Who We Are

The Metropolitan Council owns, operates and maintains the Metropolitan Disposal System (MDS), which includes eight wastewater treatment plants and 600 miles of regional interceptor sewers that convey wastewater from municipalities in the Twin Cities area to the plants. The wastewater treatment plants process 250 million gallons of wastewater every day from 2.7 million residents in 108 communities. The effluents from the wastewater treatment plants are discharged to the Mississippi, Minnesota, and St. Croix Rivers. Consequently, each wastewater treatment plant is required by law under the Clean Water Act (CWA) and the Environmental Protection Agency (EPA) to have a National Pollutant Discharge Elimination System (NPDES) permit. Under these permits, a national pretreatment program must be implemented. The responsibilities of the regional pretreatment program are delegated to Metropolitan Council Environmental Services (MCES) for the Twin Cities area and administrated by the Industrial Waste & Pollution Prevention (IWPP) Section.

The objectives of the national pretreatment program are the following:

- Prevent interference at Publicly Owned Treatment Works (POTWs)
- Minimize pollutant pass-through to receiving waters
- Avoid residual solids contamination
- Protect health/safety of POTW staff

To fulfill these objectives, the IWPP Section regulates and monitors industrial discharges to public sanitary sewers to ensure compliance with local and federal regulations. The IWPP Section also responds to sewer-related spills and community sewer problems. These functions protect MCES and community collection/treatment facilities, operating personnel, and the environment, in addition to ensuring process efficiency.

A schematic of the national pretreatment program delegation for the Twin Cities is attached.

Industrial Discharge Permits

IWPP Section staff issue Industrial Discharge Permits to industrial users of the Metropolitan Disposal System (MDS). Industrial users are issued one of four different types of permit. Currently, 848 permits are in effect.

Permit Types:

Standard Permit

- Renewed every three years
- Conduct self-monitoring on a routine basis
- Submit discharge reports on a routine basis (quarterly, semi-annual, or annually depending on the wastewater volume)

General Permit

- Renewed every five years
- Not required to conduct self-monitoring
- Submit discharge reports annually

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Liquid Waste Hauler Permit

- Renewed every three years
- Liquid waste refers to domestic septage, commercial, and industrial waste
- Submit discharge reports on a routine basis (quarterly or semi-annual)

Special Discharge Permit

- Renewed every three years
- Special discharge refers to landfill leachate and contaminated groundwater
- Submit discharge reports quarterly

IWPP reviews the discharge reports and uses them as a means of determining compliance with the MCES Waste Discharge Rules and for evaluating strength levels. Compliance determinations are also made through monitoring by the IWPP Section, using specialized equipment such as automatic samplers, flow meters, and pH recorders. The EPA requires MCES to inspect and monitor Significant Industrial Users (SIUs) at least once per year. The samples obtained are analyzed by the MCES Laboratory Services Section. MCES's laboratory performs approximately 17,000 analyses per year for industrial monitoring conducted by the IWPP Section at about 340 industrial facilities.

Wastewater Treatment

Wastewater treatment involves five steps:

1. Screening
2. Settling (primary treatment)
3. Aeration (secondary treatment)
4. Disinfection
5. Sludge Processing

Wastewater from industries, businesses, and homes is conveyed by city-owned sanitary sewer lines to the MCES interceptor sewers and then to the wastewater treatment plant. First, the wastewater passes through screens to remove large objects like rags and trash. Then the wastewater flows into settling tanks. The flow is slowed down to allow heavier solids to settle to the bottom of the tank and floating material is skimmed from the surface. The solids at the bottom of the tank are removed, and the wastewater continues to the aeration tanks. During the aeration process, air is pumped into the tanks and bacteria and other organisms use the additional oxygen to break down the organic matter in the wastewater. This process produces heavier particles, which are removed in settling tanks. The final treatment step involves disinfection. The wastewater is disinfected to kill harmful organisms, and then the treated wastewater is released to the receiving water. Some of the MCES wastewater treatment plants also perform advanced treatment, such as nutrient removal and dechlorination.

