Appendix A

MnTAP

Water Conservation Tips

MnTAP Launches Water Conservation Project in North and East Metro

The Minnesota Technical Assistance Program (MnTAP) located at the University of Minnesota in Minneapolis is pleased to announce the launch of a project to identify water conservation opportunities aimed at industrial water users in the north and east twin cities metro area. The project is supported by the Metropolitan Council with Clean Water Funds and focuses on portions of Anoka and Hennepin Counties, and all of Ramsey and Washington Counties. This area has been defined by the Department of Natural Resources as a groundwater management area in need of attention for maintaining sustainable water supplies. The project includes:

- Identification of industrial water users
- Outreach and awareness raising of the importance of water conservation, including a frequent electronic newsletter with tips for best practices and presentations to area organizations
- Assessments of industrial site water use with recommendations for improvement by MnTAP staff members

Water conservation has received significant attention from agency, public, and media sources in recent years. This project will focus on the impact of industrial water use in a growing Minnesota metro area, and will raise awareness and help identify solutions to maintain sustainable supplies of clean water for all users.

Contact MnTAP for More Information

CLEAN WATER LAND & LEGACY AMENDMENT

Let us know if you are interested in getting involved in this water conservation project, at no cost to your business. We welcome your questions and ideas for future newsletter topics, so please send them our way! For questions or further information, contact Mick Jost, MnTAP Program Coordinator and project lead, at 612.624.4694.

The Minnesota Technical Assistance Program acknowledges and appreciates the Metropolitan Council Environmental Services Water Supply Planning Group expertise and project management support of this Clean Water, Land, and Legacy Amendment sponsored project.

MnTAP is a non-regulatory program in the School of Public Health at the University of Minnesota and is funded by the Minnesota Pollution Control Agency.

Did You Know...

Water may seem like an unlimited resource, especially here in the land of 10,000 lakes. However, there are hidden, real costs to using water. Direct costs that should be added to find the true cost of water usage include:

- Softening
- Heating and/or cooling
- Chemical treatment
- Filtration
- Ultrapurification
- Pumping
- Sewer fees, including strength charges

Indirect costs that may not be readily apparent include:

- Infrastructure maintenance and repair
- Loss of competitive advantage due to non-optimized resource use
- Increased pumping costs due to declining water levels in aquifers
- Legal fees related to environmental remediation
- Company reputation and public perception

Knowing the full extent of water usage and creating a water map to track use can help identify areas for conservation as well as create a benchmark that can be used to measure future improvements. If the water use is not known then cost savings gained by water use reduction cannot be calculated. Talk to the employees involved in water intensive processes and see if there are areas where their experience points to water use reduction though process optimization or best practices implementation.

So, how is your water supply cost related to your processes? We will be exploring costs, energy implications, simple and effective water use alternatives, equipment optimization, and more in technical detail in the coming editions of this e-newsletter, providing helpful tips on how to improve YOUR cost control, water efficiency, and the environmental impact of water resources.

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612.624.1300 • 800.247.0015 (Minnesota only) • FAX 612.624.3370 • www.mntap.umn.edu

MnTAP

Water Conservation Tips

Do your water conservation challenges need a second set of eyes?

The Minnesota Technical Assistance Program (MnTAP) water conservation project with Metropolitan Council Environmental Services (MCES) is focused on industrial water users in the north and east twin cities metro area. An important part of this project is the opportunity to qualify for engineering interns to work on water conservation at your facility. If you could use help with water balances, water optimization, sewer access or strength charges, and water/energy costs, contact MnTAP now to discuss an intern project proposal.

We can support three water conservation intern projects in the MCES service area for the summer of 2015. In 2013, MnTAP had three successful water conservation projects supported by MCES outlined in our 2013 Solutions publication and another MCES intern project in 2014.

We are currently lining up projects and allocating our technical staffing capacity, and the first step is to make contact with Mick Jost, at jostx003@umn.edu to talk about your ideas, and to arrange for a free, confidential site assessment to scope out a potential 2015 intern project. If you would like more information about our long-standing intern program and project successes, company roles and responsibilities, or how to apply, visit http://mntap.umn.edu/intern/business.htm.

Don't delay:

The MnTAP intern project development and application deadline is January 15, so apply for an intern project today! After that date, our focus will be on finding the best, most qualified student to fit your project needs and fulfill the project objectives and goals.

Contact MnTAP for More Information

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Did You Know...

