablets to test toilet flappers for leaks
- Avoid using retrofit devices on existing tank-type toilets:
  - Could negatively affect performance
- Replace 1.6-gpf-or-higher tank-type toilets with WaterSense labeled models

Flushometer-Valve Toilets

- Contain two main components: toilet bowl and flushometer-valve
- Often use automatic- or sensor-flushing devices that require regular calibration to work properly
- Replace inefficient toilets with WaterSense labeled models which flush between 1.28 gpf and 1.0 gpf
- Dual-flush retrofit kits can be used to reduce water in-lieu-of replacements
- Prioritize retrofits and replacements in women's restrooms for greatest savings

Post instructions for proper dual-flush usage

Urinal Efficiencies

- Calibrate sensors regularly to prevent phantom or double flushes
- If replacing flush valves confirm that flush valve inserts are compatible with the fixture
- Replace older, inefficient urinals with WaterSense labeled models:
  - Flush at 0.5 gpf or less
  - Meet waste removal/flush performance requirements

1.5 to 3.0 gpf
Models installed before 1994

1.0 gpf
EPAct 1992 requirement

≤ 0.5 gpf
WaterSense labeled models

Private-Use Faucets

2.5+ gpm
Models installed before 1994

2.2 gpm
Current National Standard

≤ 1.5 gpm
WaterSense labeled models

- Retrofit with WaterSense labeled aerators or
- Replace with WaterSense labeled faucets:
  - Max. of 1.5 gpm at 60 psi
  - Min. of 0.8 gpm at 20 psi to ensure performance

Public-Use Faucets

- Most common in commercial facilities
- Primarily used for hand-washing so have lower maximum flow rate
- Often use automatic sensors

2.5+ gpm
Models installed before 1994

2.2 gpm
Current National Standard

0.5 gpm
ASME/CSA standard, IPC, and UPC

Public-Use Faucets: Retrofits and Replacements

- Retrofit with faucet aerators or laminar flow devices flowing at 0.5 gpm or less
- Replace with:
  - Faucets flowing at 0.5 gpm or less
  - Metered faucets delivering no more than 0.25 gallons per cycle (gpc)
- Periodically check and adjust automatic sensors

Showerheads

Showers are found in some commercial facilities:

- dormitories
- locker rooms
- fitness centers

3.5 to 5.0 gallons per minute (gpm)
Models installed before 1994

2.5 gpm
EPAct 1992 requirement

≤ 2.0 gpm
WaterSense labeled models

Showerhead Efficiencies

- Replacing a showerhead is more economical and practical than retrofitting
- Replace 2.5-gpm-or-higher with WaterSense labeled models:
  - Flow at 2.0 gpm or less
  - Meets spray coverage and spray force requirements
- Inspect showerheads often and remove any scale build-up from hard water

Water-Efficient Sanitary Fixtures

	Private Restrooms or Guest Rooms	Public Restrooms
Toilets	Tank-type ≤ 1.28 gpf	Flushometer-valve or Tank-type ≤ 1.28 gpf
Urinals		Flushing urinals ≤ 0.5 gpf
Faucets	≤ 1.5 gpm	0.5-gpm Aerators; 0.25-gpc Metered faucets
Showerheads	≤ 2.0 gpm	

Restroom Maintenance

- Implementing water-efficient O&M practices can save water with little capital cost required
- Test the water pressure serving each floor to achieve expected fixture performance – optimal pressure is between 20 and 80 psi
- Ensure proper toilet, faucet, and urinal operation
  - Annually inspect valves and replace worn parts
  - Adjust automatic sensors on fixtures to avoid double or phantom flushes and faucets running longer than necessary
- Regularly inspect for and remove scale build-up on all fixtures especially faucets and showerheads

Fix Leaks!

- Leaks can be the greatest source of water waste within a facility – especially in restrooms
- Leaking or continuously running water provides no added value
  - Facilities pay for water twice - water supplied and water discharged to the sewer
  - Unlike energy products, plumbing products leak when they fail
- A dripping faucet (one drip per second) can waste nearly 3,200 gallons of water per year

EPA

Fix Leaks!

