Permit Fact Sheet

General Information

Permit Number	WI-0031232-10-0
Permittee Name and Address	HEART OF THE VALLEY METRO SEW DIST 801 Thilmany Rd, Kaukauna, WI 54130-1642
Permitted Facility Name and Address	Heart of the Valley Metro Sewerage District 801 Thilmany Road
Permit Term	January 01, 2026 to December 31, 2030
Discharge Location	South shore of a side channel of the Fox River, downstream from the Kaukauna Lock (#5) SE ¼ of the SW ¼ of Sec. 18, T21N – R19E, in the City of Kaukauna, Outagamie County
Receiving Water	Fox River in Fox River/Appleton of Fox River (lower) in Outagamie County
Stream Flow ($Q_{7,10}$)	The Fox River 7Q10 at Wrightstown is 970 cfs 10 to 1 dilution factor is utilized since the river does not exhibit uni-directional flow at the discharge point.
Stream Classification	Fish and Aquatic Life – Warm water sport fish community in the Great Lakes Basin Non-public water supply
Discharge Type	Existing, Continuous
Annual Average Design Flow (MGD)	8.5 MGD
Industrial or Commercial Contributors	Yes, there are 4 categorical industrial and 17 other significant (non-categorical) industrial users.
Plant Classification	A1 - Suspended Growth Processes; B - Solids Separation; C - Biological Solids/Sludges; P - Total Phosphorus; D - Disinfection; L - Laboratory; SS - Sanitary Sewage Collection System
Approved Pretreatment Program?	N/A

Facility Description

The Heart of the Valley Metropolitan Sewerage District (HOV) Wastewater Treatment Facility (WWTF) provides treatment of domestic, commercial and industrial wastewater from the municipalities of Combined Locks, Kaukauna, Kimberly, Little Chute and Darboy. The sanitary sewer collection system is separate from the storm sewer system in the HOV's WWTF's service area.

All influent raw wastewater arrives at the facility through "Special Manhole-#1", which contains a motorized weir gate. Influent flows in excess of 25 MGD are diverted around the "Normal Flow Headworks" and into the "Peak Flow Headworks", which has a 35 MGD design. The Normal Headworks contains dual, automatic mechanical bar screens, and the Peak Headworks has a single bar screen. Both Headworks are equipped with 36" Parshall flumes and all influent flow

measurement, sampling and screening is conducted at the two locations. Influent samples are collected at the normal flow headworks location.

Flows exiting the Normal Headworks and Peak Headworks are pumped separately to a splitter box, which feeds dual, 30 MGD Vortex-grit removal systems. All grit is processed through a lone, Coanda grit washer, and all grit removal effluent flows to the influent channel of the Actiflo Ballasted Sedimentation System. Two Actiflo treatment trains exist which include coagulation, injection, maturation and settling. Ferric sulfate, polymer and ballast-sand are adding to the Actiflo influent. These addition rates are increased if influent flows are greater than 15.6 MGD. Hydro-cyclones separate the ballast-sand and primary sludge from the solids collected by the Actiflo system, and the sand is reused. The primary sludge is discharged to the Gravity Thickener tank.

An Actiflo effluent flow of 26.4 MGD is allowed to enter the Biostyr Biological Aerated Filter system (BAF). Flows in excess of 26.4 MGD are automatically diverted to the Peak Flow Chlorine Contact Tanks. The BAF system is an up-flow biological aerated filter technology which removes suspended solids, BOD and Ammonia nitrogen, with eight cells available. The BAF cells are backwashed based on their time in service or elapsed time since the last backwash. The BAF filters, if in idle mode and not required to run continuously, are backwashed after not more than 40 hours. BAF effluent flows by gravity to a splitter structure where effluent can be directed one of three places: one being the chlorine contact tank for disinfection and the other two feed to the tertiary filters for either chemical treatment and filtration or directly to the filters without chemical addition. Flow to the secondary treatment (BAF) system is measured by a magnetic meter.

BAF effluent flows by gravity to the Normal Flow Chlorine Contact Tank. Sodium-hypochlorite disinfectant is introduced just ahead of both the Normal Flow and Peak Flow Contact Tanks, and sodium-bisulfite is added downstream of each tank to destroy residual chlorine. Effluent flow from the Normal Flow Contact Tank is measured by a 7 foot wide by 9 inch tall, rectangular weir. Peak Flow Contact Tank discharge and emergency bypass flows are measured by a Flow Velocity meter located at manhole #3. All effluent is combined and discharged through the 48-inch outfall 001, to a backwater segment of the Fox River, which is just downstream from the Kaukauna Govt. Lock #5.

All HOV biosolids removal, treatment and disposal includes: Actiflo scum and primary sludge settling, gravity thickening of primary sludge, mechanical Dissolved Air Floatation Thickening (DAFT) of Primary and BAF solids, Auto-Thermal Thermophilic Aerobic Digestion (ATAD) of thickened sludge and Post-ATAD nitrification.

The Class A liquid biosolids are stored onsite in two fiberglass coated steel tank (2.35 MG or 1.6 MG). A contractor performs the seasonal hauling and land application injection of the stabilized liquid on department approved farm fields. Class A liquid biosolids are not currently distributed.

Sample Point/Outfall descriptions have been updated. Shaded cells in the remainder of the permit reflect changes.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, CMARs, land application reports, compliance schedule items, and a site visit on 10/9/2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Barti Oumarou on 11/6/2024. Inspection of the Class A sludge was completed by Fred Hegeman for this permit reissuance.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	7.22 MGD (2024)	Influent: 24-Hr flow proportional sampler located at the headworks prior to the bar screen. Flow meter located ahead of the influent step screens.
101	2.91 MGD (2024)	Effluent Reuse: Sample point for reporting amount of effluent flow diverted to the Fox Energy LLC electric generating power plant for its process water needs.
111	N/A	Field Blank: Sample point for reporting results of Mercury field blanks collected using standard sample handling procedures.
112	0.01 MGD (2024)	Blending: Sample point for reporting diverted flow from the Actiflo process during high flow events. Wastewater flow bypasses the Actiflo process and the Biostyr The permittee shall notify the Department when blending occurs. See “Blending” requirements in the Standard Requirements section of the permit.
001	4.36 MGD (2024)	Effluent: 24-Hr flow proportional sampler located after the "Biostyr" biological treatment system. Grab samples collected at the Biostry outfall manhole 4 after dechlorination. Flow meter located at the outfall of the chlorine contact tank.
601		River Monitoring: Lower Fox River data collected at the Appleton Lutz Park-USGS/ACOE Gauge Station - and/or other alternative method or site approved by the Department - as reported by the Lower Fox River Discharger's Association shall be used in the determination of the daily BOD5 waste load allocation.
003	990 dry US Ton (2024 permit application)	Land Application: Class A, Autothermal Thermophilic Aerobically Digested (ATAD) treated, Liquid Sludge from storage.
012	New Outfall	Land Application: Class A, Autothermal Thermophilic Aerobically Digested (ATAD) treatment process & Post-Digestion (ATAD) VAR, Liquid Sludge.
011	New Sampling Point	Land Application (In-Plant): Class B, Pre-ATAD Treatment Process, Pre-Digestion, Pre-VSR(ATAD), Liquid Sludge
008	Not used during previous permit term.	Land Application: Class B, DAF treated, Thickened Liquid Sludge.

Permit Requirements

1 Influent – Monitoring Requirements

1.1 Sample Point Number: 701- Influent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	Daily	24-Hr Flow Prop Comp	
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Quarterly	Grab	See Mercury section.

Changes from Previous Permit:

Influent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- BOD and TSS: Sampling frequency increased to daily to match the sampling frequency at the effluent Sampling Point.

Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit. The HOV discharges more than 5 MGD and is currently required to administer a pretreatment program. Monthly monitoring is required for cadmium, chromium, copper, lead, nickel, and zinc. This permit includes mercury influent monitoring for mercury monitoring, per ch. NR 106.145, Wis. Adm. Code.