A drop of water seems tiny but over time it could quickly add up to a significant amount. Did you know that a 1/32" leak (about the size of a pencil period), with water pressure of 60 pounds per square inch (psi) would lose 131,040 gallons of water a year*? If this leak is a hot water leak, energy is being wasted in addition to water. Leak prevention and repair is a relatively inexpensive way to cut down inefficient water use. Here are some suggestions on determining when there may be a water leak:

- Know your water use--track it and record it. A sudden spike in consumption without a change in production or use habit may signify a leak.
- Perform a water audit. If more water enters than exits there may be a leak.
- Determine the baseline consumption when there is no water use activity on the site. This baseline should be a good indicator of overall leakage.
- Shutoff the water supply and check the meter readings. If the meter advances this could mean underground leaks.
- For tanks, measure the water level over a period of time when there is no extraction or other activity. If the level drops lower with time, this may indicate a leak.
- Do routine leak detection and maintenance of the entire water network. Leaks may develop anywhere along the water distribution network, including unseen places such underground water tanks and hidden pipes. Places to check include restroom and shower facilities, kitchen and food preparation spaces, washdown areas and janitor closets, water fountains, water lines, water delivery devices, process plumbing, tank overflow valves, heating and cooling areas, and landscape irrigation systems.
- Moisture, mold growth or wall surface irregularities along the water network may indicate a hidden leak.
- An unexplained warm spot on the floor may indicate an underground leak of hot water.
- Toilets may leak silently. Do a dye test by dropping a non-staining indicator specific for this purpose in the tank and checking for spread of the dye in the bowl after 15-30 minutes. The dye should never spread to the bowl. If it does a tank flapper may need replacement.
- Ultrasonic equipment for compressed air and steam trap leaks can be used for water leaks too. Water leaks, especially small ones are quiet and more difficult to find. Use solid probes on the supply piping to hear water sounds evident in slow leaks at suspect equipment.
- Get a basic handle on the impact of your leak costs for water, heated water, and sewered water using the following water leak cost calculator:

  http://fishnick.com/savewater/tools/leakcalculator/ (used with permission)

  *http://www.burgy.org/Pages/WilliamsburgMA_WaterComm/leaks (used with permission)

About MnTAP

WTN-2 11/6/14

A program of the University of Minnesota, MnTAP offers a variety of technical assistance services to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution, increase energy efficiency, and reduce costs. Our information resources are available online at <mntap.umn.edu>. Please call MnTAP at 612.624.1300 or 800.247.0015 for personal assistance.

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Mn TAP

Water Conservation Tips

Start 2015 with resources to tackle water conservation opportunities

MnTAP's water conservation project with Metropolitan Council Environmental Services (MCES) is focused on industrial water users in the north and east twin cities metro area. Using MnTAP's experienced staff and project-dedicated engineering interns, you could benefit from tailored water-use conservation strategies and solutions at your facility in 2015.

Take a moment to reflect on how much water is used (and the associated fees), the inputs needed to make it useful (softening, reverse osmosis, de-ionization, heating, cooling), wastewater treatment, and add all those costs per gallon together. With water use as important (and costly) as it is in your facility, the new year is a great time to give water conservation some renewed attention.

The experienced staff at MnTAP can help with our free, confidential technical assistance. But if the complexity of your processes requires extensive and detailed help with water balances, water optimization, sewer access or strength charges, and water/energy costs, we can talk about what an intern might accomplish working 40 hour per week for 500 hours over the course of the summer.

This metro water conservation project can support three intern projects in the MCES service area in 2015. We are currently lining up projects and allocating our technical staffing capacity to advise these projects. Make 2015 a year to chalk up water conservation gains on your list of environmental improvement projects.

To arrange for a free, business confidential site assessment to scope out an intern project, contact MnTAP at mntap@umn.edu. If you would like more information on MnTAP's long-standing successes with water conservation internships or background on what businesses should do to apply, visit http://mntap.umn.edu/intern/business.htm.

Contact MnTAP for More Information

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Mn TAP University of Minnesota

Did You Know...

Boiler system water use involves several pathways that need routine attention. Phase conversion from hot water to steam uses varying amounts of water depending on the amount of condensed steam returned, system size, and the amount of steam required.

- Boiler system best management practices include:
    - fine tuning the fuel combustion to minimize excess combustion air
    - maintaining the quality of system water
    - making sure the equipment, especially the steam traps, are functioning effectively
- Next, let's focus on steam traps. A stream trap is an in-line device used to discharge condensate and noncondensable gases with negligible loss of live steam. Much like leaks in a compressed air system, malfunctioning steam traps rob the system of its efficiency, losing heated water/steam to the surrounding environment. In steam systems that are not routinely inspected, 15-30% of steam traps could be failing and allowing steam to escape, thereby wasting energy and money.
- Facilities can reduce failure rates to less than 5% by developing and implementing a regularly scheduled trap maintenance and testing program, including cleaning strainers upstream of traps.
- A starting point in regular trap maintenance is to look for steam venting in the system and listening for increases in sound levels over time. Absence of temperature variation in front and behind the steam trap (30-40°F) is also an indication of a malfunction.
- Returning condensate back to the boiler for an already hot input reduces overall energy and water use. Less condensate discharged into a sewer system reduces disposal costs.
- Return of high purity condensate also reduces energy losses due to boiler blowdown. Significant fuel savings occur as most returned condensate is relatively hot (130°F to 225°F), reducing the amount of cold makeup water (50°F to 60°F) that must be heated. If any surface temperatures in the boiler system are greater than 120°F, it will pay to insulate.
- Overall boiler water supply, chemical use, and operating costs can be reduced up to 70% by recycling the condensate for reuse-*1*.