The sludge from the settling tanks requires additional processing. This usually involves sludge thickening/dewatering, digestion, and incineration or reuse.

Wastewater Operation Costs

MCES's eight wastewater treatment plants treat a combined total of 250 million gallons of wastewater each day. This amount of wastewater could fill the Empire State Building. To sufficiently clean this massive amount of wastewater requires operators, electricity, and numerous treatment methods. Operation and maintenance costs of MCES wastewater treatment plants and interceptor sewer lines are funded entirely by user fees paid by businesses and homes that are connected to the sanitary sewer. Sewer Availability Charge (SAC), Strength Charge, and permit fees are the three main fee types that MCES charges industrial users. They are discussed below.

Strength Charge

Wastewater treatment plants are designed to treat typical domestic strength waste. Any waste with Chemical Oxygen Demand (COD) and/or Total Suspended Solids (TSS) above values for typical domestic waste requires extra energy and cost for the treatment plant. Levels of TSS above domestic waste require more solids removal and treatment. High levels of COD make the oxygen levels in the wastewater lower, which affects the bacteria and microorganisms breakdown of organic matter in the aeration process. This results in more air being required in the aeration tanks, which increases the electricity usage and cost.

To recover this extra cost, MCES requires permittees who discharge COD and TSS concentrations above typical domestic waste to pay a strength charge. Typical domestic waste has a COD concentration of 500 mg/L and a TSS concentration of 250 mg/L. The strength charge is based on the volume of wastewater from the industry and the amount of COD and TSS above the strength charge threshold (COD 500 mg/L and TSS 250 mg/L). Industries that have COD and TSS levels at or below domestic waste do not pay strength charges.

Sewer Availability Charge (SAC)

The Sewer Availability Charge (SAC) is a fee for use of wastewater capacity or demand in the sewer lines. Since 1973 MCES has levied SAC on all of our customer communities for new connections, or other increased capacity demand by users of the Metropolitan Disposal System (MDS). Funds from the SAC program go to pay for new interceptors and wastewater treatment plants, rehabilitation of existing infrastructure, and equipment to meet new environmental regulations. As the Twin Cities area continues to grow and new environmental requirements are added, additional capital improvements will be needed, and a portion of these funds will come from the SAC program. SAC payments are required for every new home and business regardless if they are on permit. While SAC is a metropolitan fee assessed to our communities, it is calculated based on the capacity demand of each specific facility. Typically, communities pass the fee through to the property owner or business involved. All SAC payments are made through the city where the property is located. MCES directly administers SAC procedures related to industrial permittees of MCES.

Permit fees

Each permittee pays an annual permit fee based on their permit type (Standard, Special Discharge, Liquid Waste Hauler, or General), discharge volume, and SIU status. The permit fee funds MCES compliance monitoring and permit administration, which includes reviewing Industrial Discharge reports, checking MCES and self-monitoring results for compliance, setting up monitoring projects, and conducting on -site inspections.

MCES's Microbrewery/Brewpub Program

Breweries have always been part of the Twin Cities business scene. Several years ago, MCES developed a formal process for surveying, inspecting, and sampling microbreweries and brewpubs as they became more prevalent in the Twin Cities. A comprehensive survey requesting production and process information was sent to all microbreweries and brewpubs in the Twin Cities that were connected to the Metropolitan Disposal System (MDS). Based on the results of these surveys, MCES staff inspected 22 of these businesses to gather more information on their processes and the wastewater being generated. In addition, sampling projects were set up at 10 of these businesses to further characterize the wastewater. Based on these findings, MCES developed the following list of areas of concerns:

- High and low pH wastewater resulting from cleaning and sanitation processes
- High strength wastewater based on TSS and COD concentrations
- Use of non-contact cooling water
- High temperature wastewater discharges
- Yeast and grain disposal
- Bad brew disposal
- Passivation wastewater

As a result, MCES developed a General Permit for the microbreweries and brewpubs to address these concerns. The Microbrewery/Brewpub General Permit requires these businesses to either manually pH adjust their individual waste streams or collect the wastewater in a sufficiently sized tank and attenuate and/or adjust pH if needed, to meet the MCES pH limits of 5.0 - 11.0 standard pH units. General Permits also contain General and Specific Conditions of discharge, and Best Management Practices (the Best Management Practices are attached). Although sampling is not required, the permit requires submittal of an annual Industrial Waste Discharge Report, which includes production and wastewater discharge information.