2 Inplant - Monitoring and Limitations

2.1 Sample Point Number: 101- Effluent Reuse

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Unregulated		MGD	Daily	Continuous	

Changes from Previous Permit:

In-plant limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

Explanation of Limits and Monitoring Requirements

This is an operational parameter to provide data regarding the amount of effluent reused by the Fox Energy power plant.

2.2 Sample Point Number: 111- Field Blank

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Quarterly	Blank	

Changes from Previous Permit:

In-plant limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

Explanation of Limits and Monitoring Requirements

Mercury Field Blank- Monitoring is included in the permit pursuant to s. NR 106.145, Wis. Adm. Code. Field blanks must meet the requirements under s. NR 106.145(9) and (10), Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). Field blanks are required to verify a sample has not been contaminated during collection, transportation or analysis.

2.3 Sample Point Number: 113- BLENDING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Continuous	See 'Blending Flow' permit section.
Time		hours	Per Occurrence	Continuous	Report the total duration of blending within a given day (12:00am - 11:59pm) in which blending occurs. See

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					'Blending Flow' permit section.

Changes from Previous Permit:

In-plant limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section. This is a new sample point.

Explanation Monitoring Requirements

The department previously determined that the facility is able to practice blending pursuant to s. NR 210.12, Wis. Adm. Code. This sample point was added to track the volume of wastewater that bypasses the aeration basins, final clarifiers and tertiary treatment and the duration of the blending event pursuant s. NR 210.12(6), Wis. Adm. Code. Additionally, the permittee is required to notify the department when blending occurs.

3 Surface Water - Monitoring and Limitations

3.1 Sample Point Number: 001- Effluent

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Weekly Avg	45 mg/L	Daily	24-Hr Flow Prop Comp	November - April
BOD5, Total	Monthly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	November - April
Suspended Solids, Total	Weekly Avg	45 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	990 lbs/day	Daily	Calculated	
Suspended Solids, Total	Monthly Avg	650 lbs/day	Daily	Calculated	
Suspended Solids, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of TSS and report on the last day of the month on the DMR. See TMDL Calculations section.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of TSS discharged and report on the last day of the month on the DMR. See TMDL Calculations section.
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	May - September
E. coli	% Exceedance	10 Percent	Monthly	Calculated	May - September. See the E. coli Percent Limit section. Enter the result in the DMR on the last day of the month.
Chlorine, Total Residual	Daily Max	38 ug/L	Daily	Grab	May - September
Chlorine, Total Residual	Weekly Avg	38 ug/L	Daily	Grab	May - September
Chlorine, Total Residual	Monthly Avg	38 ug/L	Daily	Grab	May - September
Nitrogen, Ammonia (NH3-N) Total	Daily Max	17 mg/L	Daily	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	28 mg/L	Daily	24-Hr Flow Prop Comp	January - March
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	29 mg/L	Daily	24-Hr Flow Prop Comp	April
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	17 mg/L	Daily	24-Hr Flow Prop Comp	May, and October - December
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	11 mg/L	Daily	24-Hr Flow Prop Comp	June - September
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	10 mg/L	Daily	24-Hr Flow Prop Comp	January - March
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	11 mg/L	Daily	24-Hr Flow Prop Comp	April - May
Nitrogen, Ammonia	Monthly Avg	4.4 mg/L	Daily	24-Hr Flow	June - September

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
(NH3-N) Total				Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	18 mg/L	Daily	24-Hr Flow Prop Comp	October - December
Phosphorus, Total	Monthly Avg	1.0 mg/L	Daily	24-Hr Flow Prop Comp	Limit maintained to prevent backsliding.
Phosphorus, Total	Monthly Avg	31.5 lbs/day	Daily	Calculated	
Phosphorus, Total	6-Month Avg	10.5 lbs/day	Daily	Calculated	
Phosphorus, Total		lbs/month	Monthly	Calculated	Calculate the Total Monthly Discharge of phosphorus and report on the last day of the month on the DMR. See TMDL Calculations section.
Phosphorus, Total		lbs/yr	Monthly	Calculated	Calculate the 12-month rolling sum of total monthly mass of phosphorus discharged and report on the last day of the month on the DMR. See TMDL Calculations section.
Mercury, Total Recoverable		ng/L	Quarterly	Grab	See permit for pollutant minimization measures and report submittal.
Cadmium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chromium, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Lead, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Nickel, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Monthly	24-Hr Flow Prop Comp	
Chloride		mg/L	Monthly	24-Hr Comp	Monitoring only in 2028.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See 'PFOS/PFOA Minimization Plan Determination of

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Need' in the schedules section.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See 'PFOS/PFOA Minimization Plan Determination of Need' in the schedules section.
Nitrogen, Total Kjeldahl		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Nitrite + Nitrate Total		mg/L	Quarterly	24-Hr Flow Prop Comp	
Nitrogen, Total		mg/L	Quarterly	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section.
Chronic WET	Monthly Avg	11 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section.
WLA BOD5 Value		lbs/day	Daily	See Table	May - October
WLA Adjusted Value		lbs/day	Daily	Calculated	May - October
WLA BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	May - October
WLA 7 Day Sum Of WLA Values		lbs/day	Daily	Calculated	May - October
WLA 7 Day Sum Of BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	May - October

Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- **Sample frequency-** BOD, TSS, TP, Ammonia, pH, and chlorine sampling frequency has been increased to daily.
- **E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits.

- **TSS and TP-** TSS and TP final limits effective, WQT requirements removed, and TMDL TSS and TP reporting requirements added. The mass limit is calculation is based on the sampling frequency, therefore the TSS mass limits have been updated to be expressed according to the sampling frequency.
- **Mercury-** Mercury interim limit and variance requirements removed. Continued sampling and implementation of PMPs is required.
- **Chloride-** New timeframe for chloride monitoring is now calendar year 2028.
- **PFOS/PFOA-** Monitoring once per two months for PFOS and PFOA is included in the permit in accordance with s. NR 106.98(2)(b), Wis. Adm. Code.
- **Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Quarterly monitoring is required as outlined in the permit.
- **WLA BOD Value, WLA Adjusted Value, WLA BOD Discharged, WLA 7 Day Sum of WLA Values, WLA 7 Day sum of BOD Discharged-** These parameters were previously reported under Outfall 006. This update for consistency with e-reporting and the outfall in which these limits are effective.

Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated October 11, 2024.

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. Sampling frequencies were increased to be in line with facilities of a similar size.

Lower Fox Wolf River Total Maximum Daily Load (TMDL): The permitted facility is located within the Lower Fox Wolf River Basin Total Maximum Daily Load (LFWRB TMDL), which was approved by EPA in March 2012. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus and total suspended solids that can be discharged and still protect water quality. The final effluent limits and monitoring expressed in the permit were derived from and comply with the applicable water quality criterion and are consistent with the assumptions and requirements of the EPA-approved WLAs in the TMDL, which are 3,467 lbs/yr for phosphorus and 147,003 lbs/yr for TSS for the permitted facility.

The approved TMDL expresses WLAs as lbs/year and lbs/day (maximum annual load divided by 365 days). As outlined in Section 4.6 of the department's 2020 TMDL Implementation Guidance for Wastewater Permits, TMDL limits must be given in the permit that are consistent with the TMDL WLA permit limits derived from the TMDL and need to be expressed as specified by 40 CFR 122.45 (d), s. NR 212.76 (4), and s. NR 205.065 (7), Wis. Adm. Code, unless determined to be impracticable. Impracticability has already been determined for phosphorus limits as laid out in the phosphorus impracticability agreement that was approved by USEPA in 2012 (see NPDES MOA Addendum dated July 12, 2012 at https://apps.dnr.wi.gov/swims/Documents/DownloadDocument?id=167886175).

For phosphorus, continuously discharging facilities covered by the LFWRB TMDL are given monthly average mass limits. The permittee has demonstrated the ability to meet the TMDL WLAs therefore, the limits are effective upon reissuance.

For TSS, continuously discharging municipal/industrial facilities covered by the LFWRB TMDL are given monthly average and weekly average/daily max mass limits. The permittee has demonstrated the ability to meet the TMDL WLAs therefore, the limits are effective upon reissuance.