1 - Federal Energy Management Program, http://energy.gov/eere/femp/best-management-practice-8-boiler-and-steam-systems

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MCES - GWMA-3 12/23/14

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Water Conservation Tips

2015 New Year Resolutions

How does the water health of your company look for 2015? Will you be able to operate as effectively if future water sources are limited or if future water costs increase drastically? Water supply challenges are becoming a reality in some areas of our state.

Has your company done a thorough audit of water usage and identified areas for conservation? With the start of a new year, now is a great time to do so. By using water efficiently, the costs associated with its use can be minimized. This will help maximize your company's health as well as the security of our future water supply.

MnTAP help is just a phone call away. We offer free technical site visits by veteran staff with over 150 years combined program and industry experience. In addition, the MnTAP intern program for summer 2015 offers a valuable, cost-effective opportunity to have a full-time, dedicated, onsite engineering intern, advised by experienced MnTAP staff, to tackle your company's water efficiency issues this summer. Contact Mick Jost at jostx003@umn.edu or 612-624-4694 to talk about your ideas, and to arrange for a free, confidential site assessment to scope out a water conservation project possibility.

Contact MnTAP for More Information

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University of Minnesota

Did You Know...

Cooling systems are found in a wide variety of industries. Common cooling systems include once-through/single pass cooling, cooling towers, evaporative cooling and equipment cooling. Each has operating parameters that need to be monitored and routinely adjusted to ensure water is not wasted.

Equipment that may utilize once-through (single pass) cooling includes ice machines, degreasers, vacuum pumps, air compressors, condensers, CAT scanners, hydraulic equipment, welding machines, x-ray equipment, and some air conditioners. Once-through systems offer the greatest water savings since they are the most water intensive and have permitted-use limitations. Once-through (single pass) systems in Minnesota using 5 million gallons or more annually are prohibited in most situations. Cooling towers use 50 to 90% less water than once-through systems because of recirculation but there is still water loss in the form of evaporation, drift, bleed-off/blow down and other effects that may be minimized. No matter the system, ensure that the cooling system is not providing more cooling than necessary to conserve both water and energy. Here are tips on how to reduce water use on different cooling systems:

1. Once-through (single pass) cooling systems:
    - If replacement is not an option, operate these systems only when necessary by installing automatic control devices such as auto shut-off valves.
    - Compare exit temperatures of like equipment. Different exit temperatures may mean one system is using more water than another.
    - Ensure operation is within minimum flow parameter requirements for cool load.
    - Replace it with air or oil cooled systems.
    - Close the loop and recirculate the water.

2. Cooling towers
    - Operate the system within manufacturer limits, including load, water tower pressure, and air flow rates.
    - Carefully monitor the water quality for contaminants and amount of water used to ensure operation is in specified limits and to minimize unnecessary bleed-off and other losses. Metering the bleed-off and make-up lines will help with this task.
    - Reduce bleed-off and operate at higher cycles of concentration. This will require monitoring the water quality and physical or chemical treatment of the recycled water to prevent scaling and fouling.
    - Upgrade the bleed-off system to have an automatic conductivity controlled system. If this is already in place, have a regular maintenance program set up to regularly clean and calibrate the system. Faulty readings can lead to excessive water usage.
    - Optimize water treatment. This may involve looking at different/ additional chemicals or other methods such as the addition of sulfuric acid or using in-line or side-stream (off-tower) filtration.
    - Avoid running the cooling tower when not needed. Auto shutoff controls may make this easier.
    - Install drift eliminators or arrestors to minimize drift loss. If these are already in place, check that they are of the correct design, installed correctly, and maintained properly. Modern drift eliminators can result in a drift loss less than 0.002%.
    - Install anti-splash louvres, splash mats or windbreaks to minimize splash loss.
    - Shade system from sunlight to help reduce biological growth on evaporative surfaces
    - Use variable speed fans to adjust settings based on loads to control water evaporation.
    - Prevent overflow through appropriate water level operation, correct plumbing, and valves in good working condition.Identify ways to reduce the cooling load.
    - Keep evaporative surfaces clean.
    - Use a supplemental water source such as harvested rainwater or air handler condensate.
    - Perform regular maintenance and fix leaks.

