The State of New Hampshire
**DEPARTMENT OF ENVIRONMENTAL SERVICES**

**Clark B. Freise, Assistant Commissioner**

**WATER CONSERVATION PLAN APPROVAL**

January 31, 2017

Michael Terrian
Crotched Mountain Rehabilitation Center
1 Verney Drive
Greenfield, NH 03047

**Subject:** **Greenfield – Crotched Mountain Rehabilitation Center (PWS ID #: 0972010)**
**Water Conservation Plan, NHDES # 160060**

Dear Mr. Terrian:

On January 20, 2017, the New Hampshire Department of Environmental Services ("DES") Drinking Water and Groundwater Bureau received a Water Conservation Plan (the "WCP"), signed on January 9, 2017, for Crotched Mountain Rehabilitation Center located in Greenfield, New Hampshire. Pursuant to RSA 485:61 and Env-Wq 2101, community water systems seeking permits from DES for new sources of groundwater shall submit a water conservation plan to DES. Based on review of the WCP, DES has determined the WCP complies with Env-Wq 2101, *Water Conservation* rules.

Pursuant to Env-Wq 2101, the Town of Greenfield and the Southwest Region Planning Commission were provided a copy of the WCP, along with other required materials.

DES approves the WCP based on the following conditions:

1. No later than source activation, all source meters, distribution meters, meters measuring water consuming processes, and any transfer meters and data loggers shall be installed.

2. No later than source activation, source meters, distribution meters, and any other meters measuring water consuming processes prior to distribution shall be read on a monthly basis—no sooner than 27 days and no later than 33 days from the last meter reading.

3. The system shall continue reporting monthly source production volumes to the DES Water Use Registration and Reporting program on a quarterly basis.

4. All meters shall be installed per the manufacturer's instructions or American Water Works Association standards.

5. Upon source activation, all meters shall be tested and maintained based on the schedule proposed in the WCP.

6. Upon final source approval, a comprehensive leak detection survey shall be completed every two years in accordance with the "Manual of Water Supply Practices, Water Audits and Loss Control Programs", document identification number AWWA M36, American Water Works Association, 2016.

7. Leaks shall be repaired within 60 days of discovery.

8. From the date of this WCP Approval, all new non-metallic pipes installed in the system shall be outfitted with detectable tracer tape or detectable tracer wire, or be GPS located and maintained in a GIS system.

9. Upon source activation, a water conservation outreach and education program shall be implemented in accordance with the WCP.

10. Within five years of source activation, all buildings with fixtures of unknown age shall be investigated to determine if water use meets current plumbing and efficiency standards.

11. Within five years of source activation, water fixtures older than 1994 and no longer meeting current plumbing and efficiency standards shall be replaced with WaterSense certified fixtures.

12. Within five years of source activation, all commercial kitchen pre-rinse spray valves using greater than 1.6 gallons per minute (gpm) shall be replaced with pre-rinse spray valves that use at most 1.6 gpm.

13. Within five years of source activation, all commercial kitchen appliances that do not meet current efficiency or ENERGY STAR standards shall be replaced with models meeting current efficiency or ENERGY STAR standards.

14. In accordance with the WCP, as buildings are renovated and fixtures or appliances are replaced, ENERGY STAR and WaterSense certified models shall be installed.

15. In accordance with Env-Wq 2101.21, if the system wishes to obtain a waiver from replacing water fixtures or commercial kitchen appliances, a waiver request shall be submitted to DES containing an economic analysis which shows the payback period for the measure is greater than four years.

16. Every three years from the date of this approval, a *Water Conservation Plan Ongoing Compliance Reporting Form* shall be submitted to DES documenting how the system has maintained compliance with the WCP. The following records shall be maintained by the water system to include with the report:

    a. A leak log including the date a leak was discovered, the date a leak was repaired, the type of leak (ex. water main, service line, hydrant, valve), the approximate size of the leak (gpm), and the nearest address to the leak.

    b. The title of water efficiency materials distributed and the date of distribution.

    c. Date of installation and replacement of all meters, as well as testing and calibration records.

    d. Leak detection survey reports.

    e. Number/Inventory of fixtures replaced during the reporting period.

17. Revisions to the WCP shall not be implemented without further approval from DES.

The *Water Conservation Plan Ongoing Compliance Reporting Form* may be located by going to the DES website (www.des.nh.gov), clicking on the "A-Z List" in the top right corner of the page, clicking "Water Conservation," and scrolling down to "Forms/Applications."

Please feel free to contact me with any questions at (603) 271-0659 or via e-mail at kelsey.vaughn@des.nh.gov.

Sincerely,

Kelsey Vaughn

Kelsey Vaughn
Water Conservation Program
Drinking Water and Groundwater Bureau

ec: Lynnette Carney, Underwood Engineers, Inc.
Thomas Page, Underwood Engineers, Inc.
Joseph Damour, WSO Plus Inc.
John Parisi, Crotched Mountain Rehabilitation Center
Town of Greenfield
Southwest Region Planning Commission
Christine Bowman, DES
Steve Roy, DES
Cindy Klevens, DES
Stacey Herbold, DES

# Water Conservation Plan

## For

## Crotched Mountain Rehabilitation Center

## Greenfield, New Hampshire

**FINAL**
**December 30, 2016**

Prepared by:
Underwood Engineers, Inc.
25 Vaughan Mall
Portsmouth, NH 03801

I certify that I have read this Water Conservation Plan, understand the responsibilities of the water system as referenced in the Plan, and that all information provided is complete, accurate, and not misleading.

Owner Name: Crotched Mountain Rehabilitation Center

Owner Signature: Michael A Terrian Date: 1-09-2017

Michael Terrian, Vice President

**WATER CONSERVATION PLAN:**
**Crotched Mountain Rehabilitation Center**

A community water system seeking authorization for a new source of water must submit a water conservation plan to the New Hampshire Department of Environmental Services (NHDES) for approval demonstrating how the water system proposes to comply with water conservation standards pursuant to Env-Wq 2101, *Water Conservation* rules. **Crotched Mountain Rehabilitation Center** is an existing large community water system.

Activities outlined in the water conservation plan will be completed by water system personnel under the supervision of a certified water system operator. This report will be submitted to (***Appendix B***):

- NHDES
- Town of Greenfield, via certified mail within 10 days w/ Water Conservation Rules Summary (Env-Wq 2101)
- Southwest Region Planning Commission (SWRPC), via certified mail within 10 days w/ Water Conservation Rules Summary (Env-Wq 2101)

# I. Introduction

A. Contact Information

1. Name and location of system:

   **Crotched Mountain Rehabilitation Center (CMRC)**
   **1 Verney Drive**
   **Greenfield, NH**
   **Public Water Supply # 0972010**

2. Current owner of system and mailing address:

   **Crotched Mountain Rehabilitation Center**
   **Attn: Michael Terrian, Vice President**
   **1 Verney Drive**
   **Greenfield, NH 03047**

3. Name and mailing address of designer of water conservation plan:

   **Thomas G. Page, P.E.**
   **Underwood Engineers, Inc.**
   **25 Vaughan Mall**
   **Portsmouth, NH 03801**

B. System Overview

1. **Brief description of the community being served (ex. number of units, apartments, partially attached condos, individual homes, shared common**

**facilities, population, etc.):** CMRC is a private non-profit organization that serves children and adults with severe injuries. CMRC operates its own water system and serves less than 740 people total (transients and full time). Facilities include the specialty hospitals, outpatient services, school, gymnasium, pool, media center, group homes and apartments for on-site assisted living, staff housing, daycare, sugarhouse, administration offices, and maintenance center. A central wood chip heating plant provides heating and cooling using a closed loop system.

The CMRC facility operates 24/7 over 3-shifts. Water use is less during the 3rd shift (10 pm) and weekends because the school and daycare are not in session, and there is no laundry operating.

The following are approximate populations of the various facilities:

| | |
|---|---|
| School: | 105 students |
| Hospital: | 62 patients |
| Students in Residence: | 89 students |
| Adults in Residence: | 30 adults |
| Staff in Residence: | 12 interns |

In total, there are about 200 people living on-campus.

CMRC is requesting approval of a new community supply well, Production Well #17, to supplement its three existing sources: Production Wells #8, #13, and #14. Proposed Production Well #17 is a bedrock well installed in October 2015 in response to a notice of a "Source Capacity Significant Deficiency" received from NHDES. This notice was documented in the Sanitary Survey Report dated January 30, 2014. The new source will also improve system reliability because it will be supplied by the campus electrical grid which has backup generators.

2. **Description of water sources, including water sources to be developed for non-potable uses such as irrigation:**

| Well | Notes | Capacity* (gpm) | Capacity* (gpd) |
|---|---|---|---|
| Well #8 | Installed in 1984. NHDES lists a capacity of 24 gpm. Later long-term water level monitoring has shown that capacity is too high. | 10 | 14,400 |
| Well #13 | Installed in 1994. NHDES lists its capacity as 12.5 gpm. Later monitoring confirmed that is a reasonable estimate of sustainable capacity. | 12.5 | 18,000 |
| Well #14 | Installed in 1995. The capacity of this well is listed as 39 gpm by NHDES. Recent monitoring has shown that the actual capacity is significantly lower. | 10 | 14,400 |
| Total Capacity | | **32.5** | **46,800** |

**Based on Water Level Monitoring performed by EGGI (August 2014) and data presented in UE's Phase I Water Supply Evaluation Report (2014).*
*Units: gpm = gallons per minute; gpd = gallons per day*

There are no non-potable uses such as irrigation proposed.