- Train cleaning and maintenance staff to identify and report leaky or continuously flushing fixtures
- Respond quickly to all reports of leaky or continuously flushing fixtures
- Place signage in restrooms with instructions for reporting leaks so employees, visitors, and guests can help

Savings Considerations

- Occupancy data is vital to accurate savings calculations because water consumption for restrooms is based on usage, not the number of fixtures
- The male-female ratio is key when calculating toilet savings
  - Women's restrooms have a high potential for water savings when replacing flushometer-valve toilets so they could be prioritized in phased projects
  - A combination of toilet and urinal replacement may yield greater savings in male restrooms

Savings Add Up

- By replacing old, inefficient flushometer-valve toilets with WaterSense labeled models, a 10-story office building with 1,000 occupants could save nearly 1.2 million gallons of water and nearly $10,000 per year

- Each of these toilets that is replaced with a WaterSense-labeled model could save a business nearly 5,500 gallons of water per year and nearly $1,000 over the lifetime of the toilet

Agenda

- Introduction to WaterSense
- Restroom water use and savings opportunities
- Laundry equipment and water-efficient practices
- Case study
- WaterSense resources

Water Use in Laundries Within Commercial Facilities

Multi-family buildings and dormitories laundries use:

- Commercial coin- or card-operated washers
- No-pay commercial washers

Professional laundries, hospitals and hotels use larger equipment:

- Multi-load washers
- Washer extractors
- Tunnel washers

Coin- or Card-Operated & No-Pay Commercial Washers

Top-Loading Washers

8.5 gallons/ft^3

EPAct 1992 requirement

4.5 gallons/ft^3

ENERGY STAR certified

- Replace with ENERGY STAR certified commercial washers
  - 37 percent more efficient than standard models
  - Save water, energy and detergent

Front-Loading Washers

5.5 gallons/ft^3

EPAct 1992 requirement

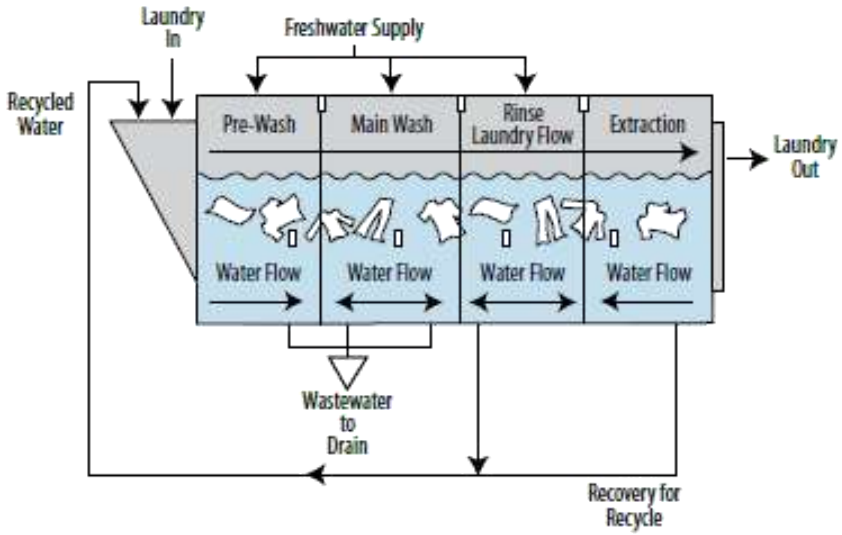
4.5 gallons/ft^3

ENERGY STAR certified

Linen Laundry

Multi-Load Washers
~80+ lbs/load
≤ 8 gallons/cycle/ft^3

Washer Extractors
30 to 800 lbs/load
2-4 gallons of water/lb fabric



Tunnel Washers
2,000 lbs/hour
≤2 gallons of water/lb fabric

Laundry Efficiencies

- Program washers to use least wash and rinse cycles for each load
  - Multi-load washers should use 8.0 gallons/cycle/ft^3 or less
- Water reuse/recycling systems:
  - Simple systems reuse water from final rinse for first wash can save 10 to 35 percent of water
  - Complex systems treat reclaimed water from wash and rinse cycles:
    - Can be used in all cycles of the next load
    - Can save up to 85 percent of water
- Ozone injection systems:
  - Allow machines to run at reduced temperatures, which saves energy
  - Wash cycles require less detergent and chemicals, so less rinsing water is required
  - Can save 10 to 25 percent of water