MCES developed a production-based strength charge for wastewater resulting from microbrewery/brewpub operations which was implemented starting in 2016. The current per barrel strength charge can be found on our webpage at *https://metrocouncil.org/Wastewater-Water/Services/Industrial-Waste/Industrial-Waste-Rates-Fees.aspx*

MCES continues to send out surveys to new microbreweries and brewpubs as they start up, as well as conduct inspections at these locations. Additional General Permits will be issued to those businesses that meet MCES permitting criteria.

National Pretreatment Program Delegation for the Twin Cities Metro Area

Congress

- **Law-Clean Water Act**
- Set national goals (reduce toxins at the source)
- U.S. Environmental Protection Agency (EPA) responsible to administer
- Methods (standards based on technology-industries/pollutants)

U.S. Environmental Protection Agency (EPA)

- **Establish Rules and Standards**
- General Pretreatment Regulations (local control/program requirements)
- Categorical Standards (address industrial groups and pollutants)
- Guidance, oversight, and delegation

Minnesota Pollution Control Agancey (MPCA)

- **Pretreatment authority in Minnesota**
- MPCA acts as EPA agent
- Pretreatment program requirements in NPDES
- Oversee MCES program

Metropolitan Council Environmental Services (MCES)

- **Operating agency-Wastewater Treatment**
- Authority in Minnesota Statute 473
- Waste Discharge Rules
- Programs/Procedures - permits, monitoring, enforcement

Industrial User

- **Source-Industrial User**
- Pretreatment
- Compliance
- Self-monitoring
- Reporting

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Best Management Practices

1. MCES Waste Discharge Rules require the pH of wastewater discharges to be between 5.0 and 11.0 (Standard Units) at all times. If the pH of the wastewater is not within these limits, then the Permittee shall pretreat the wastewater prior to discharge by pH adjusting the individual waste streams, or by collecting all the wastewater in a sufficiently sized tank for the purpose of attenuating and/or adjusting the pH, as necessary, to meet these limits.

2. MCES Waste Discharge Rules prohibit the discharge of wastewater in which the temperature exceeds 150 degrees Fahrenheit (65 degrees Celsius). The Permittee shall ensure that the temperature of the wastewater discharged from the brewing and cleaning process is below 150 degrees Fahrenheit. If the temperature is higher than 150 degrees Fahrenheit, the wastewater shall be cooled prior to discharge.

3. The Permittee shall minimize the amount of non-contact cooling water discharged to the public sewer. Non-contact cooling water used for cooling the wort shall be re-circulated and reused in subsequent batches, and/or for cleaning purposes.

4. The Permittee shall minimize high-strength discharges to the public sewer by taking the following actions:

    - limiting the number of bad brews/batches,
    - eliminating the disposal of spent grains to the public sewer by using alternative disposal methods, such as transport to local farmers for use as feed stock or disposal at a composting facility,
    - minimizing the discharge of hops and trub to the public sewer as much as feasible,
    - minimizing the discharge of spent yeast to the public sewer by reusing the yeast for multiple generations, and/or by using alternate disposal methods, such as composting,
    - minimizing the amount of chemicals used in the cleaning process and reusing chemical rinses wherever possible, and
    - minimizing on-site purging of residual product left in returned kegs, whenever possible.

5. The Permittee shall have a dedicated facility water meter, or meters, for determining the incoming process-only water usage in the brewery. This meter shall only measure the water used in the brewing process and shall not measure water used for domestic wastewater purposes in the brewery or taproom. The brewing process includes brewing and fermentation; cleaning of tanks, floors, kegs, growlers and bottles; and taproom operations such as cleaning surface areas, floors, and glassware.

6. As stated above, the Permittee shall limit the number of bad brews/batches discharged to the public sewer whenever possible. The Permittee shall report the date and quantity of all bad brews/batches discharged to the public sewer on annual Industrial Waste Discharge Reports.