Facilities with LFWRB TMDL based effluent limits for phosphorus and TSS must report the 12-month rolling sum of total monthly discharge (lbs/yr). If reported 12-month rolling sums exceed the facility's max annual WLA, the facility's mass limits (monthly average and six-month average) may be recalculated using more appropriate CVs or monitoring frequencies when the permit is reissued to bring discharge levels into compliance with the facility's given WLA.

Mercury – In pervious permit terms the permittee was granted a mercury variance. The currently available effluent data from the previous five years indicates that reasonable potential to exceed mercury limits has not been demonstrated. The permittee is required to continue the actions in the pollutant minimization plan to maintain effluent quality at or below current levels. This limit removal meets the antidegradation/antibacksliding requirements of ch. NR 207, Wis. Adm. Code, because mercury PMP efforts are recommended to continue in the reissued permit.

PFOS and PFOA– NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for major municipal dischargers, with an average flow rate greater than or equal to 5 MGD, at a minimum sample effluent on a monthly basis for PFOS and PFOA pursuant s. NR 106.98(2)(a), Wis. Adm. Code. The initial determination of the need for sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

BOD WLA- Sample Point 006 is used for reporting compliance with WLA limits for discharges from outfall 001, in accordance with ch. NR 212, Wis. Adm. Code.

3.2 Sample Point Number: 601- River Monitoring

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
WLA Previous Day River Flow		cfs	Daily	Gauge Station	May through October
WLA Previous 4 Day Avg River Flow		cfs	Daily	Calculated	May through October
WLA Previous Day River Temp		deg F	Daily	Calculated	May through October

Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section. Sampling requirements and frequencies are the same as the previous permit.

Explanation of Limits and Monitoring Requirements

Sample Point 601 is used for reporting the flow and temperature values used for determining the wasteload allocation (WLA) values for BOD_5, in accordance with ch. NR 212, Wis. Adm. Code, which apply May – October and are specified in Tables 1-5, in Section 3.2.3.1.6, of the permit.

4 Land Application - Monitoring and Limitations

Municipal Sludge Description

Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
003	A	Liquid	Fecal coliform and ATAD	VSR pre/post, Injection, and/or Incorporation	Distributed or Land Applied	990
012	A	Liquid	Fecal coliform and ATAD	VSR pre/post, Injection, and/or Incorporation	Distributed or Land Applied	New Outfall
011	B	Liquid	N/A	VSR pre/post	N/A	N/A
008	B	Thickened Liquid	Fecal coliform and ATAD	Injection or incorporation	Land Applied or Hauled to other Facility	Not used during previous permit term.

Does sludge management demonstrate compliance? **Yes**

Is additional sludge storage required? **No**

Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? **Yes**

If yes, special monitoring and recycling conditions will be included in the permit to track any potential problems in landapplying sludge from this facility

Is a priority pollutant scan required? **Yes**

Priority pollutant scans are required once every 10 years at facilities with design flows between 5 MGD and 40 MGD, and once every 5 years if design flow is greater than 40 MGD.

4.1 Sample Point Number: 003- Class A Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Cadmium Dry Wt	Ceiling	85 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Quarterly	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Quarterly	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Quarterly	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	
Radium 226 Dry Wt		pCi/g	Quarterly	Composite	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	Required in quarters in which land application and/or EQ distribution occurs.
Nitrogen, Ammonium (NH4-N) Total		Percent	Quarterly	Composite	Required in quarters in which land application and/or EQ distribution occurs.
Phosphorus, Total		Percent	Quarterly	Composite	Required in quarters in which land application and/or EQ distribution occurs.
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	Required in quarters in which land application and/or EQ distribution occurs.
Potassium, Total Recoverable		Percent	Quarterly	Composite	Required in quarters in which land application and/or EQ distribution

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					occurs.
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	Once in 2026.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	Once in 2026.
PFOA + PFOS		ug/kg	Annual	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Annual	Calculated	Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information.
Municipal Sludge Priority Pollutant Scan			Once	Composite	As specified in ch. NR 215.03 (1-4), Wis. Adm. Code

Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section.

- **PFAS** – Monitoring is required annually pursuant to s. NR 204.06(2)(b)9, Wis. Adm. Code.
- **List 2-** Monitoring for List 2 (nutrients) only required in quarters that land application occurs in.

Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k), Wis. Adm. Code. Radium requirements are addressed in s. NR 204.07(3)(n), Wis. Adm. Code.

The United States Environmental Protection Agency (USEPA) developed 40 CFR 503 relating to the treatment and use of sewage sludge, commonly referred to as biosolids, when treated. 40 CFR 503 only pertains to sewage sludge requirements when the sewage sludge is land applied, surface disposed or incinerated. However, this is not the case with respect to the requirements of ch. NR 204, Wis. Adm. Code. The State of Wisconsin is a delegated entity for implementing 40 CFR 503 and delegated entities such as the State of Wisconsin may have more stringent requirements for sewage sludge than required by USEPA. Algae solids generated during the treatment of domestic sewage is treated as sewage sludge pursuant to the definition of sewage sludge in Wisconsin Administrative Code:

> Section NR 204.03(55), Wis. Adm. Code: “Sewage sludge" or “sludge" or “biosolids" means the solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes scum or solids removed in primary, secondary or advanced wastewater treatment processes and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of a sewage sludge

incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (emphasis added)

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA has released a draft assessment which documents the potential public health risks associated with land applying biosolids contaminated with PFOA and/or PFOS, and the department is currently evaluating this information. In the interim, the department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS".

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department's implementation of EPA's recommendations. To quantitate this risk, PFAS sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9, Wis. Adm. Code.

4.2 Sample Point Number: 012- Class A Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	

Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and updates to all the land application outfalls were done to reflect the sludge operations at HOV.

Explanation of Limits and Monitoring Requirements

Sampling Point 012 is a new sampling point and is used to only for reporting of sampling required to meet Class A sludge. At this outfall the permittee samples for % total solids.

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code.

The United States Environmental Protection Agency (USEPA) developed 40 CFR 503 relating to the treatment and use of sewage sludge, commonly referred to as biosolids, when treated. 40 CFR 503 only pertains to sewage sludge requirements when the sewage sludge is land applied, surface disposed or incinerated. However, this is not the case with respect to the requirements of ch. NR 204, Wis. Adm. Code. The State of Wisconsin is a delegated entity for implementing 40 CFR 503 and delegated entities such as the State of Wisconsin may have more stringent requirements for sewage sludge than required by USEPA. Algae solids generated during the treatment of domestic sewage is treated as sewage sludge pursuant to the definition of sewage sludge in Wisconsin Administrative Code:

> Section NR 204.03(55), Wis. Adm. Code: "Sewage sludge" or "sludge" or "biosolids" means the solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes scum or solids removed in primary, secondary or advanced wastewater treatment processes and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (emphasis added)

4.3 Sample Point Number: 011- In-Plant Pre-VSR Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	

Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and this sampling was added as a new location for required sampling. This is not an outfall, discharge from this Sampling Point is not authorized.

Explanation of Limits and Monitoring Requirements

Similar to Sampling Point 012, this sample point is for demonstration of compliance with sludge quality regulations.

4.4 Point Number: 008- Class B Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Quarterly	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Quarterly	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Quarterly	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Quarterly	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Quarterly	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Quarterly	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Quarterly	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Quarterly	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Quarterly	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Quarterly	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Quarterly	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Quarterly	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Quarterly	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Quarterly	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Quarterly	Composite	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Composite	Required in quarters in which land application

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					occurs.
Nitrogen, Ammonium (NH4-N) Total		Percent	Quarterly	Composite	Required in quarters in which land application occurs.
Phosphorus, Total		Percent	Quarterly	Composite	Required in quarters in which land application occurs.
Phosphorus, Water Extractable		% of Tot P	Quarterly	Composite	Required in quarters in which land application occurs.
Potassium, Total Recoverable		Percent	Quarterly	Composite	Required in quarters in which land application occurs.

Changes from Previous Permit:

Sludge limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- Radium sampling removed.
- Monitoring for List 2 (nutrients) only required in quarters that land application occurs in.