Agenda

- Introduction to WaterSense
- Restroom water use and savings opportunities
- Laundry equipment and water-efficient practices
- Case study
- WaterSense Resources

Nor'wood Development & Colorado Springs Utilities

- Colorado Springs, CO
- Large locally owned developer
- 1.8M sqft retail, office, commercial
- Master planned communities
- Art, Land, Community, Innovation

- Municipally owned 4 service utility
- Serves ~500,000 customers
- WaterSense & ENERGY STAR Partner
- Collaboration, Innovation, Trust
- Water Efficiency Plan → Conservation
- Incentives for WaterSense plumbing fixture upgrades

NOR'WOOD

Colorado Springs Utilities

It's how we're all connected

Nor'wood Development Plaza of the Rockies

- Amber Hicks, Senior Building Engr.
- Class A Office Building, built 1983
- Showcase property, downtown
- Important tenants; federal, etc.
- Renovations for Green Leases
- Undertaking LEED EB: O&M
- Utilizing ENERGY STAR Portfolio Manager
- Water Efficiency Economic Assessment Policy – evaluate performance and savings
- 516 FTE, 50/50 Female/Male
- 50% reduction target with O&M

NOR'WOOD

Colorado Springs Utilities
It's how we're all connected

Nor'wood Development
Plaza of the Rockies

- North Tower assessment/replacement
- LEED 2009 WE Prerequisite 1.1
  - 20% minimum baseline reduction
- 39 water closets: 3.5 →1.28 gpf
- 17 urinals 1.0→ 0.125 gpf
- Installed 0.5 gpm faucet aerators
- Installed 1.5 gpm showerheads
- Corporate social responsibility via resource stewardship
- CSU Business rebate of $125/fixture
- WaterSense or HET/HEU required
- Water efficiency → WaterSense
- Water management → Partnerships
- Systemic water savings for all parties

NOR'WOOD

Colorado Springs Utilities
It's how we're all connected

Nor'wood Development
Plaza of the Rockies

- North Tower fixtures replaced 2014
- Kohler flushometer-valve toilets & urinals
- MaP-Testing.com used for performance and qualifications
- CSU rebate of $7,000 (56 @ $125)
- LEED Water Reduction from 1,295 to 763 Kgal/year → 41.1% savings
- CSU recycles all porcelain into road base aggregate → zero waste project
- Green Leases satisfied through LEED
- Tenant retention, improved facility
- CSU gains important customer participation
- Durable water savings

NOR'WOOD

Colorado Springs Utilities
It's how we're all connected

EPA

Nor'wood Development Plaza of the Rockies

- Lessons Learned
  - Inform customers of changes
  - Learning curve for new products
  - Maintenance is important
  - Educate tenants to participate in water savings; use, leaks, etc.
  - Work with utility for best results
  - Utilities often have incentives
- Ongoing efforts
  - Tracking water usage with ENERGY STAR Portfolio Manager
  - Isolating water savings is hard
  - Implemented same upgrades in other properties, recreate success

NOR'WOOD

Colorado Springs Utilities
It's how we're all connected

Agenda

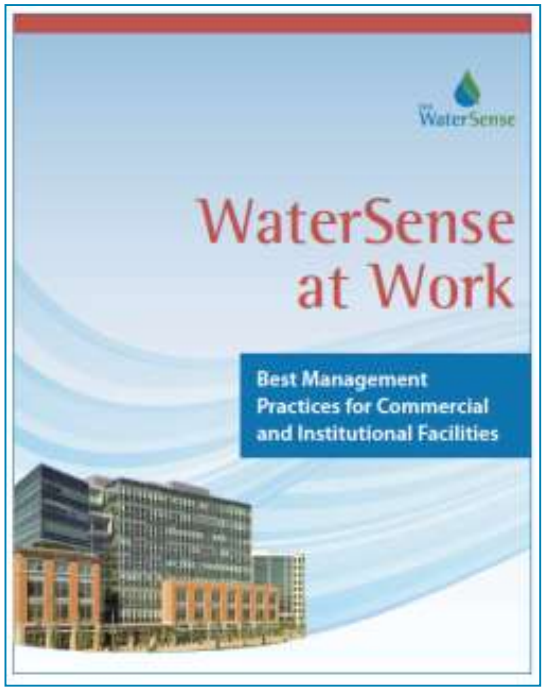
- Introduction to WaterSense
- Restroom water use and savings opportunities
- Laundry equipment and water-efficient practices
- Case study
- WaterSense Resources

WaterSense Resources

- Water use information by facility type
- Water-saving tips
- Best Management Practices
- Assessment tools
- Worksheets and checklists
- Live and recorded training webinars
- Case studies and more!