3. Evaporative cooler optimization
    - Replace a non-circulating system with an air cooled or recirculating system.
    - If bleed-off is more than a few gallons/hour for each 1000 ft3/min of air flow, check system for leaks, equipment malfunction or necessity of pad replacement.
    - Saturate the evaporation pads before turning the fan on by running the water pump.
    - Perform routine maintenance and annual tune-up: cleaner pads mean higher efficiency.
    - Turn cooler off when not in use.

4. Equipment cooling systems optimization
    - Replace non-circulating system with air cooled or recirculating system.
    - Reuse cooling water for applicable processes or uses.

While consumption of water is necessary for many business operations, opportunities are available to conserve while still being productive. It is important that the value water provides is optimized rather than squandered.

MnTAP

Water Conservation Tips

N&E Metro GWMA update - Intern projects filled, but site assessments always available

2015 water conservation intern projects have been identified and we are in the process of finding the best students for those jobs. If you missed getting an intern for 2015, that doesn't mean your water projects and conservation priorities need to move to the back burner. MnTAP staff is available to conduct water conservation assessments at your site. We will provide free and confidential site assistance with detailed water process evaluations that will get your projects underway. A MnTAP scientist or engineer will walk through your facility with you to identify water use processes or procedures that could possibly be improved. Written recommendations will be followed up by phone calls to answer questions or offer additional assistance.

MnTAP has been here to help Minnesota business and industry with their environmental efficiency challenges for 30 years and we are ready to assist your business. If you are interested in a free, confidential water efficiency site assessment, contact Mick Jost, MnTAP Program Coordinator and project lead, at jostx003@umn.edu or 612-624-4694 to make arrangements.

Contact MnTAP for More Information

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MnTAP UNIVERSITY OF MINNESOTA

Did You Know...

To get the most productivity out of water it makes sense to analyze the water flow throughout your facility and see where it can be reused or serve additional purposes instead of discharging after only one use. By analyzing each water use stream individually for opportunities, you may be able to reduce water supply costs, reduce sewer costs, and save on treatment chemicals and energy.

For example, multiple uses of non-contact cooling water might be feasible under the right conditions. It's a clean water source usable for other process applications if each of the process demands meets the supply. Here are some ideas where non-contact cooling water might be reused:

- Determine the flow needed to achieve the required temperature reduction of the equipment within a performance temperature margin of safety.
- Install flow controls to set flows to optimal levels, and turn off flows when not required.
- Check the calibration of controls to make sure they stay within set parameters. A simple test to see if you are using too much cooling water is to feel the inflow pipe and then feel the outflow pipe. Without a noticeable change in temperature, you could be using too much water and should investigate further.
- Instead of discarding water used in heat transfer, store it in an insulated vessel, or pump it to be reused in another process that can take advantage of the temperature differential embedded in the water.

More details about non-contact cooling water are found in the MnTAP water webpages at http://mntap.umn.edu/green-business/water/14.NoncontactCoolingWater.html, including highlights from several different kinds of companies that might operate like yours. A more detailed intern project success story about water use optimization (and substantial cost savings) in an Albert Lea metal fabrication facility is found at http://mntap.umn.edu/paint/resources/Lou-Rich.htm.

Results included spot welder cooling water flow throttled from 10 gallons per minute (gpm) to 1 gpm and the addition of timers and solenoids to synchronize water flow with use, reducing water use by 1.1 million gallons per year (gpy), saving $2,800.

MCES - GWMA-5 3/5/15

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Water Conservation Tips

No cost water conservation site assessments can net big cost savings

Interested in conserving water and saving money at your facility but uncertain where to start? MnTAP will provide free, confidential site visit assistance outlining detailed evaluations of process water, written recommendations, and follow up to answer questions and offer additional implementation assistance.

Water conservation assessments can shed light on opportunities to reduce pending metro sewer availability (SAC) charges. Assessments can also help with energy efficiency if the water is pumped, heated, or cooled. MnTAP has launched an effort to conduct water conservation assessments in the North and East Metro looking at both individual processes as well as the entire facility water use to help optimize conservation and maximize savings. If you are interested in seeing how much water and money your company can save, contact Mick Jost at jostx003@umn.edu / 612-624-4694 to make arrangements for a water conservation assessment.

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CLEAN WATER LAND & LEGACY AMENDMENT

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Did You Know...

Process washing and rinsing are important steps in a variety of industries that require passing a "clean and dry" criteria before the next step. Think about how your company meets that criteria from process to process and how and where water washing and rinsing can be optimized.