Explanation of Limits and Monitoring Requirements

Requirements for disposal, including land application of municipal sludge, are determined in accordance with ch. NR 204, Wis. Adm. Code. Ceiling and high-quality limits for metals in sludge are specified in s. NR 204.07(5), Wis. Adm. Code. Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7), Wis. Adm. Code for vector attraction requirements.

5 Schedules

5.1 Mercury Pollutant Minimization Program

As a condition of the variance to the water quality based effluent limitation(s) for mercury granted in accordance with s. NR 106.145(6), Wis. Adm. Code, the permittee shall perform the following actions.

Required Action	Due Date
Mercury Report: Submit a mercury report. The mercury progress report shall summarize success in maintaining mercury concentrations in the effluent, as well as the anticipated future efforts to maintain mercury concentrating in the effluent. The report shall summarize mercury pollutant minimization activities that have been implemented during the current permit term. The report shall include an analysis of trends in quarterly and annual	12/31/2029

total effluent mercury concentrations based on mercury sampling during the current permit term. The report shall also include an analysis of how influent and effluent mercury varies with time and with significant loading of mercury such as loads from industries into the collection system.	

Explanation of Schedule

The permittee is required to continue the actions in the pollutant minimization plan to maintain effluent quality at or below current levels. This schedule requires a report once prior to permit reissuance documenting the continued measures.

5.2 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	01/01/2027
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	01/01/2028

5.2.1 Explanation of Schedule

As stated above, ch. NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Section NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the Department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

5.3 Sludge Management Plan

A sludge management plan is required.

Required Action	Due Date
Sludge Management Plan Submittal for Class A facilities: Submit a sludge management plan (SMP) to optimize the sludge management performance and demonstrate compliance with Ch. NR 204, Wis. Adm. Code, by the Due Date. This management plan shall include sufficient detail of the sludge management program for the facility. The plan shall include separate sections for each type of sewage sludge included in this permit. The SMP shall provide standardized information for communication to operators and the department including but not limited to the following: 1) Specify information on the sludge treatment processes for each sampling point and outfall; 2) Show and describe sample point and outfall monitoring locations on a schematic and provide photos of the specific sampling points; 3) Show, describe and tabulate the monitoring requirements at each sampling point and outfall locations; 4) Show, describe and explain sampling protocols for each location listing parameters to be monitored including: a)Pollutants, b)Nutrients, c)Pathogen treatment process requirements including treatment temperature, moisture content (total solids) and pathogen densities (fecal concentrations), d)Vector Reduction appropriate for the pathogen treatment process such as but not limited to temperatures, volatile solids reduction, moisture content, etc. as required by the WPDES permit and Ch. NR 204, Wis. Adm. Code; 5) Monitoring frequencies at each sample point and outfall; 6) Analytical methods with appropriate hold times and chain of custody procedures; 7) Documentation relating to temperature monitoring data recording, retrieval and printing out the data when requested; 8) Storage, verification monitoring, loading, transportation and discharge details associated with all outfalls; 9) Collection, storage, disposal information for sludge detailing pickups including loading and similar details; 10) Collection, storage and disposal processes of sludge when the sludge does not meet minimum requires to meet Class A and EQ requirements. [Note: EQ and Class A are similar, but are different. Explain.] 11) Identify land application sites; 12) Describe site limitations; 13) Address vegetative cover management and removal including loading to crop needs, crop harvesting; 14) Specific the availability of storage for sludge;	01/01/2027

15) Describe the type of transportation and spreading vehicles; 16) Track site loadings to facility's land application sites; 17) Address contingency plans for adverse weather and odor/nuisance abatement; 18) Address construction contingencies when treatment equipment is out of service; and 19)Include any other pertinent information. Once approved, all sludge management activities shall be conducted in accordance with the plan. Any changes to the plan must be approved by the department prior to implementing the changes. Note: The SMP is a living document and should be designed and constructed to allow for future updates. Consider providing an overview to explain the facilities solids flow processes, then using sections and appendices to provide more details. The use of appendices to explain start up, operation and shutdown of the sludge treatment units is encouraged to show that all sludge particles meet Class A requirements.	

Explanation of Schedule

An up-to-date Sludge Management Plan is required that documents how the permittee will manage the land application of biosolids consistent with ch. NR 204, Wis. Adm. Code

Other Comments

None

Attachments

Water Quality Based Effluent Limits with maps dated 10/11/2024

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

Prepared By: Jennifer Jerich, Wastewater Specialist

Date: 5/8/2025
Revision date post fact check: 10/15/2025
Revision date post public notice:

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: October 11, 2024

TO: Sarah Adkins – NER/Oshkosh Service Center

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center Michael Polkinghorn

SUBJECT: Water Quality-Based Effluent Limitations for the Heart of the Valley Metropolitan Sewerage District
WPDES Permit No. WI-0031232-10-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Heart of the Valley Metropolitan Sewerage District in Outagamie County. This municipal wastewater treatment facility (WWTF) discharges to the Fox River, located in the Lower Fox-Appleton Watershed in the Lower Fox River Basin. This discharge is included in the Lower Fox River Basin (LFRB) Total Maximum Daily Load (TMDL) as approved by EPA on May 18, 2012. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis:

Outfall 001

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		1, 2
TSS			45 mg/L 1,100 lbs/day	30 mg/L 700 lbs/day		2, 3
pH	9.0 s.u.	6.0 s.u.				1, 2
E. coli May – September				126 #/100 mL geometric mean		4
Residual Chlorine	38 µg/L		**38 µg/L**	**38 µg/L**		1, 5
Ammonia Nitrogen Year round January – March April May June – September October – December	17 mg/L		 28 mg/L 29 mg/L **17 mg/L** 11 mg/L **17 mg/L**	 10 mg/L 11 mg/L 11 mg/L 4.4 mg/L 18 mg/L		1, 5, 6
Phosphorus						1, 3, 7
Interim				1.0 mg/L		
Final				31.5 lbs/day	10.5 lbs/day	
Mercury (Total Recoverable)						8
Cadmium (Total Recoverable)						1, 9
Chromium (Total Recoverable)						1, 9

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Copper (Total Recoverable)						1, 9
Lead (Total Recoverable)						1, 9
Nickel (Total Recoverable)						1, 9
Zinc (Total Recoverable)						1, 9
Chloride						10
PFOS and PFOA						11
TKN, Nitrate+Nitrite, and Total Nitrogen						12
Acute WET						13, 15
Chronic WET				11 TUc		14, 15

Footnotes:

1. No changes from the current permit.
2. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. The total suspended solids (TSS) and phosphorus mass limits are based on the LFRB TMDL to address TSS and phosphorus water quality impairments within the TMDL area.
4. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
6. The weekly and monthly average limits are based on multiple discharges to this section of the Fox River, including the Appleton WWTF, Grand Chute Menasha West SC WWTF, Heart of the Valley MSD, and the Neenah Menasha SC WWTF.
7. The concentration limit is a technology-based limit as described in subch. II of NR 217, Wis. Adm. Code. A compliance schedule is in the current permit to meet the final WQBELs by 01/01/2026.
8. Quarterly monitoring and PMP efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.
9. Continued monitoring for total recoverable cadmium, chromium, copper, lead, nickel and zinc is also required because this facility operates a local pretreatment program for the many industries that discharge to the treatment facility.
10. Monthly monitoring for 1 year is recommended during the reissued permit term.
11. Once every two months monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
12. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all major municipal permittees. Total nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), and total Kjeldahl nitrogen (TKN) (all expressed as N).
13. Twice/yr acute whole effluent toxicity (WET) testing is recommended during the reissued permit term. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests.