7. The Permittee shall take appropriate measures to conserve water whenever possible by utilizing water-efficient equipment, such as high pressure nozzles, and conducting dry clean-up procedures prior to wet clean-up and sanitation.

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MCES Microbrewery & Brewpub General Permit Comparison

The Industrial Waste & Pollution Prevention (IWPP) Section issues Standard, General, Liquid Waste Hauler, and Special Discharge Permits industrial users of the Metropolitan Disposal System (MDS). Microbreweries and brewpubs would be subject to either a Standard or General Permit. The following chart compares Standard and General Permits.

Permit Types:	**Standard Industrial Permit**	**General Discharge Permit**
Need for permit based on:	• Discharge Volumes • Wastewater characteristics • Treatment Requirements • Compliance with MCES & EPA Limits	500 BBLs/year or more; annual discharge volume less than 1,000,000 gallons
2018 Annual Permit Fee	$1000 - $9675	$475
Reporting Requirements	1 - 4 times per year	1 time per year
Local Discharge Limits (pH & metals)	Applicable to all Permittees	Applicable to all Permittees
Best Management Practices (BMPs)	Not applicable	Applicable to General Permits for Microbreweries & Brewpubs
Sampling & Analytical Requirements: • Specified in Permit • Conducted & paid for by Permittee	Minimum of 2 samples/hour over the course of a normal operating day, 1 - 4 times per year or more when deemed necessary due to wastewater variability and/or compliance issues	Not required (Optional)
Sampling Points	Must meet MCES requirements specified in permit	Must meet MCES requirements specified in permit
Strength Charge Based on:	Sampling and volume data input into MCES Strength Charge formula (See p. 2)	MCES Production-Based Strength Charge (2018 rate = $0.737/BBL)
Strength Charge Determined:	Each reporting period	Once per year
Strength Charge Invoices Issued:	Following reporting period due dates: January 30th, April 30th, July 30th, and October 30th	Once per year following report due date: January 31st
Sewer Availability Charge (SAC)	SAC volume review done once every 3 years, 1 year prior to permit expiration date	SAC volume review done once every 5 years,1 year prior to permit expiration date

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MCES Strength Charge Formula

Strength Charge is based on the volume of wastewater from the industry and the concentration of COD and TSS above the strength charge threshold (COD=500 mg/L and TSS=250 mg/L). Standard strength charge is calculated using the formula below. The Strength Charge formula only affects COD and TSS above domestic values.

Formula	Strength Charge = [Vx(TSS-250)x(8.34)x(TSS Rate)+Vx(COD-500)x(8.34)x(COD Rate)]
Strength Charge	= Strength Charge in dollars
V	= Volume in million gallons per reporting period
TSS	= Total suspended solids (TSS) >250 in mg/l. If TSS is <250 mg/l, use 250 mg/l.
COD	= Chemical oxygen demand (COD) > 500 in mg/l. If COD is < 500 mg/l, use 500 mg/l.
250	= TSS threshold value in mg/l
500	= COD threshold value in mg/l
8.34	= Conversion factor for converting mg/l and gallons to pounds
TSS Rate	= Via onsite connection: $0.235/lb of excess TSS (2018)
COD Rate	= Via onsite connection: $0.1175/lb of excess COD (2018)

1. Introduction

As microbreweries and brewpubs became more prevalent in the Twin Cities metro area, MCES began investigating wastewater characteristics from these facilities beginning in 2012. Brewery wastewater samples have been collected from 10 microbreweries to date. The results from MCES monitoring projects are summarized in Section 2, which shows that wastewater from the brewing process is high in chemical oxygen demand (COD) and suspended solids (TSS). This finding was not surprising since MCES has been sampling at larger breweries for many years and additional sampling of pure product mass produced beer was found to have a COD of 113,000 mg/l and dark beer to have a COD of 173,000 mg/l. Wastewater that has COD and TSS concentrations above typical household waste levels (i.e. COD greater than 500 mg/l and TSS greater than 250 mg/l) is considered to be a high strength waste and is subject to an MCES Strength Charge. For microbreweries and brewpubs on a General Permit, MCES has developed a production-based strength charge based on the barrels of beer produced. Details about this charge can be found in Section 3.