Reliable water storage is provided by two 200,000 gallon steel standpipes for equalization, fire and emergency use.

3. **Name designation of each proposed water source and any existing sources:**
   a) BRW #8 (existing)
   b) BRW #13 (existing)
   c) BRW #14 (existing)
   d) BRW #17 (proposed)

4. **Number of connections proposed for each of the following classes:**
   a) Residential: 2 existing
   b) Industrial/Commercial/Institutional: 25 existing institutional connections for domestic supply and fire suppression.
   c) Municipal: 0

   No new connections are proposed at this time.

5. The water system does not provide water to any consecutive water systems or privately owned redistribution systems.

6. There are no existing or proposed connections that receive more than 20,000 gpd.

7. **Please provide the following information based on metered source withdrawal volumes from the last complete year. Please report in gallons.**

   Year: **2015**

   | | |
   |---|---|
   | Average daily use (ADU): | **39,400** gpd |
   | Lowest ADU in the winter: | **38,000** gpd |
   | Highest ADU in the summer: | **43,500** gpd |

8. Attached (***Appendix C***) is a summary table identifying the approximate types of water use at each building, and the approximate fixture quantities. The maintenance staff at the facility is limited, and operating the water system is only one of their duties. As such, conducting a complete water audit of each fixture at the facility is more labor intensive than the existing staff can provide at this time.

C. Transfer of Ownership

1. The system ownership is not proposed to be transferred.

# II. System Side Management

A. Water Meter

1. Source and Other System Side Meters

a) No later than the source activation date, meters will be installed on each new water source. Meters are present on existing water sources. A new magnetic flowmeter will be installed in the new Well #17 building.

b) An irrigation well is not proposed.

c) **Meter information for each proposed and existing water source and other system side meters:**

| Name Description | Meter Size, Make, Model, Flow Range, Installation Date |
|---|---|
| BRW #8 Production | 3 inch Neptune HP Turbine, 5-450 gpm range, installed April 2014 |
| BRW #13 Production | 2 inch Neptune HP Turbine, 4-200 gpm range, installed April 2014 |
| BRW #14 Production | 3 inch Neptune HP Turbine, 5-450 gpm range, installed April 2014 |
| BRW #17 Production | 1" Badger M2000 magnetic water meter, with 4-20mA output. The meter will measure source water pumped as well as source water used for backwash, and track/record each at the control panel. |

d) No later than the source activation date, source meters will be read at least every 30 days. Source meters are typically read daily (Monday through Friday) and total flow is recorded.

2. Service Meter Installation, Reading and Maintenance

a) Meters are not installed at existing service connections. CMRC does not bill for water since it is a non-profit institution and provides water only for its facilities. Many of the existing services were constructed without provisions to install meters and would be cost prohibitive to retrofit.

b) The distribution system is looped, and therefore zone meters are also not practical in this system.

3. Meter Selection, Installation and Maintenance

a) All meters will be American Water Works Association (AWWA) certified, with the exception of b), below.

b) AWWA does not have standards for magnetic flow meters. If a magnetic flow meter is proposed, the meter make, model, size and manufacturer specifications will be forwarded to the NHDES Water Conservation program for review. The meter will not be installed until receiving approval for its use from NHDES.

c) The selected size of the meters will be based on projected flow rates.

d) Meters will be installed as specified by the manufacturer, including requirements for horizontal or vertical placement, distance of straight run of pipe upstream and downstream of the meter and strainer

installation. If the manufacturer does not supply installation specifics, meters will be installed in accordance with the "Manual of Water Supply Practices M6, Water Meters-Selection, Installation, Testing, and Maintenance" (AWWA, 2012).

e) Meters are currently calibrated every 2 years. The following meter testing and calibration schedule or meter change-out schedule will be implemented. If the manufacturer's accuracy warranty extends beyond the schedule below, the meter will be tested or changed-out no later than the warranty expiration date.

| Meter Size (inches) | Testing Rate (years) |
|---|---|
| <1" | 10 yrs |
| 1" - 2" | 4 yrs |
| 3" | 2 yrs |
| >3" | 1 yr |

f) A log of the date meters were installed, tested, calibrated, repaired and replaced will be maintained. Calibration certificates will be kept on file.

B. Water Balance and Water Audit

1. The calculation of a direct water balance (system input volume – authorized metered consumption) is not possible because meters are not installed on all service connections. Historic monthly water production and flow at the WWTP are reportedly reasonably similar.

C. Leak Detection and Repair

1. Description of the system's leak detection program (ex. acoustic leak detection, zone meters, night flow analysis) to be implemented within one year of source approval:

a) An acoustic leak detection survey of the entire system will be completed every two years from the date of final source approval.

(1) CMRC had an acoustic leak detection survey of existing mains conducted using NHDES grant funds in June 2016 (see ***Appendix D***). One leak was identified and repaired.

b) Storage tank level and metered production is monitored regularly. An unexplained decrease in water level, or increase in production to maintain level, may indicate a leak has developed and will be investigated.

(1) The storage tanks were renovated and re-coated in 2014. A leaking tank valve was replaced and system operation (wells on/off) modified so that the tanks no longer overflow.

c) CMRC has replaced valves and installed additional valves at certain locations, including the storage tanks and Mellon Building, to allow isolation if necessary for repairs or maintenance.

d) CMRC has made recent repairs to sections of mains and services that were determined to have the highest risk due to poor condition, to proactively minimize potential breaks.

2. Mapping of existing water mains and valves is updated as an ongoing process to reflect known materials, sizes, and locations based on surveys and field observation. Non-metal pipes will either be GPS located and stored in a GIS system or equipped with detectable tracer tape or detectable tracer wire during new installation.

3. Leak detection will be conducted in accordance with the "Manual of Water Supply Practices M36, Water Audits and Loss Control Programs" (AWWA, 2016).

4. Leaks will be repaired within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.23.

5. A log of all leaks will be maintained, including the date the leak was discovered, the date the leak was repaired, the type of leak (ex. service, main, hydrant, valve), the size of the leak (gpm) and the closest street address.

6. CMRC is currently in discussions with Utility Services, Inc. for a distribution system maintenance plan. They are locating and evaluating the existing system and proposing improvements.

D. Pressure Management

1. The existing pressures of the system are from approximately **25** psi to **72** psi depending on the elevation of the service.

# III. Consumption Side Management

A. Conservation Rate Structure and Billing

1. There is no existing rate structure or billing system since CMRC only serves its own facilities.

B. Educational Outreach Initiative

1. No later than the source activation date, the system will begin distributing water efficiency outreach materials twice a year to CMRC Staff. The materials distributed will be either NHDES Water Efficiency Fact Sheets (***Appendix A***) located at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm#efficiency or EPA WaterSense materials located at http://www.epa.gov/watersense/. CMRC has an Intranet, where informational messages can be posted for all users as they log into the system. Materials can also be distributed via an all-user email.

2. CMRC will periodically remind staff to report leaks to the Maintenance Department and to conserve water where possible.

3. The system will maintain a log indicating how the system has complied with III. B.1., above. The log will include dates the outreach and education actions were taken and what was done.

C. Water Efficiency Practices

1. Existing Water Efficiency Practices

a) The maintenance building was constructed in 2008 and is equipped with dual flush toilets and automatic faucets in the bathrooms. There is also a rainwater collection system that collects, treats and stores rainwater from the roof in two 10,000 gallon cisterns. This water is used for outside water uses and in the toilets.

b) In the last year, both pools have had new dehumidification systems installed. The new systems reduce evaporation from the pools, extract moist air, condense water from the air and return it to the pool. It is a closed loop system which reduces make-up water to the pool.

c) The therapy pool has a movable floor that is moved to the top of the pool at night to reduce evaporation and heat loss.

d) The group homes have been retrofitted with new clothes washers and dryers. Ten to twelve Speed Queen extractors are currently in place.

2. Proposed Water Efficiency Practices

a) Within 5 years of source activation, water fixtures older than 1994 (as identified in ***Appendix C***) and no longer meeting current standards listed in ***Appendix E*** (toilets = 1.6 gallons per flush [gpf], urinals = 1.0 gpf, residential and commercial kitchen sinks = 2.2 gallons per minute [gpm], public sinks = 0.5 gpm, and showerheads = 2.5 gpm) will be replaced with WaterSense certified fixtures, which use 20% less water than standard fixtures.

(1) Toilets in some buildings are wall-mounted units or constructed in a way such that they are difficult to be changed without a major renovation. These fixtures may not be able to be retrofitted or replaced until renovations to the entire bathroom or building take place.