Water Efficiency Best Management Practices

- *WaterSense at Work* is an online guide facilities can use to manage water use:
  - Water management planning
  - Water use monitoring and education
  - Sanitary fixtures and equipment
  - Commercial kitchen equipment
  - Outdoor water use
  - Mechanical systems
  - Laboratory and medical equipment
  - Onsite alternative sources of water



www.epa.gov/watersense/commercial

WaterSense at Work

36 best management practices

- Overview of technology
- O&M and user education tips
- Retrofit and replacement options
- Calculations for potential water energy and dollar savings and payback

- 15+ case studies from all types of facilities using BMPs

6.3 Cooling Towers

EPA WaterSense

Overview

Cooling towers are used in a variety of commercial and institutional applications to remove excess heat. They serve facilities of all sizes, such as office buildings, schools, supermarkets, and large facilities, such as hospitals, office complexes, and university campuses. Cooling towers dissipate heat from recirculating water that is used to cool chillers, air conditioning equipment, or other process equipment. By design, they use significant amounts of water.

Cooling towers often represent the largest use of water in industrial and commercial applications, comprising 20 to 50 percent or more of a facility's total water use. However, facilities can save significant amounts of water by optimizing the operation and maintenance of cooling tower systems.[4]

Cooling towers

Cooling towers work by circulating a stream of water through systems that generate heat as they function. To cool the system, heat is transferred from the system to the water stream. This warm water is then pumped to the top of the cooling tower, where it is sprayed or dripped through internal fill (i.e., a labyrinth-like packing with a large surface area). Fans pull or push air through the tower in a counterflow, crossflow, or parallel flow to the falling water. As some of the water is evaporated, the heat is removed.[5] The remaining cooled water is recirculated back through the systems to repeat the process.

The thermal efficiency and longevity of the cooling tower and its associated water loops depend upon the proper management of water recirculated through the tower. Water leaves a cooling tower system in four ways: evaporation, blowdown or bleed-off, drift, and leaks or overflows.

Evaporation

Evaporation is the primary function of the tower and is the method that transfers heat from the cooling tower system to the environment. The quantity of evaporation is not typically targeted for water-efficiency efforts, because it controls the cooling process (although improving the energy efficiency of the systems that use the cooling water will reduce the evaporative load on the tower). The rate of evaporation from a cooling tower is typically equal to approximately 1 percent of the rate of

[4] North Carolina Department of Environment and Natural Resources, et al. May 2003. *Water Efficiency Manual for Commercial, Industrial and Institutional Facilities*. Page 39. www.wellmrc.org/bushome.php.
[5] Ibid.

6-8 *WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities*

EPA

What You Can Do Right Now

- Start tracking water use in Portfolio Manager
- Incorporate restrooms into facility walk-throughs to check plumbing fixtures for leaks
- Post signage in restrooms and laundry rooms to tell users how to save water and report leaks
- Install 0.5-gpm faucet aerators in public restrooms and WaterSense labeled faucet aerators in private-use bathrooms
- Check and adjust automatic sensors on all toilets and faucets regularly
- Encourage laundry staff to weigh laundry so that washers are filled to capacity

Upcoming Webinars

- WaterSense and ENERGY STAR are hosting a joint Tackling WaterSense webinar series throughout 2016

Tackling WaterSense – Outdoor Water Use	**March 30th**
Tackling WaterSense – Mechanical Systems	**May 10th**
Let's Go on an Energy and Water Treasure Hunt	**July 12th**
Tacking WaterSense – Commercial Kitchens	**September 20th**

www.epa.gov/watersense/commercial/webinars.html

Questions?

ENERGY STAR

For technical questions related to Portfolio Manager® or the ENERGY STAR program, please visit:

www.energystar.gov/buildingshelp

WaterSense

www.epa.gov/watersense

www.facebook.com/epawatersense

www.twitter.com/epawatersense

Email: watersense@epa.gov

Helpline: (866) WTR-SENS (987-7367)