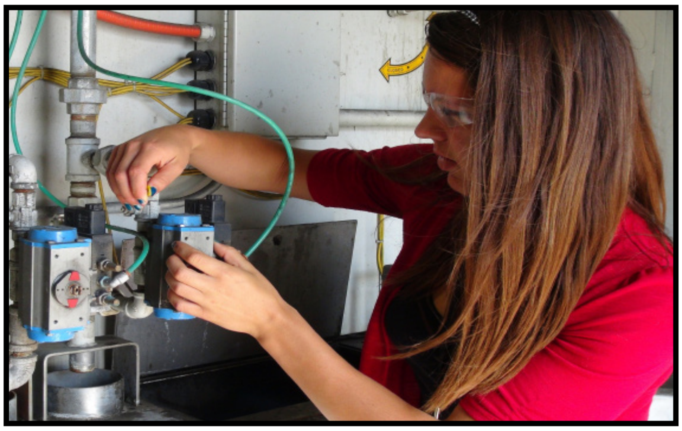
- Are your suppliers using oils and coatings that are difficult for you to clean when it gets to your process? Are there opportunities to negotiate a compromise that will save you and your supplier materials, time, and effort?
- Agitation, pressurized impingement, or higher temperature may be able to substantially aid the cleaning process in lieu of boosting the chemical concentration or adding process washing steps.
- Is the wash chemistry optimally matched to the cleaning need? In many cases, if the particulate and floating oil phases are removed, there is a reasonable chance that the cleaner supply life can be extended for additional applications. Chemical solutions should be routinely evaluated to ensure they are operating within an acceptable performance range.
- There is always a possibility that water/chemical washing may be the incorrect application, and that media blasting, or vibratory finishing maybe a better option.

In a complex, multi-step process where cleanliness is paramount, rinse steps play a critical role in removing contaminants and cleaners and are an important opportunity to optimize water use. Determine if less water can be used to achieve the same results, or if final (clean) rinses can be reused by routing them back into an earlier cleaning sequence. For example, rinse conductivity at a low enough concentration could allow for reuse of rinse water until a conductivity endpoint is reached. Water volume may or may not have the desired effect in rinsing. A mist may be just as effective as a soaking.

The process cleaning equipment setup could also have a significant impact on water conservation. Equipment factors for consideration include smaller tanks and sinks, intermittent and timed flow operated by float sensors and solenoid valves, covered tanks to reduce evaporation and contamination, and batch processing. For near-continuous cleaning such as in the sanitation-conscious food industry, cleaning process equipment in place (without disassembling) is definitely a more water-conservative choice.

Case Study

In 2013, a MnTAP intern came up with several suggestions to reduce water usage at Federal Cartridge in Anoka, MN. Her suggestions included installing timed rinse faucets, wash tub spray nozzles and automatic shut-off valves, recycling wastewater effluent, and recycling de-ionized water used in a condenser. These recommendations outlined annual potential savings of almost 5.5 million gallons of water and carried a cost savings opportunity of $95,000.



For a more detailed project summary, please see: http://www.mntap.umn.edu/intern/pdf/Federal%20Cartridge_Kaylea%20Brase.pdf

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Water Conservation Tips

North & East Metro Groundwater Management Area (GWMA) project update

MnTAP water conservation intern projects this year span a variety of facilities. We are looking forward to a busy summer working with each company to guide the projects towards substantial water saving results. Within the boundaries of the GWMA, there are two projects: City of Woodbury and Xcel Energy Riverside. Outside the boundary, but still in the metro, are projects at Sanimax in South St. Paul and Lloyds BBQ in Mendota Heights. Some of the other nine intern projects for 2015 also have some focus on water conservation.

There is no need to wait for the summer 2016 MnTAP internship program to launch your water conservation projects. MnTAP program staff can assist you in launching your conservation projects right now with detailed water process evaluations and written recommendations, and then follow up to answer questions or offer additional assistance in moving toward implementation.

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Did You Know...

Depending on facility operations and the size of the workforce, domestic water use can account for a significant portion of total industrial water use. Operating three shifts with lots of workers, locker rooms, and a work environment that calls for shift change showering add up to a surprising amount of water use. Fixture improvements can help quantify potential water savings typically flying under the radar.

Efficiency improvements to fixtures have been and continue to be made. The table below shows some of the performance improvements available now and the most conservative estimate of savings.

Fixture	Standard gallons per minute/flush	New gallons per minute/flush	Savings gallons per minute/flush
Faucets	2.2	1.5	0.7 (32%)
Toilets	1.6 [3.5 - 7 for pre 1992]	1.28	0.3 (20%)
Urinals	1 - 5	0.5	0.5 - 4.5 (50 - 90%)
Showers	2.5	2.0	0.5 (20%)

Let's make some real-world sense of the small numbers in the table with the following potential scenario:

Acme Industries has 60 employees: 30 males and 30 females (total for all three shifts), 5 days a week, for 250 work days in 2015. Let's assume these 60 people use the bathrooms 4 times during the work shift:-urinals for the males and toilets for the females, and everyone washes their hands each bathroom visit for 20 seconds. Let's also say that Acme has a policy that everyone showers and changes from work clothes before leaving to go home, and we'll use a 10 minute shower as a reasonable amount of time. Domestic water consumption over a year looks like this:

