School Water Efficiency Assessment Exercise

Equipment Needed: Recycled half-gallon and gallon-sized transparent plastic bottles, calibrated in ounces, with tops cut off; stopwatch.

Benefits of Water Efficiency Program

- Reduced water demand
- Water and wastewater treatment saving
- Less environmental impact
- Sustained water quality

Data Sheet for Inventory

Building Fixtures to be Measured		
	Number	Flow Rate (gpm/f)
Sinks		
Lavatories		
Showers		
Urinals		
Toilets		

(gpm/f = gallons per minute/or per flush)

Meeting with Students

- Review data sheets.
- Assign groups to conduct survey.
- Review calculation sheets.
- Perform the assessment.
    - Each group will take a physical count of the number of fixtures (toilets, lavatories, etc.) in the rest room under consideration and enter the numbers in the data sheet.
    - Identify the type of flow control on the fixture:
        - Toilets – Sloan type valve or tank type toilet? Other?
        - Lavatories – Aerator present? Physically measure the water flow using an appropriate container and watch.
        - Shower – Physically measure the water flow, using a one-gallon calibrated container and watch.
        - Urinals – Sloan type valve or other?
        - Record all pertinent data on the data sheet.
- Using the Standards and Calculations Form, perform the calculations to determine flow rate for each fixture.
- Analyze the data and develop recommendations for reducing consumption of water.
- Calculate the savings that can be achieved by implementing the recommendations.

Standards and Calculations for School Water Efficiency Assessment

Fill in the following: Number of students per year___; Number pf days per school year 180 (generally); Number of faculty and staff___

Typical Standards for Water-Using Fixtures

• Length of shower	10 minutes
• Shower flow rate, current	as measured
• Shower flow rate with low-flow head	2.4 gpm
• Shower usage – number of showers/person/day	estimation
• Toilets – flushes/person/day	3
• Toilets – flow rate, current	consult chart
• Toilets – flow rate, retrofitted w/low-flow units	1.6 gpf
• Lavatories – number of hand washes/person/day	4
• Lavatories – length of hand wash	15 seconds each
• Lavatories – flow rate, current	as measured
• Lavatories – flow rate, retrofitted w/aerators	2.0 gpm

Calculations for hot water energy savings based on natural gas water heaters

First, obtain the number of gallons of water that can be saved by converting to low-flow showerheads, using the above assumptions. Then, proceed through the following steps (ccf = hundred cubic feet):

1. Convert the total gallons saved to total ccf -
   Gal saved/748 = total ccf saved
2. Convert ccf to lb of water - 748gal/ccf x 8.34 lb/gal = lb/ccf (a constant)
3. Convert total ccf to total lb of water –
   Total ccf saved x lb/ccf = lb of water saved
4. Calculate Btu required to heat the amount of water saved –
   Total lb water saved x 70 deg F temperature rise = Total Btu
5. Convert the total Btu to gas therms – Total Btu/100,000 = therms saved
6. Calculate the $ savings – Total # of therms x rate/therm = dollar savings

Typical Water Savings Calculations for Toilets (3.5 gpf before 1992)

	# Units	Days/yr	Flushes/day/person	Persons	gpf	Yearly volume
Existing	1	180	3	1	3.5	1,890
Retrofit (1.6 gal)	1	180	3	1	1.6	864 gal

Annual water savings/person: 1,890 – 864 = 1,026 gal/year savings
1,026/748 = 1.3717 ccf saving/year
1.3717 ccf x cost/ccf (say $4.10/ccf, typical) = $ 5.62/person/year savings