(2) In some circumstances, WaterSense certified toilets may not meet the needs of residential use. In these cases, standard flow models shall be used.

b) Within 5 years of source activation, all buildings listed in ***Appendix C*** as having fixtures of unknown age shall be investigated to determine if water use meets today's plumbing standards (summarized in ***Appendix E***). Those that do not shall be replaced as described in section III.C.2.a) above.

c) Within 5 years of source activation, all commercial kitchen pre-rinse spray valves using greater than 1.6 gpm shall be replaced with a pre-rinse spray valve that uses at most 1.6 gpm.

d) Within 5 years of source activation, all commercial kitchen appliances that do not meet today's standards or ENERGY STAR standards shall be replaced unless the payback period will be more than 4 years.

e) As residential clothes washers are replaced, ENERGY STAR and water efficient models will be used.

f) As buildings are constructed, WaterSense certified fixtures will be installed and water saving measures will be incorporated.

g) Medical tubs in the hospital are gradually being replaced with newer, more efficient tubs. Tubs are one of the largest water uses in the hospital.

h) Water efficiency practices for institutions, health care facilities, kitchens/cafeterias, and outdoor uses will be used as described in the NHDES Water Efficiency Fact Sheets.

# IV. Reporting and Implementation

A. The facility will continue to report monthly water use, quarterly to the NHDES Water Use Registration and Reporting Program. Monthly means once every calendar month, but no sooner than 27 days after and no later than 33 days after the previous reading.

B. The water system will submit a form supplied by NHDES once every three years from the date of the water conservation plan approval documenting how compliance with the requirements of Env-Wq 2101, *Water Conservation* rules, is being achieved. The system may attach the meter, leak and outreach and education logs to the form or fill out the form manually. The form will also include an update on fixture replacements/retrofits or renovations that have taken place on campus.

# Appendix A
# Water Efficiency Fact Sheets

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-13 2013

# Water Efficiency: Institutions

Schools, colleges, universities and other institutions that provide room and board can realize significant water and cost savings by implementing the water efficiency practices in this fact sheet. These practices address water use outdoors and in living areas, classrooms, cafeterias and laundries. A comprehensive audit should be performed to assess the facility's water system and identify locations where these practices can be employed to conserve water. For instructions, visit the fact sheets webpage at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-DWGB-26-16, "To find the fact sheet "Water Efficiency: Business or Industry Water Use and Conservation Audit."

**General Water Efficiency Practices**

- Locate and repair leaks. Metering at strategic points in the facility helps detect leaks and maintain minimum flow rates.
- Develop a maintenance program. Routinely inspect all plumbing and fixtures, equipment, water lines, irrigation systems, valves and pumps for leaks, clogging, worn out gaskets and faulty operation. Keep replacement and repair parts on hand.
- Educate residents about water efficiency practices.

**Domestic/Sanitary Water Efficiency Practices**

- Install ultra low-flow toilets that use a maximum of 1.28 gal/flush (4.8 L/flush) or retrofit existing toilets with displacement bottles or dams. Install ultra low-flow urinals that use a maximum of 0.5 gal/flush (1.9 L/flush) or use waterless urinals.
- Install low flow faucets, faucet aerators or laminar flow restrictors that limit flow to $\leq$1.5 gpm.
- Install low flow showerhead devices that limit flow to $\leq$2.0 gpm.
- Install flow restrictors on plumbing fixtures wherever possible.
- Install automatic faucet shut-off valves in public water use areas.
- Replace older model piped-in drinking water fountains with stand-alone water coolers/dispensers.
- Replace top-loading vertical-axis washing machines with front-loading horizontal-axis types.
- If a commercial type laundry exists onsite, consider using tunnel or similar washers that recycle the final rinse water into the next wash cycle. Visit the fact sheets webpage (see above) and scroll

to WD-DWGB-26-10, "Water Efficiency Practices for Laundry Facilities."

**Kitchen/Cafeteria Water Efficiency Practices**

- Minimize or eliminate pre-wash spray systems and replace spray heads with low-flow models.
- Install automatic shut-off valves in all water-using kitchen equipment or shut off water when not in use.
- Remove garbage disposals. Replace them with strainers, or reuse wash and rinse water for disposal purposes. Composting food waste is the most practical disposal method for water conservation and nutrient recycling.
- Replace water-cooled ice machines with air-cooled models or retrofit to recirculating non-contact cooling.
- Use flake ice machines. These require less bleed-off than cube ice machines.
- Reuse non-contact cooling water for other purposes.
- Upgrade to water-saving machinery as old equipment wears out.
- Install on-demand point-of-use water heating systems to eliminate the need to purge lines for hot water. Insulate pipes to retain heat.
- Operate dishwashers, sanitizers and sterilizers with full loads only and shut them off when not in use. Install sensors on conveyor systems that automatically shut off water when no dishes are present.
- Use high-temperature rinse dishwashers rather than low-temperature ones as they require less water and wash more racks per hour.
- Consider using ultrasonic pre-rinse units or hand scrape dishes rather than rinsing with water.
- Pre-rinse utensils and dishes in a water basin.
- Rinse vegetables in a water basin.
- Reuse rinse water where appropriate for pre-rinsing, dish washing, garbage disposers, or scrapping troughs.
- Operate scrapping troughs only when washing dishware.
- Eliminate scrapping troughs or minimize the water flowing through them.
- Do not use running water to melt ice or frozen foods.
- Provide self-serve water dispensers and eliminate serving water with meals except upon request.

**Outdoor Water Efficiency Practices**

Visit the fact sheets webpage (see above) and scroll to the "Water Efficiency" fact sheets at the bottom of

the page for additional ways to save water outdoors.

- Cover outdoor swimming pools when not in use to prevent evaporative losses.
- Wash fleet vehicles less often.
- Sweep parking lots, driveways, walks and steps rather than hosing them off.
- Watering frequency should be based on soil moisture, weekly precipitation and plant/turf conditions. Typically, established landscape plants and turf grass require an inch of water per week, and this amount may be applied in one application.
- Employ rain sensors and soil moisture sensors on outdoor irrigation systems to ensure they do not turn on when not needed.
- Be sure sprinkler heads are producing drops rather than a mist. This helps reduce evaporative losses.
- Incorporate soil moisture and rain sensors into automatic sprinkler systems.
- Operate automatic sprinkler systems connected to public water systems only when the water demand is low, usually between 4:00 and 6:00 AM.
- Don't water the pavement. Adjust sprinklers so they water only the plants.
- Plant drought-resistant turf grass. The most drought-tolerant grasses are the fine-leaf fescues. The University of New Hampshire Cooperative Extension recommends a mix containing hard fescue, Chewings fescue and perennial ryegrass.
- Soil moisture sensors are useful in determining how wet your soil is. You can check the moisture of the soil to determine watering needs. In some instances you will find that you do not need to water even if it has not rained recently. Water should be applied until the soil moisture meets the Cooperative Extension's recommendations for your soil type.
- Check soil moisture before watering, even if it hasn't rained. Then spot water, irrigating only those areas that are dry. Water by hand, if possible.
- Do not irrigate during windy conditions.
- Use hose nozzle shut-off devices
- Use drip or trickle irrigation wherever possible. These systems apply water near the root zone of the plant, ensuring a complete watering while eliminating excess water usage.
- Minimize your lawn area. Replace grass with moss, rocks, gravel, wood chips or mulched flowerbeds.
- Plant species native to New Hampshire. Native plants are hardier and tend to need less water. Check out the New England Wildflower Society's website for information about native plants at www.newfs.org.

- Use mulch wherever possible.

**For Additional Information**
Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/index.htm. All of the bureau's fact sheets are online at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm. More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm.

**Resources**
*UNH Cooperative Extension*, Fact sheets on cultural requirements for turf and choosing varieties of turf grass. www.extension.unh.edu/Agric/AGNLT.htm

**References**
New England Interstate Water Pollution Control Commission; *MRI Water Conservation Technical Bulletin #5, Water Conservation Best Management Practices for Domestic/Sanitary Water Use;* NEIWPCC, Lowell, MA; 1996.

New England Interstate Water Pollution Control Commission; *MRI Water Conservation Technical Bulletin #6, Water Conservation Best Management Practices for Kitchen Water Use;* NEIWPCC, Lowell, MA; 1996.

U.S. Department of Defense; *MIL-Handbook-1165, Water Conservation;* U.S. Dept. of Defense; 1997; pp 25-37.

Vickers, Amy; *Handbook of Water Use and Conservation;* WaterPlow Press, Amherst, MA; 2001; pp 267-277.

Note: This fact sheet is accurate as of February 2013. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-14 2013

# Water Efficiency: Health Care Facilities

Health care facilities with steam sterilizers, autoclaves, x-ray equipment, and in-house laundries or kitchens can be significant water consumers, using as much as 30,000 gallons of water a day. The water efficiency practices found in this fact sheet can save considerable water and water-related costs. A comprehensive audit should be performed to assess the facility's water system and identify locations where these practices can be employed to conserve water. For instructions, read the fact sheet "Water Efficiency: Business or Industry Water Use and Conservation Audit" at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-DWGB-26-16.

**Domestic/Sanitary Water Efficiency Practices**
Approximately 35 percent of the total water use at health care facilities goes to domestic purposes, plumbing fixtures and appliances.

- Install ultra low-flow toilets that use a maximum of 1.28 gal/flush (4.8 L/flush) or retrofit existing toilets with displacement bottles or dams. Install ultra low-flow urinals that use a maximum of 0.5 gal/flush (1.9 L/flush).
- Install low-flow faucets, faucet aerators or laminar flow restrictors that limit flow to $\leq$1.5 gpm.
- Install low-flow showerhead devices that limit flow to $\leq$2.0 gpm.
- Install flow restrictors on plumbing fixtures wherever possible.
- Install automatic faucet shut-off valves in public water use areas.
- Replace older-model piped-in drinking water fountains with stand-alone water coolers/dispensers.
- Replace top-loading vertical-axis washing machines with front-loading horizontal-axis types.
- If a commercial type laundry exists onsite, consider using tunnel or similar washers that recycle the final rinse water into the next wash cycle. Visit the fact sheets webpage (see above) and scroll to WD-DWGB-26-10, "Water Efficiency Practices for Laundry Facilities."