14. Twice/yr chronic WET testing is recommended during the reissued permit term. According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 11 TUc as a monthly average. The Instream Waste Concentration (IWC) to assess chronic test results is 9%. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 30%, 10%, 3% & 1% and the dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the Fox River upstream of the confluence of Outfall 001 and other discharges.
15. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued). <u>If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute and chronic WET testing can be reduced to annual in the reissued permit.</u>

Sample Point 601

Parameter	Footnotes
River Flow May – October	1
River Flow (4 day avg) May – October	1
River Temp May – October	1

Sample Point (Outfall) 006

Parameter	Daily Maximum	Footnotes
BOD_5 May – October	Variable	1, 2, 3

Footnotes:

1. No changes from the current permit term.
2. Variable BOD_5 daily maximum mass WQBELs are required for any point source discharge to the Lower Fox River (river miles 0 – 40.0) as described in s. 212.40, Wis. Adm. Code. The tables below, based on the tables in ch. NR 212, Wis. Adm. Code, for each respective month provide the receiving water temperature and flow conditions where the resulting mass limit shall apply on a daily basis, such that the actual discharge may not exceed 138% of the mass limit for that day.
3. <u>Additional Limit:</u> The sum of the actual daily discharges for any 7-consecutive-day-period may not exceed the sum of the daily mass limit values for the same 7-consectutive-day-period based on the tables below.

Daily Maximum BOD_5 Limits (lbs/day) – May & June

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	1081	1130	1222	1331	1447	1564	1679	1785	1899	2012	2192	2450	2824	3538	4070
82 TO 85	1075	1131	1230	1350	1476	1599	1718	1827	1950	2105	2303	2583	2978	3766	4409

78 TO 81	1060	1130	1247	1386	1526	1659	1798	1962	2146	2285	2484	2827	3278	4162	5055
74 TO 77	1045	1128	1271	1427	1576	1762	1956	2145	2298	2449	2701	3061	3529	4652	5568
70 TO 73	1033	1133	1299	1473	1687	1908	2121	2282	2457	2640	2917	3354	3797	5265	5568
66 TO 69	1034	1157	1344	1584	1833	2080	2266	2455	2672	2878	3191	3637	4174	5568	5568
62 TO 65	1055	1197	1461	1746	2036	2254	2481	2723	2958	3195	3597	4015	4735	5568	5568
58 TO 61	1103	1320	1652	1999	2266	2548	2838	3100	3406	3712	4071	4659	5568	5568	5568
54 TO 57	1248	1532	1962	2297	2661	3003	3355	3752	4047	4375	4910	5568	5568	5568	5568
50 TO 53	1501	1892	2340	2817	3250	3753	4173	4595	5065	5568	5568	5568	5568	5568	5568
46 TO 49	1948	2364	2974	3600	4275	4843	5477	5568	5568	5568	5568	5568	5568	5568	5568
42 TO 45	2561	3130	4040	4989	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	3541	4506	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – July

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	1075	1119	1218	1328	1423	1449	1494	1560	1619	1649	1734	1891	2130	2817	3291
82 TO 85	1083	1137	1228	1345	1455	1521	1569	1610	1653	1745	1877	2043	2369	3081	3667
78 TO 81	1076	1146	1252	1372	1485	1584	1667	1758	1869	1966	2104	2382	2737	3569	4374
74 TO 77	1077	1145	1271	1398	1514	1655	1830	1960	2078	2191	2413	2701	3058	4124	5182
70 TO 73	1067	1155	1285	1421	1602	1819	2032	2167	2312	2478	2709	2990	3404	4786	5568
66 TO 69	1065	1169	1311	1516	1768	2020	2211	2407	2601	2779	2984	3306	3840	5568	5568
62 TO 65	1080	1194	1410	1695	2000	2229	2465	2717	2897	3059	3326	3747	4444	5568	5568
61 OR LESS	1115	1289	1615	1984	2265	2564	2856	3046	3257	3484	3855	4431	5393	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – August

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	947	987	1082	1199	1315	1419	1509	1587	1658	1723	1812	1893	2079	2655	3040
82 TO 85	947	995	1098	1221	1337	1444	1537	1617	1696	1759	1883	1999	2304	2917	3385
78 TO 81	947	1010	1123	1253	1377	1488	1587	1675	1808	1942	2057	2318	2617	3343	4054
74 TO 77	947	1020	1148	1287	1417	1534	1681	1856	1995	2125	2338	2588	2926	3854	4814
70 TO 73	947	1031	1173	1319	1459	1666	1863	2018	2175	2343	2586	2865	3225	4486	5568
66 TO 69	947	1056	1210	1382	1622	1854	2038	2217	2421	2639	2863	3151	3631	5256	5568
62 TO 65	972	1093	1285	1561	1837	2056	2276	2512	2784	2934	3173	3556	4208	5568	5568
61 OR LESS	1015	1175	1489	1821	2091	2374	2674	2927	3118	3324	3663	4206	5113	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – September

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	947	947	947	1049	1178	1297	1408	1511	1608	1697	1814	1934	2120	2666	3057
82 TO 85	947	947	947	1076	1207	1329	1439	1540	1643	1735	1810	1994	2310	2910	3387
78 TO 81	947	947	975	1119	1257	1385	1502	1608	1704	1780	1953	2261	2576	3303	4054
74 TO 77	947	947	1010	1160	1303	1436	1558	1679	1819	1956	2180	2517	2866	3803	4810
70 TO 73	947	947	1044	1201	1347	1523	1676	1827	1994	2160	2456	2785	3137	4434	5568
66 TO 69	947	947	1090	1254	1478	1665	1845	2031	2234	2455	2761	3053	3526	5208	5568
62 TO 65	947	970	1148	1417	1645	1860	2085	2317	2594	2826	3059	3441	4108	5568	5568
58 TO 61	947	1036	1342	1623	1888	2171	2469	2795	2995	3195	3529	4079	5001	5568	5568
54 TO 57	980	1240	1592	1928	2291	2688	3003	3250	3529	3838	4343	5142	5568	5568	5568
50 TO 53	1218	1534	1966	2454	2950	3301	3654	4057	4502	4983	5568	5568	5568	5568	5568
46 TO 49	1568	1977	2637	3280	3752	4289	4892	5561	5568	5568	5568	5568	5568	5568	5568
42 TO 45	2144	2796	3683	4414	5253	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	3152	4096	5330	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – October

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
66 OR MORE	947	947	960	1127	1277	1443	1642	1817	2027	2260	2662	2995	3515	5323	5568
62 TO 65	947	947	1012	1225	1422	1635	1868	2102	2392	2705	2978	3385	4087	5568	5568
58 TO 61	947	947	1158	1396	1657	1944	2245	2583	2894	3097	3444	4019	4995	5568	5568
54 TO 57	947	1048	1354	1683	2048	2445	2864	3130	3413	3728	4249	5084	5568	5568	5568
50 TO 53	1006	1279	1702	2186	2721	3155	3510	3913	4367	4857	5568	5568	5568	5568	5568
46 TO 49	1288	1683	2323	3024	3568	4106	4712	5384	5568	5568	5568	5568	5568	5568	5568
42 TO 45	1806	2444	3369	4179	5010	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	2798	3701	5022	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & thermal table.

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Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Heart of the Valley Metropolitan Sewerage District

WPDES Permit No. WI-0031232-10-0

Prepared by: Michael A. Polkinghorn

PART 1 – BACKGROUND INFORMATION

Facility Description

The Heart of the Valley Metropolitan Sewerage District (MSD) provides treatment of domestic, commercial, and industrial wastewater from the municipalities of Combined Locks, Kaukauna, Kimberly, Little Chute and Darboy. The sanitary sewer collection system is separate from the storm sewer system in the HOVMSD's WWTF's service area.

All influent raw wastewater arrives at the facility through "Special Manhole-#1", which contains a motorized weir gate. Influent flows in excess of 25 MGD are diverted around the "Normal Flow Headworks" and into the "Peak Flow Headworks", which has a 35 MGD design. The Normal Headworks contains dual, automatic mechanical bar screens, and the Peak Headworks has a single bar screen. Both Headworks are equipped with 36" Parshall flumes and all influent flow measurement, sampling and screening is conducted at the two locations. Influent samples are collected at the normal flow headworks location.