60 employees	Total annual use	Standard rate of water use	New rate of water use	Using improved fixtures annual savings
Toilet	30,000 flushes	1.6 gpf (48,000 gallons)	1.28 gpf (38,400 gallons)	9,600 gallons
Urinal	30,000 flushes	1 gpf (30,000 gallons)	0.5 gpf (15,000 gallons)	14,000 gallons
Hand wash	60,000 washes	2.2 gpm (44,000 gallons)	1.5 gpm (30,000 gallons)	15,000 gallons
Shower	15,000 showers	2.5 gpm (375,000 gallons)	2.0 gpm (300,000 gallons)	75,000 gallons
Total water		497,000 gallons	383,400 gallons	113,900 gallons

(1) Regional Water Providers Consortium in the greater Portland, Oregon metropolitan region, http://www.conserveh2o.org/toilet-water-use

(2) Dept. of Environmental Engineering Sciences, University of Florida http://www.sswm.info/sites/default/files/reference_attachments/MARTIN%20and%20HEANEY%20 2008%20Water%20Use%20by%20Urinals.pdf

In the simplest metro system wastewater cost terms, 113,600 gallons of water saved is 311 gallons per day, the equivalent of slightly over one sewer availability charge (SAC) unit (a SAC unit equals 274 gallons per day). In real cost, one SAC base unit added to your metro utility bill would be $2,485. Water supply cost savings would be realized as well. You could make long-term improvements to a lot of fixtures with that money. Don't overlook how much energy it takes to heat water for the standard sink and shower fixtures from 55°F to 120°F. Heating 89,000 gallons of excess water with electric energy at $0.08 per blended kWh is estimated at around $1,100. The natural gas energy cost at $0.60 a therm is around $288.

Do you want to learn more on your own about how water conservation can be practically applied in your business or industry, or even in your home? Consider browsing through the Environmental Protection Agency (EPA) WaterSense website www.epa.gov/watersense, as well as WaterSense at Work (http://www.epa.gov/watersense/commercial/docs/watersense_at_work/)

About MnTAP

MCES - GWMA-7 5/14/15

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Water Conservation Tips

North & East Metro Groundwater Management Area (GWMA) project update

The student selection process for the intern projects has been completed and projects are already beginning. The project with the City of Woodbury will be working to optimize irrigation systems to minimize water use for a variety of commercial properties. This project is exciting because of the potential it offers in developing Minnesota best practice irrigation methods that can be used on other properties (commercial or residential) and in other communities.

Are you excited about the prospect of water savings but disappointed that you did not receive an intern or discovered the intern program too late? Another objective of this project includes free, confidential site assessments with detailed water process evaluations, written recommendations, and follow-up to answer questions or offer additional assistance in moving toward implementation. You may be surprised to see how conserving water can actually produce savings in other areas as well, such as heating and cooling costs, chemicals used in water solutions, and metro SAC charges.

We have on site assessments available, and are ready to help industrial facilities in the GWMA reduce water use. Contact Mick Jost at jostx003@umn.edu / 612-624-4694 to make arrangements for an assessment today.

Contact MnTAP for More Information

Let us know if you are interested in getting involved in this water conservation project, at no cost to your business. We welcome your questions and ideas for future newsletter topics, so please send them our way! For questions or further information, contact Mick Jost, MnTAP Program Coordinator and project lead, at jostx003@umn.edu or 612.624.4694.

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Did You Know...

Experts estimate that 50% of the water used in landscape irrigation is wasted through overwatering. Here are some signs that you may be overwatering: water runoff, water-logged turf hours after the sprinklers have been off, fungal growth, and grass that looks wilted despite being watered. The latest innovations in irrigation controllers can help reduce this waste by controlling the watering schedule based on local weather and landscape conditions rather than a preset timer that waters independently of whether it rained yesterday or will rain tomorrow.

Regular inspection and maintenance could also help prevent unnecessary water loss and huge water bills. Irrigation systems should be checked for broken sprinkler heads and leaky valves. Sprinkler heads should also be adjusted so that only lawn is being watered and not paved or impermeable areas.

If you are in the market for a new irrigation system, choose a drip irrigation system over sprinklers. Water use with drip systems may be as much as 70% less since wind drift, evaporation, and runoff losses are minimized. If considering a new landscape, consider the use of native water-efficient plants, mulch, putting in an efficient water system, landscape fabric rather than solid plastic sheeting and permeable hardscaping. By limiting lawn areas, mowing and maintenance costs will be reduced as well. Consider reseeding or starting new lawns with drought tolerant species, such as some fescue grasses. Here are some additional tips to keep in mind to help conserve water:

- Water when evaporation will be minimized, during early morning and early evening.
- Water deeply and less often to encourage deeper root growth.
- Do not water when it is windy or raining.
- Do not water all plants at the same time. Customize application so that each plant type receives the appropriate amount of water and is not overwatered. Also, water appropriately for each season.
- Adjust sprinkler heads so that water is going where it is needed.
- Keep the grass height at least 3.5”. Longer grass can retain water better and longer turf also shades weeds and weed seeds, preventing them from taking hold and thriving.