**Sterilizing Equipment Water Efficiency Practices**
Sterilizers and autoclaves can use a significant amount of water if run constantly. The following water efficiency practices can save water when using these devices.

- Install automatic shut-off valves, when possible, to shut off water flow to the unit when not in use. If shutting off is not possible determine the minimum flow the unit can sustain and set it to this level.

- Shut down the sterilizer when not in use, if possible.

- Recycle steam condensate and non-contact cooling water from sterilizers to make-up water in cooling towers or boilers.

- As they wear out, replace old sterilizers with water-efficient models with water recirculation automatic shut-off.

- Run the sterilizer or autoclave with full loads only. If the device you presently use is too large to routinely run full loads, replace it with a smaller-capacity model.

**X-Ray Equipment Water Efficiency Practices**
X-ray equipment uses water in the processing of prints. The following water efficiency practices will help save water when using this type of equipment.

- Adjust flow rates in rinse baths to the minimum recommended by the manufacturer.

- Install solenoid-controlled flow valves to shut off units when not in use.

- Reuse rinse bath water for make-up water in the developer solution.

- Install flow meters and regulators to limit the rinse water flow rate.

**Kitchen/Cafeteria Water Efficiency Practices**
Large quantities of water are used in the food preparation process. The following water efficiency practices can save significant amounts of water in kitchens and cafeterias.

- Minimize pre-wash spray systems and replace spray heads with low-flow models.

- Use high-pressure, low-volume nozzles for increased cleaning efficiency.

- Install automatic shut-off valves or shut off water when not in use.

- Remove garbage disposals or reuse wash and rinse water for disposal purposes. Composting food waste is a practical disposal method for water conservation and nutrient recycling.

- Replace water-cooled machines with air-cooled models or recirculating non-contact cooling systems.

- Reuse non-contact cooling water for other purposes.

- Upgrade to water-saving machinery as old equipment wears out.

- Install on-demand point-of-use water heating systems to eliminate the need to purge lines for hot water. Insulate pipes to retain heat.

- Operate dishwashers with full loads only and shut them off when not in use. Install sensors on conveyor systems that automatically shut off water when no dishes are present.

- Use high-temperature rinse dishwashers rather than low-temperature ones, as they require less water and wash more racks per hour.
- Consider using ultrasonic pre-rinse units.
- Pre-rinse utensils and dishes in a water basin.
- Rinse vegetables in a water basin.
- Reuse rinse water where appropriate for pre-rinsing, dish washing, garbage disposers or scrapping troughs.
- Eliminate or minimize water flow-through scrapping troughs.
- Do not use running water to melt ice or frozen foods.

*Dartmouth-Hitchcock Medical Center in Lebanon, New Hampshire replaced toilets and urinals with water-efficient models, installed flow restrictors on all faucets and kitchen equipment, and installed recirculation systems on their autoclaves, RO/DI water treatment, medical air and vacuum pumps and boiler blowdown wastewater and now save an average of $100,000 a year in water, sewer, and energy costs.*

**Outdoor Water Efficiency Practices**

Outdoor water use can be a significant portion of total use by a facility, especially if large turf areas are irrigated. The following water efficiency practices will help save water in outdoor applications at your facility. Visit the fact sheets webpage (see above) and scroll to "Water Efficiency" at the bottom of the page for more detailed fact sheets on saving water outdoors.

- Wash fleet vehicles less often.
- Sweep parking lots, driveways, walks and steps rather than hosing them off.
- Landscape watering frequency should be based on soil moisture, weekly precipitation and plant/turf conditions. Typically, established landscape plants and turf grass require an inch of water per week, and this amount may be applied in one application.
- Employ rain sensors and soil moisture sensors on outdoor irrigation systems to ensure they don't turn on when not needed.
- Be sure sprinkler heads are producing drops rather than a mist. This helps reduce evaporative losses.
- Incorporate soil moisture and rain sensors into automatic sprinkler systems.
- Operate automatic sprinkler systems only when the water demand is low, usually between 4 and 6 a.m.
- Don't water the pavement. Adjust sprinklers so they water only the plants.
- Plant drought-resistant turf grass. The most drought-tolerant grasses are fine leaf fescues. The UNH

Cooperative Extension recommends a mix containing hard fescue, Chewings fescue and perennial ryegrass.

- Soil moisture sensors are useful in determining how wet your soil is. You can check the moisture of the soil to determine watering needs. In some instances you will find that you do not need to water even if it has not rained recently. Water should be applied until the soil moisture meets the Cooperative Extension's recommendations for your soil type.

- Check soil moisture before watering, even if it hasn't rained. Then spot water, irrigating only those areas that are dry. Water by hand, if possible.

- Do not irrigate during windy conditions.

- Use hose nozzle shut-off devices

- Use drip or trickle irrigation wherever possible. These systems apply water near the root zone of the plant, ensuring a complete watering while eliminating excess water usage.

- Use mulch wherever possible.

- Minimize your lawn area. Replace grass with moss, rocks, gravel, wood chips or mulched flowerbeds.

- Plant species native to New Hampshire. Native plants are hardier and tend to need less water. Visit the New England Wildflower Society's website for information about native plants at www.newfs.org.

**For Additional Information**
Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/index.htm. All of the bureau's fact sheets are online at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm . More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm .

**Resources**
*UNH Cooperative Extension.* Turf management and irrigation.
www.extension.unh.edu/Agric/AGNLT.htm

*US EPA*, Energy Star, Listing of commercial washers that meet the Energy Star rating.
www.energystar.gov

**References**
U.S. Department of Defense; *MIL-Handbook-1165, Water Conservation;* U.S. Dept. of Defense; 1997; pp 66-67.

Vickers, Amy; *Handbook of Water Use and Conservation;* WaterPlow Press, Amherst, MA; 2001; pp 256-257, 265-280.

Note: This fact sheet is accurate as of February 2013. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-16 2013

# Water Efficiency: Business or Industry Water Use and Conservation Audit

Performing a water audit of your facility is the first step in designing an effective water conservation plan. A water audit surveys all water-using or conveying fixtures, plumbing, equipment and practices at a business or manufacturing facility to determine the present water uses, losses and conservation practices and to recommend improvements. A water audit serves as the starting point for identifying losses and implementing useful water efficiency practices.

An audit for a large facility that uses vast quantities of water is a significant undertaking. You may want to obtain outside help from a consultant or your water utility. The following steps are designed as a general guide to the water audit process. Since this is a generic document, not all portions of the audit process will apply to your facility.

**Step 1: Identify your source.**

- Where do you get your water? Is it from an offsite municipal supplier, an onsite community water supply, an onsite private water supply, a surface water body or a combination?

**Step 2: Gather all existing information including:**

- Water and sewer bills.
- Maps, schematics, and floor plans of the distribution system, plumbing and equipment.
- Number of employees/occupants and their schedules. Does your facility have shifts covering the entire 24 hours? These factors make a difference in the magnitude of your water use.
- Capacities, storage and water use of all appliances, fixtures, pumps, hoses, rinse tanks, cooling towers, recycling ponds and other water-using equipment and structures. You may have to call the manufacturer or installer to get this information.
- Paperwork (owner's manuals) related to water-using equipment, appliances, fixtures, pumps, etc.

**Step 3: Quantify your water use from each source.**

- If your business or facility is metered this task is easy. Calculate your water use based on a 24-hour period. Record the meter readings at the beginning and end of the 24 hours. Subtract the initial reading from the final one. This is how much water you used on that day. Do this several times and average the daily readings.
- If you are not metered, you will need to estimate water use based on the use type and equipment you have, employees/occupant numbers, and information gathered in Step 2. You may also use a portable, non-invasive, ultrasonic water meter to measure flows at various points in the facility. This is a device that clamps onto the outside of pipes and, using ultrasound, measures water flow through the pipe.

**Step 4. Perform the audit.**

- Catalog all water-using devices and measure daily use of each. Note the number of each, the manufacturer and the amount of water each uses. Don't forget to include fixtures and practices employed in outside water use.
- Identify and quantify water losses due to leaks for each device. This can be as simple as comparing manufacturing specifications with meter readings. If the device uses more water than the manufacturer recommends, then it is possible there is a leak.
- Determine water consumption for each device. Consumption = water in – leaks – (waste) water out. For instance, consumption can be blow down, or the water used to make your product, such as concrete or bottled beverages, or the water left in linens after washing that is subsequently lost in the drying process.
- Identify and quantify water conservation devices and practices already in place. Quantify their water use and savings over conventional devices and methods.

**Step 5. Analyze the audit results.**

- Water in from the source should equal wastewater out + consumption + losses.
- Compare measured water consumption of devices to the manufacturer's claims.
- Calculate the amount of "lost" water for each device. This includes consumptive use plus leaks.
- Identify ways to locate and repair leaks.