2. Monitoring Results

MCES collected wastewater samples from 10 different microbreweries and brewpubs over periods ranging from one to two days. Initially, wastewater grab samples were collected at different stages of the brewing process. This helped determine if certain stages of the brewing process had wastewater characteristics that were of concern and to determine which stages generated the highest strength waste. Sampling results may be found in Table 1.

Table 1: Detailed summary of 2012 wastewater grab sample results at different stages

Permit No.	No. of Days	Process Location	Total Suspended Solids (TSS) Range in mg/L	Chemical Oxygen Demand (COD) Range in mg/L	pH Range
B005	2	Brewing	216-665	442-38,800	7.3-11.7
	2	Fermentation	<1-23	526-1,000	5.3-11.7
	1	Kegging	169	2,880	5.8
B006	2	Brewing	10-13	450-800	2.7-11.7
	1	Fermentation	3	600	2.7-11.7
	2	Kegging	22	1,260	6-6.1
B008	2	Brewing	70	134-4,900	3.8-10.6
	2	Fermentation	3-376	72-1,260	8.2-12.6
	2	Kegging	6-560	202-2,880	2.5-5.7
B009	2	Brewing	2,240-4,200	4,280-32,000	2.5-11.4
	1	Fermentation	1,580	14,800	3.8-11.6
	1	Kegging	26	1,200	2.8-5.2
	1	Brite Tank Sanitation	2	299	2.1-12

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Because the initial grab sample results confirmed that the wastewater was high in strength, MCES determined that it was necessary to collect daily composite samples over the entire production day. MCES conducted one to four-day monitoring projects using a continuous automatic sampler set up at microbreweries with a centralized floor trench or drain which contained wastewater from all brewery operations. These composite samples are considered to be the most representative of the wastewater discharged by these microbreweries. It is important to note that not all microbreweries have a total process monitoring point, so the microbreweries that were sampled were selected based on whether they had this type of monitoring point.

Even then, collecting representative samples was challenging due to the intermittent nature of microbrewery wastewater discharges. Composite sampling results are presented in Table 2.

Table 2: MCES composite sampling results of microbrewery wastewater

Permit No.	Year	No. Days	Composite Method*	Total Suspended Solids (TSS) Range in mg/L	Chemical Oxygen Demand (COD) Range in mg/L	pH Range**
B005	2012	1	Daily	392	8,720	2.5-12.2
B012	2013	3	Daily	1,220-1,710	8,450-13,200	2.4-11.2
B001	2013	3	Daily	775-2,410	10,600-23,200	4.7-11.7
B005	2013	3	Daily	142-410	5,160-13,600	5.6-11.8
1531	2013	4	Daily	108-892	5,800-14,000	3.8-11.8
B004	2013	1	Daily	1,060	21,200	3.6-6.4
Pending	2015	2	Daily	56-107	5,120-6,740	4.2-11.4

*Daily composite samples of total facility brewery wastewater were collected using a continuous automatic sampler set up at a centralized floor trench or drain.
**MCES pH limits are 5.0-11.0 S.U.

3. Determination of Production Based Strength Charge

Based on the monitoring results presented above, microbrewery wastewater has been determined to have COD and TSS levels that would be subject to a Strength Charge. To reduce the burden and costs associated with routine sampling and reporting, and to reduce MCES program costs, MCES has established a modified strength charge that will be applied to all Microbrewery and Brewpub General Permittees. This Strength Charge is a production-based strength charge based on the annual number of barrels produced. It was determined using data from larger breweries currently holding an MCES Standard Industrial Discharge Permit. The production-based strength charge was developed using data presented in Table 3.