If your facility has a lot of roof square footage, consider a rainwater collection system for some specific plant irrigation needs. Read how CHS Field, the home of the St Paul Saints baseball team has the potential to collect an estimated 480,000 gallons of rainwater a year to irrigate fields and flush toilets: http://www.twincities.com/localnews/ci_27568765/st-paul-saints-new-ballpark-among-greenest-country. For an approximation of how much water your facility rooftop can generate, look at the rainwater harvesting calculator example below.

Catchment Area to Runoff Yield Assuming 90% Runoff				
Rainfall (inches):	1	2	3	4
Catchment (sq feet)	Yield: Gallons of Rainwater (rounded to nearest whole gallon)			
3000	1683	3366	5049	6732
3100	1739	3478	5217	6956
3200	1795	3590	5386	7181
3400	1907	3590	5386	7181
3500	1964	3927	5891	7854
3600	2020	4039	6059	8078
3700	2076	4151	6227	8303
3900	2188	4376	6564	8752
4000	2244	4488	6732	8976
Actual square footage				
44000	24684	49368	74052	98736
[Precipitation in Minneapolis = 30.64 inches/yr (www.usclimatedata.com)				

The on-line version factors in variables for the catchment area (roof area in square feet) to runoff yield (the percent assumption of how much runoff capture is possible) and the average area rainfall to show collection based on 1, 2, 3, or 4 inch rainfall events. In the case of the example above, a formula to arrive at the total square feet was added. So for a 44,000 square foot facility recovering most of a 1 inch rainfall, the total water available would be over 24,000 gallons. Over an entire year, the total volume of precipitation available from a 44,000 square foot roof is approximately 740,000 gallons.

Water Conservation Tips

North & East Metro Groundwater Management Area (GWMA) project update

MnTAP research supported by the Metropolitan Council has determined that the largest industrial groundwater users in the GWMA are chemicals, food, paper, petroleum, and energy generation utilities. If your facility falls within any of these sectors, your water use—and water conservation potential—may be substantial. Emphasis on water stewardship continues to grow, and industrial sector water efficiency opportunities wait to be uncovered. MnTAP can help find those opportunities. Although the end of June signals the last remaining month in our current project support, there is still plenty of time for additional site assessments. MnTAP provides no-cost, confidential site assessment services including water conservation assessments anytime to improve your water resource efficiency.

Not in one of these sectors? Sign up anyway. Every industry has water conservation opportunities that are important to regional water conservation efforts. Be resource-smart, gain competitive advantage, and contribute to sustainable water use in Minnesota. Contact Mick Jost at jostx003@umn.edu / 612-624-4694 to make arrangements for an assessment soon.

Contact MnTAP for More Information

CLEAN WATER LAND & LEGACY AMENDMENT

Let us know if you are interested in getting involved in this water conservation project, at no cost to your business. We welcome your questions and ideas for future newsletter topics, so please send them our way! For questions or further information, contact Mick Jost, MnTAP Program Coordinator and project lead, at jostx003@umn.edu or 612.624.4694.

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Did You Know...

Even within the same industrial sector, like food production, water use savings vary appreciably between companies because of different products and process lines. Since each company uses water in specific ways, the best way to realize potential water savings is through a thorough analysis. Water use is often tied directly with heating and cooling costs, water process chemicals and metro SAC charges, so as a result the actual cost savings and benefits can be much higher than the actual water supply costs. The table below illustrates a few of the MnTAP intern projects in the food sector that focused on water efficiency. Recommended water savings ranged from 943,000 gallons to 30,593,000 gallons annually which equates to annual savings from $7,000 to $288,000.

Company	Annual Water Savings (gallons)	Annual Cost Savings ($)
Food Sector		
Northern Star/Michael Foods	30,593,000	$166,300
Malt-O-Meal	24,000,000	$288,000
Gedney	3,146,600	$155,230
CSM Bakery	1,802,000	$7,800
Kerry Ingredients	943,500	$7,000

At Northern Star/Michael Foods, water savings recommendations included lowering the water level in a washer, replacing a float in the basket washer, reducing water spray times, replacing a leaking solenoid, reusing RO reject water in another application, reusing scrubber water, installing auto fill valves on pump tanks, and optimizing surge bin water levels.

Malt-O-Meal water savings recommendations included reuse of non-contact cooling water and changing the boiler water treatment.

Gedney water savings suggestions included reuse of hot water overflow from one pasteurizer to another, reuse of fermentation tank brine, reduction of salt storage level, and fixing water leaks.