**Step 6. Develop a forecast of future water use.**

- Consider historical water demand, future expansion, employee/occupant increases or decreases, planned water conservation practices, retrofits and upgrades, and weather conditions and trends.

**Step 7. Prepare a benefit/cost analysis of potential water conservation measures.**

- Calculate the cost of "lost" water identified in Step 5. Include consumptive use plus leaks. This cost could be either cost per gallon to buy water or cost per gallon to pump it. Include treatment and processing costs of lost water. Be sure to include wastewater disposal costs. If you know the wattage rating for your pump you can estimate cost of pumping water. Multiply the wattage times the number of hours a day the pump runs times the kilowatt-hour rate your electric company charges.
- Consider all costs associated with a proposed conservation measure including initial purchase and installation, administrative, maintenance, leak detection, repair and personnel.
- Determine the savings the new conservation measure will provide. Take into consideration savings due to leak repair. Calculate the cost savings of buying, pumping, treating, processing and heating water that would be used without the measure. Factor in the disposal costs of wastewater. Water efficiency practice implementation could also eliminate or reduce the need for water or sewer system expansions or replacements or infrastructure upgrades. Take avoided costs into consideration as well.
- Calculate a payback period for the proposed water efficiency measures. The payback period is the time it takes to recover the initial expenditure of an installation or retrofit as a result of the savings associated with its use.

**Step 8. Develop a long-range water conservation plan.**

- Use your forecast and benefit/cost analysis to formulate your plan.
- State the goals of the plan and how water will be used in the future.
- Include a regular leak detection and repair program.
- Determine where and how you will replace or retrofit water efficiency devices.
- Determine how water efficiency practices will be implemented.
- Document an implementation schedule for any proposed water efficiency practices and upgrades.

- Inaugurate employee or public education of the implemented practices and installed devices. Without the participants' buy-in and help, water efficiency practices will not work.

**For Additional Information**

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/index.htm. All of the bureau's fact sheets are online at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm . More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm .

**Reference**

_____; *MIL-Handbook-1165, Water Conservation;* US Dept. of Defense; 1997

Vickers, Amy; *Handbook of Water Use and Conservation;* WaterPlow Press, Amherst, MA; 2001

Note: This fact sheet is accurate as of February 2013. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.

# Appendix B
# Notification Process

**Public Notification Instructions**
Once a final draft of the water conservation plan is agreed upon by the applicant and NHDES, NHDES will send a signature line to the applicant for addition to the plan along with a summary of the requirements of Env-Wq 2101, *Water Conservation* rules. Within 10 working days of receiving the summary from NHDES, the applicant is required to provide a copy of the water conservation plan via certified mail with return receipt requested to the governing board of the municipality in which a proposed source is located, all municipalities that will receive water from the water system (if any), all wholesale customers (if any) and the regional planning commission serving the location of the proposed source. In most cases, only the municipality and the regional planning commission will require notification. All signed copies of the certified mail return receipts (the green cards) must be forwarded to NHDES along with the final, signed water conservation plan.

**Additional Attachments**
The applicant must provide the governing boards with a summary of the requirements of Env-Wq 2101, which may be found at:

http://des.nh.gov/organization/divisions/water/dwgb/waterconservation/index.htm

and request that the governing board amend local site planning requirements to reflect the requirements of Env-Wq 2101 or to promote water efficiency.

**Notification of Consecutive Water Systems and Privately Owned Redistribution Systems**
Within 5 working days of obtaining final approval of the source from NHDES, the system is required to notify any consecutive water system or privately owned redistribution system receiving water from the system, that pursuant to Env-Wq 2101.13, the systems must implement a water conservation plan and should contact the NHDES Water Conservation Program using the contact information below.

Kelsey Vaughn, Water Conservationist
New Hampshire Department of Environmental Services
Drinking Water and Groundwater Bureau
PO Box 95
Concord, NH 03302-0095
kelsey.vaughn@des.nh.gov
Phone: (603) 271-0659
Fax: (603) 271-0656

# Appendix C
# Table of Water Uses and Kitchen Inventories

**Crotched Mountain Rehabilitation Facility**
**Building Inventory - Table of Water Uses**
**December 2016**

| Building | Use | Bedrooms | Baths, Kitchens, etc. | Notes | Fixture Age/Last Renovated |
|---|---|---|---|---|---|
| Sycamore | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Dogwood | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Mapleview | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Acacia | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Magnolia | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Willow | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Aspen | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Redwood | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Hawthorn | Residential | 5 bedrooms | 2 bathrooms – 1 w/ shower; 1 w/ tub room; 1 kitchen | Group home/client assisted living | Built 1987; renovated 2x since |
| Cedars | Residential | 5-3 br apts, 1-1 br apt | 2 main laundry; 3 satellite laundry | Client housing & upstairs guestrooms | Has new kitchens and baths; 8 kitchen, 17 bathrooms |
| Pines | Residential | 8 rooms (3 apts) | 1 kitchen, 2 kitchenettes, 2 laundry | Client housing | |
| Birches | Residential | 16 rooms & 1-1 br apt | 8 bathrooms, 1 apt bathrm, kitchen | Client housing | |

| Building | Use | Bedrooms | Baths, Kitchens, etc. | Notes | Fixture Age/Last Renovated |
|---|---|---|---|---|---|
| Birches Basement | Residential | 6 bunkrooms, most w/ 4 beds (19 cots total) | 1 bathroom, 1 laundry, 1 kitchen | Weekend staff housing | |
| Fox Meadow Apts | Residential | 4-3 br apts = 12 beds | 4 kitchens, 4 bathrooms, 1 tubroom, ½ bath (staff) | Client housing | |
| Verney Drive Apts/Benson House | Residential | 5 bedrooms | 3 bathrooms, 1 tubroom, 2 kitchens | Client housing | |
| Brien Lodge/Gregg House | Residential | 8 bedrooms | 6 bathroooms; 2 kitchens (only 4 br & 3 baths in use); 3 laundry | Client housing | |
| Crathern House | Residential | 4 bedrooms (1 used as office) | 1 bath, 1-3/4 bath, 1 kitchen, laundry | Client housing | |
| Farmers House | Residential | 2 bedrooms | 1 bathroom, 1 kitchen, 1 laundry | Currently empty | |
| Wonderworks | Institutional | | 3 bathrooms; 1 kitchen; 1 kitchenette; 1 laundry | Daycare; approx 20 children | Renovated 20 yrs ago |
| CM School | Institutional | | 15 bathrooms (2 stalls ea), approx 10 classroom sinks, cafeteria; 4 janitor closets | | Renovated 1985 |
| CM School | Institutional | | Commercial kitchen – steam tables, dishwasher, 3 bay pot sink, garbage disposal, private bathroom | | Renovated 1985 |

| | | | | | |
|---|---|---|---|---|---|
| Gymnasium/Pool/ media center | Institutional | | 9 bathrooms; 2 locker rooms w/ showers (2 stalls); 2 deck showers; total 21 toilets 125,000 gal pool & 30,000 gal pool – each shut down every 2 years (1 per yr); re-filled from system; 2 janitor closets | | Sinks, showerheads, dehumidification equipment replaced within the last year. Toilets are 1990 vintage. |
| **Building** | **Use** | **Bedrooms** | **Baths, Kitchens, etc.** | **Notes** | **Fixture Age/Last Renovated** |
| Greenhouse | Institutional | | Sprinklers used for summer watering | Raised bed gardens outside; greenhouse inside | Hosebib |
| Mellon Building/ Hospitals (Admin & Hospital) | Institutional | | 11 public restrooms; 13 bathrooms; 4 tub rooms; 2 serving kitchens w/ sink and sanitizer (chem. clean; not heat); 2 residential laundry; 2 sinks (media rooms), 1 ADL training kitchen; 1 apt w/ kitchenette & bathroom | | The main kitchen was renovated in 1985. |
| WWTP | Institutional | | Lab sink | | New 2008 |
| Generator bldg | Institutional | | Hosebib | | |
| Heath Center/Bromley | Institutional | | | 2 bathrooms | |
| Barn | Institutional | | Hosebib | Not currently in use | |
| Sugarhouse | Institutional | | Sink | | |
| Main Laundry – Hayden Bldg | Institutional | | Commercial laundry - 3-50 lb extractors; all Milnor model #30022T5E; Washer #5 S#0100671101; Washer #6 S#0201233101; Washer #7 S#0101233201 | Est 30-40 gal/load | 10-15 years old |

| | | | | | |
|---|---|---|---|---|---|
| Outpatient clinic | Institutional | | 2 bathrooms | Basement of Carter Hall | Renovated 2001 |
| Hayden Bldg (Hospital) | Institutional | | 3 public bathrooms; 4 tub rooms; ADL laundry (training); 16 client bathrooms; 2 sinks in each media room; 2 staff bathrooms | | 1999/2000 Renovation |
| **Building** | **Use** | **Bedrooms** | **Baths, Kitchens, etc.** | **Notes** | **Fixture Age/Last Renovated** |
| Rehab Engineering | Institutional | | Sink & toilet | Fix wheelchairs; basement of main Admin bldg | Pre-1994 fixtures |
| Maintenance Bldg | Institutional | | 4 bathrooms; 2 showers | New building in 2008; rooftop rain reclamation system for toilets and outdoor water use | Renovated 2008 |
| Cooling Tower (School/Gym) | Institutional | | Seasonal use for cooling school, gym. Recirculating cascade; lose a little water to evaporation. Closed loop; only used April – Sept. | | |
| Woodchip plant | Institutional | | Closed loop system; minimal makeup water; make-up is metered which allows identification of leaks in the heating system on campus | | |

