



Biofuels

Reusing Municipal Wastewater

What is wastewater reuse?

Conserving Minnesota's water resources is important. Reusing municipal wastewater at industrial facilities is one way to conserve resources while supporting economic development. There are various ways in which an ethanol or other biofuel facility could use treated municipal wastewater. Various factors affect whether reuse is a viable option. This fact sheet discusses issues that need to be considered before implementing reuse at a facility.

The primary concern in reusing municipal wastewater is the protection of public health. Municipal wastewater contains pathogens and other microorganisms that could cause illness. Therefore, any potential contact with workers, or others nearby, is a primary concern when considering reuse.

This fact sheet uses the term "reuse" to describe the use of municipal wastewater or treated wastewater that is transferred to the facility from an outside source. For the purposes of this document, the term "recycling" describes water/wastewater reuse within the facility, for example the recycling of the facility's cooling-tower blow-down as process water supply.

Level of treatment needed for reuse

The highest level of risk for human contact may occur when municipal wastewater is being utilized in a process, or cooling/air conditioning involving cooling towers, evaporative condensers, or spray that creates mist. If this is the intended use, the wastewater needs to be "disinfected tertiary." This means a secondary-treated wastewater that is filtered and disinfected to achieve a total coliform bacterial concentration of no more than 2.2 MPN (most probable number) per 100 milliliters (ml) of wastewater sampled.

If the wastewater is used for boiler feed or cooling/air conditioning **not** involving cooling towers, evaporative condensers, or spray that creates mist, then the wastewater must be "disinfected secondary 23." This means a secondary-treated wastewater that is disinfected to an allowable coliform concentration of 23 MPN per 100 ml sample. This treated wastewater can also be used (provided other needed environmental, health and safety approvals are obtained) for activities such as roadway landscaping, nonstructural fire fighting, backfill consolidation around non-potable water pipe, soil compaction, mixing concrete, dust control on roads and streets, and cleaning roads, sidewalks, and outdoor work areas.

See Minnesota Pollution Control Agency "Municipal Wastewater Reuse" fact sheet (wq- wwr2-02) for more on specific treatment levels.

Factors to consider

Several factors influence whether treated municipal wastewater is a viable option for an industry. Each factor is site-specific and will differ between facilities. These include:

- **Additional treatment.** Is additional treatment of the municipal effluent required before it can be reused? Does the specific process using the effluent have specific water chemistry needs that necessitate treatment beyond that which the municipality can provide? Will the amount of nutrients (nitrogen and phosphorus) in the municipal effluent have a negative effect on any equipment by encouraging biological growth? Are emerging contaminants a concern (pharmaceuticals and personal care products, endocrine disruptors)? What about hardness and salts?
- **Impact on byproducts.** How will wastewater reuse affect the quality, marketability and management of dried distillers-grain solubles and other byproducts/co-products? Are there other agencies (Food and Drug Administration) or customers (livestock producers) that may have requirements that prohibit or restrict reuse?
- **Infrastructure.** How far away is the facility from the source water? What is the cost of building the infrastructure? Will these costs be shared? Between whom and how? How will workers and the public be protected by proper separation of potable water supplies and recycled water? How much will this separation cost and how will it be properly signed?
- **Management of treatment residuals** after reuse at the industry. How will residual treatment wastes be managed? What additional treatment steps are needed for these wastes to enable direct or indirect discharge of these residuals? Where will the treatment wastewater be discharged? What water-quality limits must be met, including pretreatment limits if discharged back to the municipal wastewater treatment facility (WWTF)? How much treatment is needed to avoid inhibition, interference and pass-through at the municipal WWTF? How will treatment residual solids be disposed of?
- **Quantity.** How much treated wastewater is needed? Is storage needed? How much can the city provide?
- **Water supply alternatives.** What are the other sources of water at the site: ground water, surface water, or municipal water supply? What sustainable contingency sources of water will supply the facility if the WWTF wastewater source is interrupted or discontinued?

Treatment considerations

Activities such as boiler and cooling-tower blowdown and reverse osmosis concentrate pollutants in water. Nutrients (phosphorus, nitrogen) and salts (chloride, sulfates) in particular are pollutants that concentrate during reuse. Industrial reuse of municipal wastewater may decrease the volume of wastewater discharged, but also may increase pollutant concentrations in the ultimate discharge. If those pollutants (for example, chloride) are not effectively removed before discharge, the discharge could be toxic to aquatic organisms. If the facility discharges wastewater to surface waters, water-quality standards must be met and will be reflected in a National Pollutant Discharge Elimination System / State Disposal System permit. If the facility returns the reused wastewater to the municipal wastewater treatment facility, there may be limits set by the MPCA and/or the municipality to reduce interference of treatment and pass-through of pollutants. Water-quality standards must be met by both the municipality and the industry. Pollutants such as sodium, chloride and sulfates can be especially problematic and costly to remove before discharge. If the reused wastewater is discharged back to the municipality, it is important to evaluate whether there is sufficient capacity in the WWTF. This includes the daily flows from the industry as well as the reused wastewater. Careful consideration should be given to the amount and costs of treatment needed for the residual wastes.

Be sure to contact MPCA early and often in the process of evaluating potential wastewater reuse for biofuel facilities. The following are helpful links about wastewater reuse.

- EPA Guidelines for Water Reuse
<http://epa.gov/nrmrl/pubs/625r04108/625r04108.pdf>
- Metropolitan Council Environmental Services
“Recycling Treated Municipal Wastewater for Industrial Water Use”
<http://www.metrocouncil.org/planning/environment/RTMWIWU/RecyclingWastewater.htm>
- Minnesota Ethanol Facilities and Wastewater Reuse, Metropolitan Council presentation
<http://www.pca.state.mn.us/publications/presentations/ethanol-0706-manning.pdf>