CSM Bakery water savings proposals include switching faucets and hose nozzles to low flow models and optimization of their Sanitation Standard Operating Procedure.

Kerry Ingredients water savings suggestions included fixing water leaks.

You can see from our experience in the food production sector that nearly all companies have water conservation opportunities, even when those companies make widely different products and use water is a variety of ways. More details of these projects are found at: http://www.mntap.umn.edu/intern/pastproj.htm.

MCES - GWMA-9 6/16/15

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Water Conservation Tips

GWMA water project final update and invitation

The summer intern projects will be concluding in mid-August. MnTAP would like to invite you to hear the results of their research at the 2015 MnTAP Intern Symposium on Thursday, August 20, 2015 from 12:00 - 5:00 p.m. at the McNamara Alumni Center on the University of Minnesota east bank campus. In addition to the City of Woodbury and Xcel Riverside water conservation-focused projects, there will be additional water conservation project presentations as well as project presentations concerning pollution prevention, energy efficiency, solid waste, and lean initiatives- 13 projects in all. Additional agenda information will be posted on the MnTAP website shortly.

This year-long project has focused on outreach and technical information on water conservation for business and industry in the North and East metro and was supported by the Metropolitan Council. We have engaged numerous stakeholders with e-newsletters like this one, provided technical content, and worked in depth with intern projects and water conservation site assessments. A year later, there is still much opportunity remaining to optimize industrial water use.

If your business could benefit from improved water use, water treatment or management costs, or water infrastructure issues, MnTAP remains in place to provide detailed site visits from experienced staff, or to work with you on developing an intern project application for summer 2016. Come to the symposium on August 20 to learn more about what's possible with an intern project and get a better sense of what the accumulation of 30 years of MnTAP expertise and assistance experience might be able to provide your facility.

Visit with Mick Jost at the symposium, or contact him at jostx003@umn.edu / 612-624-4694 to discuss your needs for water conservation assistance.

Contact MnTAP for More Information

CLEAN WATER LAND & LEGACY AMENDMENT

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Did You Know...

Many kinds of industries treat water before it is used to optimize its performance in a process or piece of equipment like a boiler or cooling tower. However, the water treatment process itself may not be optimized. A common water treatment process used in many industry sectors is reverse osmosis (RO). Portions of the following information are taken from a thorough 2013 study of industrial RO optimization for the US Department of Energy (DOE) (http://www1.eere.energy.gov/femp/pdfs/ro_optimization.pdf).

Industrial RO system efficiencies are typically between 40% and 60%, but with a fully optimized system, recovery rates can exceed 90%. As an example, the amount of raw water to produce 1 gallon of process water could be reduced from up to 2.5 gallons to 1.11 gallons. Some ways to optimize your RO system to improve water use efficiency include installing feed water pretreatment, using advanced membrane technology, and reconfiguring the water treatment flow. Depending on the source, feed water may contain either dissolved solids, suspended solids, or both. Pretreatment can reduce both, resulting in less membrane fouling and increasing the system efficiency rate. Possible pretreatment solutions include multimedia filtration, microfiltration, antiscalants and scale inhibitors, ion exchange (for softening), sodium bisulfite injections, and granular activated carbon.

Advances in RO membrane technology can increase the water recovery rate of your RO system. Thin film composite (TFC) membranes with embedded nano-particles change the structure of the thin film surface. This results in a higher permeability that allows more water to pass through while still meeting a high contaminant rejection rate. This membrane works with a lower operating pressure, meaning reduced pumping energy and increased water savings. Another membrane advance is low-biofouling feed spacers. These have a larger open cross-sectional area than traditional spacers which translates to a reduced pressure drop, more effective cleaning, and reduced fouling resulting in increased water productivity.

Re-configuring the water treatment flow can also increase the water efficiency of the system. By reusing the RO reject, water recovery rates can be as high as 95%. However, to effectively use the RO reject, an effective pretreatment system must be installed in that reject loop like the examples from Tobyhanna Army Depot and Sandia National Labs in the DOE citation referenced.

A 2013 MnTAP intern project at Tennant Company investigated reducing the RO unit pump size which could eliminate nearly 490,000 gallons of reject water annually, with a quick payback. In addition, pre-treatment equipment maintenance was expected to double the life of the RO membranes, reduce maintenance costs and save $3,600 per year.

Sometimes treated water going to waste can be reduced by something as simple as recycling a water sampling, testing, or bypass line stream. In a 2014 MnTAP intern project at TEL FSI Inc, de-ionized water bypass lines were being sent straight to sewer. Replumbing these bypass lines for reclamation had the potential to save 3.3 to 5.7 million gallons of water and $14,500 to $25,000 annually. For a more detailed summary of this project see: http://www.mntap.umn.edu/intern/pdf/TELFSI_David%20Binstock.pdf

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