Notes:

- Most sterilizing at the facility is done with UV, not with water. There aren't a lot of instruments used.
- No sprinklers for irrigation. Very limited watering is done with hoses.
- Residential laundry facilities are a mixture of top and front loaders; all are commercial type extractor machines; similar to Laundromat equipment

SCHOOL KITCHEN

## Worksheet 9. Commercial-Grade Kitchen Appliances

| Location / Dishwasher | | Make/ Model | Quantity | Racks washed per day | Building hot water fuel type | Booster water heater fuel type | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|
| | Under Counter | | | | | | | |
| | Door Type | HOBART | 1 | 150 | WOODCHIPS | ELECTRIC | 250 | NO |
| Low Temp. 110° | Single Tank Conveyor | AM-14 | | | | | | |
| Or High Temp. 190° | Multi Tank Conveyor | | | | | | | |
| Leaks or Other Comments | NO LEAKS | | | | | | | |

| Location / Ice Machine | | Make/ Model | Quantity | Harvest rate (pounds ice per day) | Potable water use (gallon per 100 pounds ice) | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|
| | Ice Making Head | | | | | | |
| | Remote Condensing Unit /Split System | | | | | | |
| | Self-Contained Unit | SCOTSMAN CM3 | 1 | 100 | 12 | 250 | NO |
| Leaks or Other Comments | | | | | | | |

| Location / Steam Cooker | | Make/ Model | Quantity | Pounds of food cooked per day per unit | Number of pans per unit | Operating hours per day | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|
| | Electric | MARKET FORCE PS-6E | 1 | 120 | 12 | 6 | 250 | |
| | Natural Gas | | | | | | | |
| Leaks or Other Comments | NO LEAKS | | | | | | | |

| Location / Clothes Washer | How is water for each unit heated? | Make/ Model | Quantity | Average number of loads per week | Type of water heating | Type of clothes dryer | Electric or Gas Drier | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|
| | Electric Heat | | | | | | | |
| | Gas Heat | | | | | | | |
| Leaks or Other Comments | | | | | | | | |

| Location / Combi Oven | | Make/ Model | Quantity | Operating hours per day | Operating days per year | Pounds of food cooked per day per oven |
|---|---|---|---|---|---|---|
| | Electric Heat | | | | | |
| | Gas Heat | | | | | |
| Leaks or Other Comments | | | | | | |

See Worksheet 10 for Commercial-Grade Kitchen Fixtures.

## Worksheet 10. Commercial-Grade Kitchen Fixtures

| Location (SCHOOL KITCHEN) | Hand Faucet | Pre-Rinse Spray Valve | Marked (gpm) | Timed | | | Leaks? Comments |
|---|---|---|---|---|---|---|---|
| | | | | Num. of Cups/ Pints/ Quarts. | Num. Secs. | Calc. Rate (gpm) | |
| 3 BAY POT SINK | 2 | NO | NO | 8 QT | 15 | 8 GPM | NO LEAKS |
| DISPOSAL SINK | 1 | YES | NO | 2 QT | 30 | 1 GPM | NO LEAKS |
| HAND WASH SINK | 1 | NO | NO | 4 QT | 15 | 4 GPM | NO LEAKS |
| PREP SINK BY STEAMER | 1 | NO | NO | 6 QT | 30 | 3 GPM | NO LEAKS |
| PREP SINK BY WALK IN | 1 | YES | 1.8 GPM | 4 QT | 15 | 4 GPM | NO LEAKS |
| | | | | | | | |
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**See Worksheet 9 for Commercial-Grade Kitchen Appliances.**

MAIN KITCHEN

## Worksheet 9. Commercial-Grade Kitchen Appliances

| Location | | | Make/ Model | Quantity | Racks washed per day | Building hot water fuel type | Booster water heater fuel type | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|---|
| Dishwasher | | Under Counter | | | | | | | |
| | | Door Type | | | | | | | |
| Low Temp. | | Single Tank Conveyor | HOBART C-44A | 1 | 300 | WOOD CHIPS | ELECTRIC | 365 | NO |
| Or High Temp. | 170 | Multi Tank Conveyor | | | | | | | |
| Leaks or Other Comments | | | | | | | | | |

| Location | | Make/ Model | Quantity | Harvest rate (pounds ice per day) | Potable water use (gallon per 100 pounds ice) | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|
| Ice Machine | Ice Making Head | | | | | | |
| | Remote Condensing Unit /Split System | | | | | | |
| | Self-Contained Unit | MANITOWOC IY0504A-161 | 1 | 333 | [illegible] | 365 | NO |
| Leaks or Other Comments | | | | | | | |

| Location | | Make/ Model | Quantity | Pounds of food cooked per day per unit | Number of pans per unit | Operating hours per day | Operating days per year | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|
| Steam Cooker | Electric | MARKET FORCE | 2 | 100 LBS | 4 | 12 HR | 365 | NO |
| | Natural Gas | PS-3E | | | | | | |
| Leaks or Other Comments | | | | | | | | |

| Location | How is water for each unit heated? | Make/ Model | Quantity | Average number of loads per week | Type of water heating | Type of clothes dryer | Electric or Gas Drier | ENERGY STAR Qualified? |
|---|---|---|---|---|---|---|---|---|
| Clothes Washer | Electric Heat | | | | | | | |
| | Gas Heat | | | | | | | |
| Leaks or Other Comments | | | | | | | | |

| Location | | Make/ Model | Quantity | Operating hours per day | Operating days per year | Pounds of food cooked per day per oven |
|---|---|---|---|---|---|---|
| Combi Oven | Electric Heat | | | | | |
| | Gas Heat | | | | | |
| Leaks or Other Comments | | | | | | |

See Worksheet 10 for Commercial-Grade Kitchen Fixtures.

MAIN Kitchen

## Worksheet 10. Commercial-Grade Kitchen Fixtures

| Location | Hand Faucet | Pre-Rinse Spray Valve | Marked (gpm) | Timed | | | Leaks? Comments |
|---|---|---|---|---|---|---|---|
| | | | | Num. of Cups/ Pints/ Quarts. | Num. Secs. | Calc. Rate (gpm) | |
| VEG PREP SINK | NO | YES | NO | 4 QT | 30 | 2 GPM | NO |
| BY STEAMER | YES | NO | NO | 6 QT | 15 | 6 GPM | NO |
| SINK BY WINDOWS | YES | NO | NO | 6 QT | 15 | 6 GPM | NO |
| 3 BAY POT SINK | YES | YES | 1.42 | 3 QT | 60 | .75 GPM | NO |
| DISHWASHER SINK | NO | YES | NO | 3 QT | 60 | .75 GPM | NO |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |

**See Worksheet 9 for Commercial-Grade Kitchen Appliances.**

# Appendix D
# Leak Detection Study

# State of New Hampshire
# Department of Environmental Services

# Crotched Mountain Rehab
# Water System Leak Detection Survey Report

# 2016

## Prepared By


Arthur Pyburn & Sons Inc.
Technical Services
1065 Summer Street ♦ Lynnfield, MA 01940
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gpyburn@apsitech.com

# Arthur Pyburn & Sons Inc.

## Technical Services

1065 Summer Street ♦ Lynnfield, MA 01940
617-529-3646 ♦ Fax 978-948-5066
gpyburn@apsitech.com


July 20, 2016

Crotched Mountain Rehab

PWSID# 0972010

The following is a summary of leak detection performed on approximately 2.35 miles of the Crotched Mountain Rehab's water distribution system.
This survey was performed for the State of New Hampshire, Department of Environmental Services, Drinking Water and Groundwater Bureau

The pages that follow are the individual reports for each leak.

During the course of this survey a leak was found at the following location.

Hydrant found to be leaking;

Hydrant #4 Leaking Approx. 1/2-1 gpm

In conclusion, 1 non-revenue leak was located during the course of this survey. The total of estimated leakage from the non-revenue leaks found during this survey is approximately 1/2 to 1 gallons per/min.

The leakage amounts noted in this report are only estimates and require confirmation during the repair of the leaks.