Flows exiting the Normal Headworks and Peak Headworks are pumped separately to a splitter box, which feeds dual, 30 MGD Vortex-grit removal systems. All grit is processed through a lone, Coanda grit washer, and all grit removal effluent flows to the influent channel of the Actiflo Ballasted Sedimentation System. Two Actiflo treatment trains exist which include coagulation, injection, maturation and settling. Alum, polymer and ballast-sand are added to the Actiflo influent. These addition rates are increased if influent flows are greater than 15.6 MGD. Hydro-cyclones separate the ballast-sand and primary sludge from the solids collected by the Actiflo system, and the sand is reused. The primary sludge is discharged to the Gravity Thickener tank.

An Actiflo effluent flow of 26.4 MGD is allowed to enter the Biostyr Biological Aerated Filter system (BAF). Flows in excess of 26.4 MGD are automatically diverted to the Peak Flow Chlorine Contact Tanks. The BAF system is an up-flow biological aerated filter technology which removes suspended solids, BOD and ammonia nitrogen, with eight cells available. Under normal flow the BAF cells are backwashed every approx. every 30 hours. Flow to the secondary treatment (BAF) system is measured by a magnetic meter.

Tertiary treatment is present via 6 Kruger media disk filters that were operational starting first quarter 2024.

BAF effluent flows by gravity to the Normal Flow Chlorine Contact Tank. Sodium-hypochlorite disinfectant is introduced just ahead of both the Normal Flow and Peak Flow Contact Tanks, and sodium-bisulfite is added downstream of each tank to neutralize residual chlorine. Effluent flow from the Normal Flow Contact Tank is measured by a 7 foot wide by 9 inch tall, rectangular weir. Peak Flow Contact Tank discharge and emergency bypass flows are measured by a Flow Velocity meter located at manhole #3.

Effluent is combined and discharged on a continuous basis via Outfall 001 to a backwater, side channel, segment of the Fox River, which is just downstream from the Kaukauna Govt. Lock #5.

A special Effluent Reuse agreement has been established between this facility and the Fox Energy Center LLC, several miles north of the facility. On any given day, the Reuse contract allows the diversion of some or all of HOV's effluent to the Fox Energy site, for the power company's process water needs. During the tertiary treatment upgrade, Fox Energy installed a pumping station at the facility, and also constructed a force main that conveys effluent from facility to the Fox Energy complex.

Attachment #2 is a discharge area map of Outfall 001.

Existing Permit Limitations

The current permit, expired on 12/31/2023, includes the following effluent limitations and monitoring requirements.

Outfall 001

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5			45 mg/L	30 mg/L		2, 3
TSS			45 mg/L 1,345 lbs/day	30 mg/L 801 lbs/day		2, 3, 4
pH	9.0 s.u.	6.0 s.u.				2, 3
Fecal Coliform May – September			**656#/100 mL** **geometric mean**	400#/100 mL geometric mean		5
Residual Chlorine	38 µg/L		**38 µg/L**	**38 µg/L**		5
Ammonia Nitrogen Year round January – March April May June – September October – December	17 mg/L		 28 mg/L 29 mg/L **17 mg/L** 11 mg/L **17 mg/L**	 10 mg/L 11 mg/L 11 mg/L 4.4 mg/L 18 mg/L		5, 6
Phosphorus						4, 7
Interim				1.0 mg/L		
Final				31.5 lbs/day	10.5 lbs/day	
Mercury (Total Recoverable)	4.0 ng/L					8
Cadmium (Total Recoverable)						9
Chromium (Total Recoverable)						9
Copper (Total Recoverable)						9
Lead (Total Recoverable)						9

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Nickel (Total Recoverable)						9
Zinc (Total Recoverable)						9
Acute WET						10
Chronic WET						10

Footnotes:

1. Monitoring only.
2. These limits are based on the Warm Water Sport Fish (WWSF) community of the immediate receiving water as described in s. NR 210.05(1), Wis. Adm. Code.
3. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, **limitations for these water quality characteristics do not need to be re-evaluated at this time.**
4. The total suspended solids (TSS) and phosphorus mass limits are based on the LFRB TMDL to address TSS and phosphorus water quality impairments within the TMDL area. A water quality trading plan has been approved as an alternative compliance option to offset any TSS discharged from this outfall that exceed the TSS WQBELs. The TSS WQBELs are expressed as computed compliance limits.
5. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
6. The weekly and monthly average limits are based on multiple discharges to this section of the Fox River, including the Appleton WWTF, Grand Chute Menasha West SC WWTF, Heart of the Valley MSD, and the Neenah Menasha SC WWTF.
7. The concentration limit is a technology-based limit as described in subch. II of NR 217, Wis. Adm. Code. A compliance schedule is in the current permit to meet the final WQBELs by 01/01/2026.
8. The interim limit is an alternative mercury effluent limit based on the variance granted by EPA as described in s. NR 106.145(4), Wis. Adm. Code, for the current permit term. This limit is based on the 1-day P_{99} of effluent data and includes implementation of a pollutant minimization plan.
9. Monitoring for total recoverable cadmium, chromium, copper, lead, nickel and zinc is also required because this facility operates a local pretreatment program for the many industries that discharge to the treatment facility.
10. Annual acute and chronic whole effluent toxicity (WET) testing was required during the current permit term. The IWC for chronic WET was 9%.

Sample Point 601

Parameter	Footnotes
River Flow May – October	1
River Flow (4 day avg) May – October	1

Attachment #1

Parameter	Footnotes
River Temp May – October	1

Sample Point (Outfall) 006

Parameter	Daily Maximum	Footnotes
BOD_5 May – October	Variable	2, 3, 4

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, **limitations for these water quality characteristics do not need to be re-evaluated at this time.**
3. Variable BOD_5 daily maximum mass WQBELs are required for any point source discharge to the Lower Fox River (river miles 0 – 40.0) as described in s. 212.40, Wis. Adm. Code. The tables below, based on the tables in ch. NR 212, Wis. Adm. Code, for each respective month provide the receiving water temperature and flow conditions where the resulting mass limit shall apply on a daily basis, such that the actual discharge may not exceed 138% of the mass limit for that day.
4. Additional Limit: The sum of the actual daily discharges for any 7-consecutive-day-period may not exceed the sum of the daily mass limit values for the same 7-consectutive-day-period based on the tables below.

Daily Maximum BOD_5 Limits (lbs/day) – May & June

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	1081	1130	1222	1331	1447	1564	1679	1785	1899	2012	2192	2450	2824	3538	4070
82 TO 85	1075	1131	1230	1350	1476	1599	1718	1827	1950	2105	2303	2583	2978	3766	4409
78 TO 81	1060	1130	1247	1386	1526	1659	1798	1962	2146	2285	2484	2827	3278	4162	5055
74 TO 77	1045	1128	1271	1427	1576	1762	1956	2145	2298	2449	2701	3061	3529	4652	5568
70 TO 73	1033	1133	1299	1473	1687	1908	2121	2282	2457	2640	2917	3354	3797	5265	5568
66 TO 69	1034	1157	1344	1584	1833	2080	2266	2455	2672	2878	3191	3637	4174	5568	5568
62 TO 65	1055	1197	1461	1746	2036	2254	2481	2723	2958	3195	3597	4015	4735	5568	5568
58 TO 61	1103	1320	1652	1999	2266	2548	2838	3100	3406	3712	4071	4659	5568	5568	5568
54 TO 57	1248	1532	1962	2297	2661	3003	3355	3752	4047	4375	4910	5568	5568	5568	5568
50 TO 53	1501	1892	2340	2817	3250	3753	4173	4595	5065	5568	5568	5568	5568	5568	5568
46 TO 49	1948	2364	2974	3600	4275	4843	5477	5568	5568	5568	5568	5568	5568	5568	5568
42 TO 45	2561	3130	4040	4989	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	3541	4506	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Attachment #1