Table 3: MCES Industrial Discharge Permittee data and calculated production-based strength charge

Permit number	1161	1392
Year(s) when samples were collected	2004-2014	2010-2014
Number of samples	53	15
Average COD of Permittee and MCES data (mg/l)	8,126	7,088
Average TSS of Permittee and MCES data (mg/l)	609	681
Average Annual Industrial Wastewater Volume (gallons)	10,190,771	2,472,322
2015 Production-Based Strength Charge ($/barrel)*	**$0.58**	**$0.62**

*The 2015 production-based Strength Charge was determined using the average annual number of barrels produced. However, to respect the privacy of these businesses, this information is not reported in this table.

In Table 3, the COD and TSS results were tabulated from 2004 to 2014 for these larger breweries on MCES Standard Industrial Discharge Permit. Using the average COD and TSS values over this period along with an average annual industrial wastewater discharge volume, an overall strength charge for this period was calculated using the 2015 Strength Charge formula (see Appendix A). To determine the cost per barrel, the strength charge was divided by the average number of barrels produced per year. The strength charge cost per barrel for each of the Standard Industrial Discharge Permittees was then averaged to determine a combined production-based Strength Charge of $0.60 per barrel.

For 2015, the production-based Strength Charge of $0.60 per barrel of beer produced will be phased in at 50% of the 2015 production. The production-based Strength Charge will be adjusted annually based on the increase in the strength charge rates as determined by MCES treatment costs. The projected 2016 rate is $0.64 per barrel.

4. Comparison of Production-Based Strength Charge

For demonstration purposes, MCES calculated potential production-based strength charges using a selection of the most representative microbrewery and brewpub composite sample data from Table 2. MCES analytical data, industrial wastewater discharge volumes, and 2013 production levels were used to calculate these potential production-based strength charges using the 2015 Strength Charge formula (see Appendix A). For all four of these microbreweries, the MCES production-based Strength Charge of $0.60 per barrel is lower than the calculated value at each microbrewery. These results are presented in Table 4 below.

Table 4: Potential production-based strength charges based on MCES microbrewery data

Permit No.	Industrial Discharge Volume (gal/yr)	2013 Average TSS (mg/L)	2013 Average COD (mg/L)	2015 Production Based Strength Charge ($/barrel)*
B012	1,013,445 in 2013	1,537	11,020	1.23
B001	529,945 in 2013	1,485	17,267	2.36
B005	269,532 in 2013	297	8,467	1.13
1531	1,478,979 in 2014	454	10,050	1.07

*The 2015 production-based strength charge was determined using the average annual number of barrels produced. However, to respect privacy of these businesses, this information is not reported in this table.

If Microbrewery and Brewpub General Permittees believe that the production-based Strength Charge does not reflect the actual characteristics of their facility's wastewater, they will have the option of conducting sampling to determine the strength characteristics of their wastewater discharge. Permittees interested in this option must contact MCES to obtain information about the sampling requirements.

Note: Craft distilleries, wineries and cider manufacturers are not currently subject to the production-based Strength Charge specified in this document, since MCES has not conducted sampling at these facilities to determine their specific wastewater characteristics.

Appendix A

Strength Charge is based on the volume of wastewater from the industry and the concentration of COD and TSS above the strength charge threshold (COD=500 mg/L and TSS=250 mg/L). Standard strength charge is calculated using the formula in Table A1. The Strength Charge formula only affects COD and TSS above domestic values.

Table A1: Strength Charge Formula

Formula	Strength Charge = [Vx(TSS-250)x(8.34)x(TSS Rate)+Vx(COD-500)x(8.34)x(COD Rate)]
Strength Charge	= Strength Charge in dollars
V	= Volume in million gallons per reporting period
TSS	= Total suspended solids (TSS) >250 in mg/l. If TSS is <250 mg/l, use 250 mg/l.
COD	= Chemical oxygen demand (COD) > 500 in mg/l. If COD is < 500 mg/l, use 500 mg/l.
250	= TSS threshold value in mg/l
500	= COD threshold value in mg/l
8.34	= Conversion factor for converting mg/l and gallons to pounds
TSS Rate	= Via onsite connection: $0.190/lb of excess TSS (2015) = Via onsite connection: $0.186/lb of excess TSS (2014)
COD Rate	= Via onsite connection: $0.095/lb of excess COD (2015) = Via onsite connection: $0.093/lb of excess COD (2014)