Respectfully Submitted by Gregory Pyburn

# Arthur Pyburn & Sons Inc.

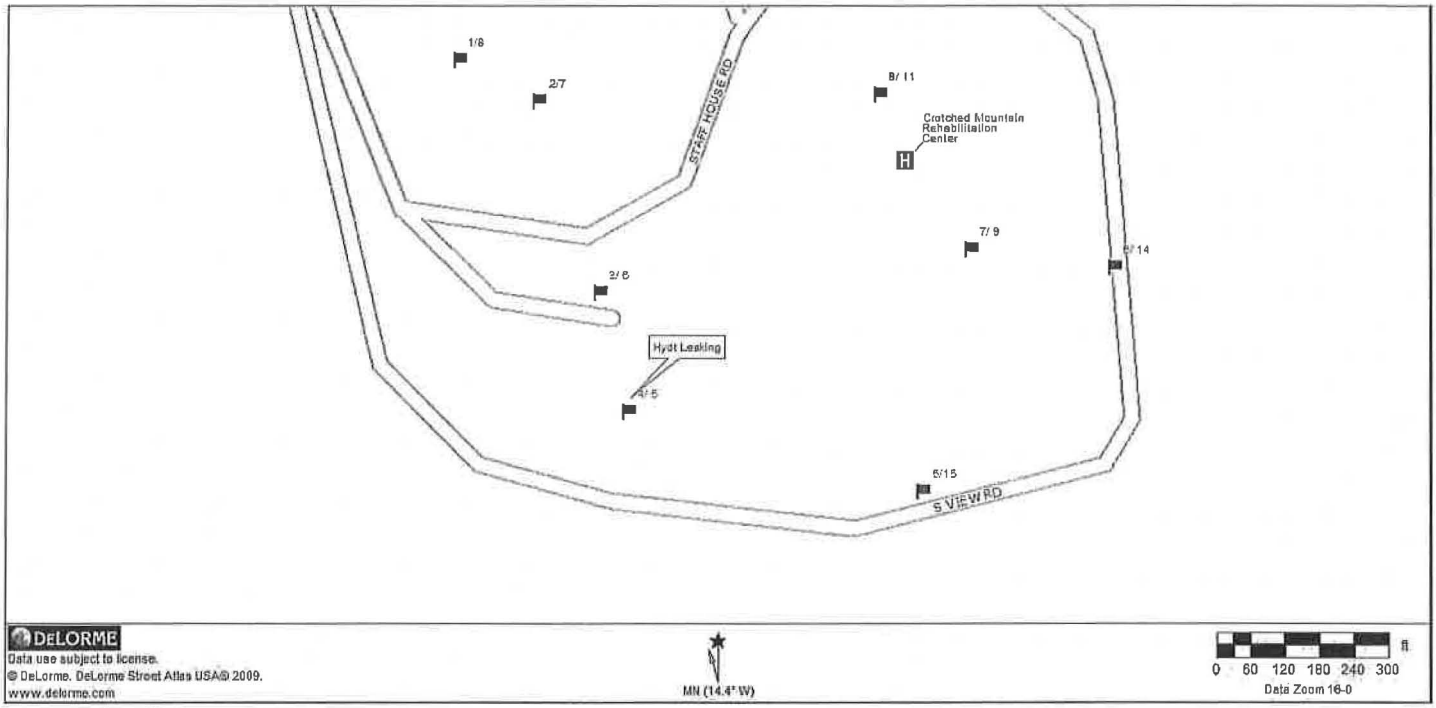
1065 Summer Street □ Lynnfield, MA, 01940

Phone (617) 529-3646

gpyburn@apsitech.com

## Technical Services

## Leak worksheet




Date: 7/20/16

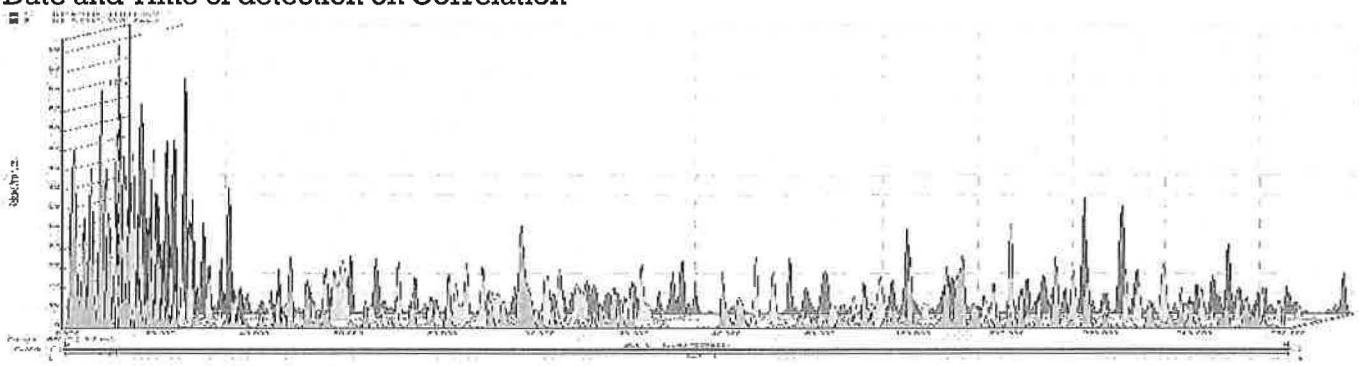
System Name: Crotched Mtn Rehab

Location: Hydrant #4

Approx. Size: 1/2-1 gpm Type of Surface Cover: Grass

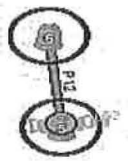
Pipe Material 6" CI Weather 75 degrees / light wind _____

Date and Time of detection on Correlation



| Pipe ID | Length | Diameter | Material | Sound Velocity |
|---|---|---|---|---|
| P12 | 269' 0" | 6" | Cast Iron | 3940 feet/sec |

| Leak ID | Leak Position | Correlation Between | Confidence | Recording Time |
|---|---|---|---|---|
| LS2 | 11' 1" from S | S -> 6 | 73.6% | Jul 15 2016, 09:00:04AM |
| LS3 | 6' 2" from S | S -> 6 | 75.4% | Jul 15 2016, 09:01:04AM |
| LS4 | 2' 6" from S | S -> 6 | 75.2% | Jul 15 2016, 09:02:04AM |
| LS8 | 3' 8" from S | S -> 6 | 70.5% | Jul 15 2016, 09:01:04AM |
| LS9 | 11' 6" from S | S -> 6 | 74.4% | Jul 15 2016, 09:02:04AM |



# Appendix E
# National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

# National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005, "Energy Independence and Security Act of 2007" *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed/Future Specification |
| Residential Toilets | 1.6 gpf[1] | 1.28 gpf/ 4.8 Lpf proposed by efficiency advocates for tank-type only | Tank-type toilets: WaterSense = 1.28 gpf (4.8L) with at least 350 gram waste removal + LA Spec. | | No specification | |
| Residential Lavatory (Bathroom) Faucets | 2.2 gpm at 60 psi[2] | 1.5 gpm/ 5.7 Lpm proposed by efficiency advocates | WaterSense = 1.5 gpm maximum & 0.8 gpm minimum at 20 psi | | No specification | |
| Residential Kitchen Faucets | | | | None proposed at this time | No specification | |
| Residential Showerheads | 2.5 gpm at 80 psi | | WaterSense = 2.0 gpm | | No specification | |
| Residential Clothes Washers | MEF ≥ 1.26 $ft^3$/kWh/cycle<br>*No specified water use factor<br>Note: MEF measures energy consumption of the total laundry cycle (wash + dry). The higher the number, the greater the energy efficiency | Energy Independence and Security Act of 2007 specified effective in 2011:<br>MEF ≥ 1.26 $ft^3$/kWh/cycle<br>WF ≤ 9.5 gal/cycle/$ft^3$<br>Also specified: DOE shall publish final rule by Dec 31, 2011, determining if standards will change effective 1/1/2015. | Energy Star (DOE) effective July 1, 2009:<br>MEF ≥ 1.8 $ft^3$/kWh/cycle<br>WF ≤ 7.5 gal/cycle/ $ft^3$ | Energy Star (DOE)<br>To be effective Jan 1, 2011:<br>MEF ≥ 2.0<br>WF ≤ 6.0 gal/cycle/$ft^3$ | Tier 1:<br>MEF ≥ 1.80 $ft^3$/kWh/cycle; WF ≤ 7.5 gal/cycle/$ft^3$<br>Tier 2:<br>MEF ≥ 2.00 $ft^3$/kWh/cycle; WF ≤ 6.0 gal/cycle/$ft^3$<br>Tier 3:<br>MEF ≥ 2.20 $ft^3$/kWh/cycle; WF ≤ 4.5 gal/cycle/$ft^3$ | |

[1] EPAct 1992 standard for toilets applies to both commercial and residential models.
[2] EPAct 1992 standard for faucets applies to both commercial and residential models.