Daily Maximum BOD_5 Limits (lbs/day) – July

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	1075	1119	1218	1328	1423	1449	1494	1560	1619	1649	1734	1891	2130	2817	3291
82 TO 85	1083	1137	1228	1345	1455	1521	1569	1610	1653	1745	1877	2043	2369	3081	3667
78 TO 81	1076	1146	1252	1372	1485	1584	1667	1758	1869	1966	2104	2382	2737	3569	4374
74 TO 77	1077	1145	1271	1398	1514	1655	1830	1960	2078	2191	2413	2701	3058	4124	5182
70 TO 73	1067	1155	1285	1421	1602	1819	2032	2167	2312	2478	2709	2990	3404	4786	5568
66 TO 69	1065	1169	1311	1516	1768	2020	2211	2407	2601	2779	2984	3306	3840	5568	5568
62 TO 65	1080	1194	1410	1695	2000	2229	2465	2717	2897	3059	3326	3747	4444	5568	5568
61 OR LESS	1115	1289	1615	1984	2265	2564	2856	3046	3257	3484	3855	4431	5393	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – August

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	947	987	1082	1199	1315	1419	1509	1587	1658	1723	1812	1893	2079	2655	3040
82 TO 85	947	995	1098	1221	1337	1444	1537	1617	1696	1759	1883	1999	2304	2917	3385
78 TO 81	947	1010	1123	1253	1377	1488	1587	1675	1808	1942	2057	2318	2617	3343	4054
74 TO 77	947	1020	1148	1287	1417	1534	1681	1856	1995	2125	2338	2588	2926	3854	4814
70 TO 73	947	1031	1173	1319	1459	1666	1863	2018	2175	2343	2586	2865	3225	4486	5568
66 TO 69	947	1056	1210	1382	1622	1854	2038	2217	2421	2639	2863	3151	3631	5256	5568
62 TO 65	972	1093	1285	1561	1837	2056	2276	2512	2784	2934	3173	3556	4208	5568	5568
61 OR LESS	1015	1175	1489	1821	2091	2374	2674	2927	3118	3324	3663	4206	5113	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – September

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
86 OR MORE	947	947	947	1049	1178	1297	1408	1511	1608	1697	1814	1934	2120	2666	3057
82 TO 85	947	947	947	1076	1207	1329	1439	1540	1643	1735	1810	1994	2310	2910	3387
78 TO 81	947	947	975	1119	1257	1385	1502	1608	1704	1780	1953	2261	2576	3303	4054
74 TO 77	947	947	1010	1160	1303	1436	1558	1679	1819	1956	2180	2517	2866	3803	4810
70 TO 73	947	947	1044	1201	1347	1523	1676	1827	1994	2160	2456	2785	3137	4434	5568
66 TO 69	947	947	1090	1254	1478	1665	1845	2031	2234	2455	2761	3053	3526	5208	5568
62 TO 65	947	970	1148	1417	1645	1860	2085	2317	2594	2826	3059	3441	4108	5568	5568

58 TO 61	947	1036	1342	1623	1888	2171	2469	2795	2995	3195	3529	4079	5001	5568	5568
54 TO 57	980	1240	1592	1928	2291	2688	3003	3250	3529	3838	4343	5142	5568	5568	5568
50 TO 53	1218	1534	1966	2454	2950	3301	3654	4057	4502	4983	5568	5568	5568	5568	5568
46 TO 49	1568	1977	2637	3280	3752	4289	4892	5561	5568	5568	5568	5568	5568	5568	5568
42 TO 45	2144	2796	3683	4414	5253	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	3152	4096	5330	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Daily Maximum BOD_5 Limits (lbs/day) – October

River Temperature (previous day average in °F)	Flow at Appleton Lutz Park (previous four-day average in cfs)														
	750 OR LESS	751 TO 1000	1001 TO 1250	1251 TO 1500	1501 TO 1750	1751 TO 2000	2001 TO 2250	2251 TO 2500	2501 TO 2750	2751 TO 3000	3001 TO 3500	3501 TO 4000	4001 TO 5000	5001 TO 8000	8001 OR MORE
66 OR MORE	947	947	960	1127	1277	1443	1642	1817	2027	2260	2662	2995	3515	5323	5568
62 TO 65	947	947	1012	1225	1422	1635	1868	2102	2392	2705	2978	3385	4087	5568	5568
58 TO 61	947	947	1158	1396	1657	1944	2245	2583	2894	3097	3444	4019	4995	5568	5568
54 TO 57	947	1048	1354	1683	2048	2445	2864	3130	3413	3728	4249	5084	5568	5568	5568
50 TO 53	1006	1279	1702	2186	2721	3155	3510	3913	4367	4857	5568	5568	5568	5568	5568
46 TO 49	1288	1683	2323	3024	3568	4106	4712	5384	5568	5568	5568	5568	5568	5568	5568
42 TO 45	1806	2444	3369	4179	5010	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568
41 OR LESS	2798	3701	5022	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568	5568

Receiving Water Information

- Name: Fox River
- Waterbody Identification Code (WBIC): 117900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.
- Flow: A ten-to-one dilution ratio will be used for calculating effluent limitations based on chronic or long-term impacts, in accordance with s. NR 106.06(4)(b)2, Wis. Adm. Code, because the receiving water does not exhibit a unidirectional flow at the point of discharge. A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.
  - The 7-Q_{10} low flow of 970 cubic ft per sec (cfs) is a USGS flow estimate based on the Fox River at Wrightstown WI. This flow is only used in calculations for temperature limits in this evaluation.
- Hardness = 175 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 6, April 2019 – February 2024) from WET testing.
- Source of background concentration data: Source of background concentration data: Chromium data is taken from the Fox River at De Pere, WI. Chloride data is taken from the Fox River at Appleton, WI. Other metals data are from the Wolf River at New London, WI due to the limited availability of background data for the Fox River upstream of Outfall 001. The Wolf River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The

numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen and phosphorus are described later.

- Multiple dischargers: Multiple dischargers were integrated in the weekly and monthly average ammonia nitrogen limits for the Heart of the Valley MSD along with 3 other facilities in this section of the Fox River. Otherwise, the effects of multiple dischargers were not historically considered for other parameters due to not being in the immediate vicinity and the belief mixing zones are not overlapping. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Fox River is on the Clean Water Act Section 303(d) list for phosphorus and polychlorinated biphenyls (PCBs) impairments. Outfall 001 is included in the LFRB TMDL to address phosphorus and TSS impairments within the TMDL area.

Effluent Information

- Design flow rate(s):
  Annual average = 8.5 million gallons per day (MGD)
  Peak daily = 41.41 MGD
  Peak weekly = 23.63 MGD
  Peak monthly = 18.44 MGD
  The peak design flows were estimated from the annual average design flow and a peaking factor of 5.422 from the previous limit evaluation (May 2015).

  For reference, the actual average flow from January 2019 – August 2024 was 3.8 MGD.
- Hardness = 634 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 4, May 2023) from the permit application.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Domestic wastewater with 11 industrial contributors. Water supply from Village of Little Chute, Kaukauna Utilities, Village of Kimberly, and Darboy SD #1.
- Total Phosphorus Wasteload Allocation: 3,467 lbs/year, 9.49 lbs/day (See page 83 of the *Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay Report*, March 2012).
- Total Suspended Solids Wasteload Allocation: 147,003 lbs/year, 402 lbs/day (See page 84 of the *Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay Report*, March 2012).
- Additives: Alum for chemical phosphorus removal, polymer for settling, and chlorination/dechlorination chemicals for disinfection.
- Effluent characterization: This facility is categorized as a major municipal, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The current permit required monitoring for Cd, Cr, Cu, Pb, Ni, Hg and Zn.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.
- Mercury field blanks (Sample Point 111) indicated contamination was present from either sample transportation or environmental sources via 3 detects. Therefore, the effluent mercury samples associated with those blanks are not used in this evaluation. The field blanks and effluent samples in question are shown in the table below:

Attachment #1

Detectable Mercury Field Blanks & Effluent Data

Sample Date	SP 111 (ng/L)	Outfall 001 (ng/L)
01/09/2019	0.2	1.22
07/09/2019	0.2	0.69
01/04/2023	1.4	0.96

Multiple Toxic Substances Effluent Data

Statistics	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)
1-day P_{99}	4.9	13.6	
4-day P_{99}	2.9	10.4	
30-day P_{99}	1.6	7.5	
Mean	0.8	6.1	0.5
Std	0.8	2.3	4.8
Sample size	68	68	68
Range	<1.3 - 5.4	<6.3 - 17.6	<2.6 - 16