DOE: Department of Energy
EPA: Environmental Protection Agency
EPAct 1992: Energy Policy Act of 1992
EPAct 2005: Energy Policy Act of 2005
EF: energy factor
$ft^3$: cubic feet
gal: gallons
gpm: gallons per minute
gpf: gallons per flush
kWh: kilowatt hour
MEF: modified energy factor
MaP: maximum performance
NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
WF: water factor
Lpf: Litres per flush

*Updated March 2010*
*Koeller/Dietemann*

## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005, "Energy Independence and Security Act of 2007" *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed/Future Specification |
| Standard Size and Compact Residential Dishwashers[3] | *Standard models*: Energy Independence and Security Act of 2007 specified: effective 1/1/2010:<br>Standard Size: 355 KWh/year<br>(.62 EF + 1 watt standby)<br>WF ≤ 6.5 gallons/cycle<br>Compact Size: 260 kWh<br>WF ≤ 4.5 gallons/cycle<br><br>EF is the number of cycles the machine can run for each kWh of electricity | Also specified by the Act: DOE shall publish final rule by 1/1/2015 determining if dishwasher standards will change effective 1/1/2018. | Energy Star (DOE) Effective since July 1, 2009<br>Standard Size:<br>324 kWh/year<br>WF ≤ 5.8 gallons/cycle<br>Compact Size:<br>234 kWh/year<br>WF ≤ 4.0 gallons/cycle<br><br>kWH/yr is replacing EF since it includes the cycles the machine can run for each kWh, but also includes up to 8 kWh/yr of standby power (when the machine isn't cycling) | Energy Star effective July 1, 2011:<br>Standard Size:<br>307 kWh/yr<br>5.0 gallons per cycle<br><br>Compact Size:<br>222 kWh/yr<br>3.5 gallons per cycle | *Effective Aug. 11, 2009:*<br>*Standard models*: EF; maximum kWh/year<br>Tier 1:<br>EF ≥ 0.72 cycles/kWh; and 307 max kWh/year; 5.0 gallons per cycle<br>Tier 2:<br>EF ≥ 0.75 cycles/kWh; 295 max kWh/year; 4.25 gallons per cycle<br>*Compact models*:<br>Tier 1:<br>EF ≥ 1.0 cycles/kWh; 222 max kWh/year; 3.5 gallons per cycle | Could adjust Tiers after July 1, 2011 when new Energy Star becomes effective |

[3] ***Standard models***: capacity is greater than or equal to eight place settings and six serving pieces; ***Compact models***: capacity is less than eight place settings and six serving pieces

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## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005 *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/ Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed /Future Specification |
| Commercial Toilets | 1.6 gpf[4]/6.0 Lpf<br>Except blow-out fixtures: 3.5-gpf/13 Lpf<br>Note: Some states prohibit blow-out at 3.5 gpf | 1.28 gpf/ 4.8 Lpf proposed by efficiency advocates for tank-type only | Tank-type only:<br>WaterSense at 1.28 gpf (4.8L) with at least 350 gram waste removal + LA Spec. | Flushometer valve/ bowl combinations: WaterSense specification in development. No release date promised. | No specification | |
| Commercial Urinals | 1.0 gpf | 0.5 gpf/ 1.9 Lpf proposed by efficiency advocates | WaterSense =<br>0.5 gpf/1.9Lpf (flushing urinals only) | | No specification | |
| Commercial Faucets | Private faucets:<br>2.2 gpm at 60 psi[5]<br>Public Restroom faucets:<br>0.5 gpm at 60 psi[5]<br>Metering (auto shut of) faucets:<br>0.25 gallons per cycle[6] | | | WaterSense draft specification now under consideration | No specification | |

[4] EPAct 1992 standard for toilets applies to both commercial and residential models.

[5] In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code for all except private applications, private being defined as residential, hotel guest rooms, and health care patient rooms. All other applications subject to the 0.5 gpm/1.9 Lpm flow rate maximum.

[6] Metering faucets not subject to flow rate maximum

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psi: pounds per square inch
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Lpf: Litres per flush

*Updated March 2010*
*Koeller/Dietemann*

## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005 *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/ Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed /Future Specification |
| Commercial Clothes Washers (Family-sized) | MEF ≥ 1.26 $ft^3$/kWh; WF ≤ 9.5 gal/cycle/$ft^3$ | New standards under development: DOE scheduled final action: January 2010; Rulemaking process postponed by DOE in 2008; began again in Dec. 2009. | Energy Star (DOE) MEF ≥ 1.72 $ft^3$/kWh/cycle; WF ≤ 8.0 gal/cycle/$ft^3$ | | Adopted Jan 1, 2007 (Note: this spec covers only normal capacity family washers, NOT large capacity commercial washers) Tier 1: 1.80 MEF 7.5 gal/cycle/$ft^3$ Tier 2: 2.00 MEF 6.0 gal/cycle/$ft^3$ Tier 3: 2.20 MEF 4.5 gal/cycle/$ft^3$ | |

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psi: pounds per square inch
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*Updated March 2010*
*Koeller/Dietemann*

## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005 *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/ Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed /Future Specification |
| Commercial Dishwashers | No standard | | Energy Star (EPA) using NSF/ANSI standards for water use and ASTM standards for energy use<br>Effective **10/11/2007**<br>*Under counter*:<br>Hi Temp: 1.0 gal/rack; <= 0.90 kW; Lo Temp 1.70 gal/rack <= 0.5 kW<br>*Stationary Single Tank Door*:<br>Hi Temp: 0.95 gal/rack; <= 1.0 kW<br>Lo Temp: 1.18 gal/rack; <= 0.6 kW<br>*Single Tank Conveyor*:<br>Hi Temp: 0.70 gal/rack; <= 2.0 kW;<br>Lo Temp: 0.79 gal/rack; <= 1.6 kW<br>*Multiple Tank Conveyor*:<br>Hi Temp: 0.54 gal/rack; <= 2.6 kW<br>Lo Temp: 0.54 gal/rack;<br><= 2.0 kW | | No specification | |

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*Updated March 2010*
*Koeller/Dietemann*

## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005 *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/ Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed /Future Specification |
| Automatic Commercial Ice Makers[7] | Effective 1/1/2010:<br>Energy and condenser water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table) | | Energy Star (EPA)<br>Energy and water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table). Water cooled machines excluded from Energy Star | | Energy and water (potable and condenser) standards are tiered and vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table) | |
| Commercial Pre-rinse Spray Valves (for food service appli-cations) | Flow rate ≤ 1.6 gpm (no pressure specified; no performance requirement) | | No specification | Proposed Energy Star specification abandoned after standard established in EPAct 2005; WaterSense specification in development in conjunction with Energy Star | No specification (program guidance recommends 1.6 gpm at 60 psi and a cleanability requirement) | |

[7] Optional standards for other types of automatic ice makers are also authorized under EPAct 2005.

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## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

***Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)***

| Fixtures and Appliances | EPAct 1992, EPAct 2005 *(or backlog NAECA updates)* | | WaterSense® or Energy Star® | | Consortium for Energy Efficiency | |
|---|---|---|---|---|---|---|
| | Current Standard | Proposed/ Future Standard | Current Specification | Proposed/Future Specification | Current Specification | Proposed /Future Specification |
| Commercial Steam Cookers[8] | No standard | | Energy Star (EPA)<br>*Electric*: 50% cooking energy efficiency; idle rate 400–800 Watts<br>*Gas*: 38% cooking energy efficiency; idle rate 6,250–12,500 British thermal units/hour<br>*No specified water use factor | | *Electric*: 50% cooking energy efficiency; idle rate 400–800 Watts<br>*Gas*: 38% cooking energy efficiency; idle rate 6,250–12,500 British thermal units/hour<br>Water Use Factor (for both electric and gas models):<br>Tier 1A: ≤ 15 gal/hr<br>Tier 1B: ≤ 4 gal/hr | |

[8] Idle rate standards vary for 3-, 4-, 5-, and 6-pan commercial steam cooker models.

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## National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances

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### Information/materials on EPAct 2005/NAECA standards:

Schedule for development of appliance and commercial equipment efficiency standards:
http://www.eere.energy.gov/buildings/appliance_standards/2006_schedule_setting.html

Commercial Clothes Washers and Dishwashers (agenda/presentations at 4/27/06 DOE public meeting on rulemaking):
http://www.eere.energy.gov/buildings/appliance_standards/residential/home_appl_mtg.html

Automatic Commercial Ice Maker Standards:
http://www.eere.energy.gov/buildings/appliance_standards/pdfs/epact2005_appliance_stds.pdf (Page 18)

Pre-rinse Spray Valves
http://www.eere.energy.gov/buildings/appliance_standards/pdfs/epact2005_appliance_stds.pdf (Page 10)

### Information/materials on WaterSense specifications:

Toilets
http://www.epa.gov/watersense/products/toilets.html

Urinals
http://www.epa.gov/watersense/products/urinals.html

Bathroom Lavatory Faucets
http://www.epa.gov/watersense/products/bathroom_sink_faucets.html

### Information/materials on Energy Star specifications:

Residential Clothes Washers
http://www.energystar.gov/index.cfm?c=clotheswash.pr_crit_clothes_washers

Commercial Clothes Washers
http://www.energystar.gov/index.cfm?fuseaction=clotheswash.display_commercial_cw

Residential Dishwashers
http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers

Commercial Dishwashers
http://www.energystar.gov/index.cfm?c=new_specs.comm_dishwashers

Automatic Commercial Ice Makers
http://www.energystar.gov/index.cfm?c=new_specs.ice_machines

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MEF: modified energy factor
MaP: maximum performance

NAECA: National Appliance Energy Conservation Act
psi: pounds per square inch
WF: water factor
Lpf: Litres per flush

Commercial Steam Cookers
http://www.energystar.gov/index.cfm?c=steamcookers.pr_steamcookers

## Information/materials on CEE specifications:

Residential Clothes Washers
http://www.cee1.org/resid/seha/rwsh/rwsh-main.php3

Residential Dishwashers
http://www.cee1.org/resid/seha/dishw/dishw-main.php3

Commercial, Family-Sized Clothes Washers
http://www.cee1.org/com/cwsh/cwsh-main.php3

Commercial Ice-Makers
http://www.cee1.org/com/com-ref/ice-main.php3; Spec Table: http://www.cee1.org/com/com-kit/ice-specs.pdf

Pre-rinse Spray Valves
http://www.cee1.org/com/com-kit/prv-guides.pdf

Commercial Steam Cookers
http://www.cee1.org/com/com-kit/sc-hc-specs.pdf