Statistics	Mercury (ng/L)	Nickel (µg/L)	Zinc (µg/L)
1-day P_{99}	2.41	23.7	31.8
4-day P_{99}	1.57	14.8	25.4
30-day P_{99}	1.14	10.2	21.1
Mean	0.94	8.0	18.8
Std	0.44	4.5	4.5
Sample size	20	68	68
Range	0.37 - 2.1	<2.6 - 28	<11.6 - 39.8

"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Chloride Effluent Data

Sample Date	Chloride (mg/L)
04/16/2023	500
04/20/2023	540
05/02/2023	440
05/09/2023	520
Mean	500

The following table presents the average concentrations and loadings at Outfall 001 from January 2019 – August 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

	Average Measurement	Average Mass Discharged
BOD_5	9.8 mg/L	311 lbs/day
TSS	13.3 mg/L	427 lbs/day

pH field	7.3 s.u.	
Fecal Coliform	319 #/100 mL	
Chlorine (Total Residual)	0.26 µg/L	
Ammonia Nitrogen	0.59 mg/L	
Phosphorus	0.33 mg/L	
Mercury (TR)	0.94 ng/L	

*Any results below the level of detection (LOD) were included as zeroes in calculation of average.

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in terms of micrograms per liter (µg/L), except for hardness and chloride (mg/L) and mercury (ng/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 10:1 dilution.

SUBSTANCE	REF. HARD.* mg/L	ATC	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Arsenic		340	679.6	135.9	1.4		1.4
Chromium	301	4,446	8,891.7			4.9	5.4
Copper	495	70.2	140.4			13.6	17.6
Lead	356	365	729.3	145.9	0.5		16
Mercury (ng/L)***		830	830			2.41	2.1
Nickel	268	1080	2,160.6			23.7	28
Zinc	333	345	689.4			31.8	39.8
Chloride (mg/L)		757	1,514.0	**303**	**500**		

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

** Limits are calculated based on 2 X ATC because they are more stringent than limits based on a 10:1 dilution.

*** A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 10:1 dilution.

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Arsenic		152.2		1,674	334.8	1.4	
Chromium	175	209.02	0.781	2,291			2.9
Copper	175	16.72	1.06	173.3			10.4
Lead	175	48.12	0.247	526.9	105.4	0.5	
Mercury (ng/L)*		440		440			1.57
Nickel	175	83.84		922			14.8
Zinc	175	196.47	1.8	2,143			25.4
Selenium		5.00		55.00	11.00	0.84	
Chloride (mg/L)		395	17.2	4,173	834.6	500	

* A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Monthly Average Limits based on Wildlife Criteria (WC)

RECEIVING WATER FLOW = 10:1 dilution.

SUBSTANCE	WC	MO'LY AVE. LIMIT	30-day P_{99}
Mercury (ng/L)*	1.3	1.3	1.14

* A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 10:1 dilution.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Antimony	373		4,103	820.6	0.58	
Chromium	3,818,000	0.781	41,997,992			1.6
Lead	140	0.247	1,538	307.5	0.5	
Mercury (ng/L)*	1.5		1.5			1.14
Nickel	43,000		473,000			10.2
Selenium	2,600		28,600	5,720	0.84	
Cyanide, total	9,300		102,300	20,460	6.7	
Thallium**	3.5		39	7.7	0.18	

* A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

** The limit for this substance is based on a secondary value.

Attachment #1

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 10:1 dilution.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		146.3	29.26	1.4

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations would be recommended for chloride. Limits and monitoring recommendations are made in the paragraphs below:

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, "When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L." Because the WQBELs are more restrictive, they are recommended instead. **Specifically, a daily maximum limit of 38 µg/L is required.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

The current permit has weekly average and monthly average limits of 38 µg/L to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes. **These limits are recommended to continue during the reissued permit term.**

Chloride – Considering available effluent data from the current permit term (n = 4, April 2023 – May 2023), the mean effluent concentration is 500 mg/L. This effluent concentration is above 1/5th of the calculated daily maximum chloride WQBEL; therefore, a daily maximum limit of 1,500 mg/L would be recommended. Considering historic effluent chloride data (n = 11, June 2004 – April 2005) from the previous limit evaluation (August 2009) as representative of the current discharge, the 1-day P_{99} of that effluent data is 683 mg/L. This is less than the calculated daily maximum chloride WQBEL, **so limits are not recommended during the reissued permit term. Chloride monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.**

Mercury – Considering available effluent data from the current permit term (n = 20, April 2019 – July 2024), the 1-day, 4-day, and 30-day P_{99} values are 2.41, 1.57, and 1.14 ng/L respectively. These levels are below the calculated mercury WQBELs; **therefore, limits are not recommended during the reissued permit term. Quarterly monitoring and PMP efforts are recommended to continue during the reissued permit term to maintain effluent quality at or below current levels.**

The current permit has the interim limit of 4.0 ng/L as a daily maximum and is an alternative mercury effluent limit based on the variance granted by EPA as described in s. NR 106.145(4), Wis. Adm. Code. **This limit is recommended to be removed during the reissued permit term because reasonable potential for mercury WQBELs is not demonstrated.** This limit removal meets the

antidegradation/antibacksliding requirements of ch. NR 207, Wis. Adm. Code, because mercury PMP efforts are recommended to continue in the reissued permit.

PFOS and PFOA– The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge and the effluent flow rate, **PFOS and PFOA monitoring is recommended during the reissued permit term at a once every two months frequency.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average, and monthly average limits year round. These limits are re-evaluated at this time due to the following changes:

- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The maximum expected effluent pH has changed.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)
Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The ATC for ammonia is calculated using the following equation:

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a WWSF community, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 2,070 sample results were reported from January 2019 – August 2024. The maximum reported value was 8.3 s.u. (Standard pH Units). The effluent pH was 8.1 s.u. or less 99% of the time. The 1-day P_{99}, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 7.9 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 7.9 s.u. Therefore, a value of 8.1 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 7.9 s.u. into the equation above yields an ATC = 9.99 mg/L. Therefore, the applicable daily maximum limit is 20 mg/L using 2 x ATC.

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)
The weekly and monthly average limits in the current permit are based on multiple discharges to this section of the Fox River, including the Appleton WWTF, Grand Chute Menasha West SC WWTF, Heart of the Valley MSD WWTF, and the Neenah Menasha SC WWTF. The Department does not plan to revise these limits for these facilities at this time but may do so in the future dependent on expanded monitoring programs which can potentially lead to more detailed modeling of the Fox River. The calculations are explained in further detail in the Department memorandum dated October 2009 and the final applicable limits for the Heart of the Valley MSD are included in the table below:

Attachment #1

Weekly and Monthly Average Ammonia Nitrogen Limits

Months Applicable	Weekly Average (mg/L)	Monthly Average (mg/L)
January – March	28	10
April – May	29	11
June – September	11	4.4
October – December	47	18

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from January 2019 – August 2024 based on the seasonal breakdown of the limits in the current permit. Because the current permit has daily maximum, weekly average, and month average limits year round, and all the calculated limits are greater than or equal to those in the current permit; reasonable potential does not need to be determine at this time. Therefore, the effluent ammonia data is presented below for informational purposes:

Ammonia Nitrogen Effluent Data

Statistics (mg/L)	January – March	April	May	June – September	October – December
1-day P_{99}	1.3	3.9	3.4	3.1	3.7
4-day P_{99}	0.8	2.1	1.9	1.7	2.0
30-day P_{99}	0.5	1.1	1.1	0.9	1.1
Mean*	0.4	0.7	0.8	0.6	0.8
Std	0.3	0.8	0.7	0.6	0.7
Sample size	385	129	133	610	322
Range	0.02 - 2.3	0.1 - 6.8	0.1 - 3.2	0.07 - 7.6	0.1 - 7.6

The current permit has daily maximum, weekly average, and month average limits year round. **Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:**

> (b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Heart of the Valley MSD's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May – September. No changes are recommended to the current recreational period and the required disinfection season.

Effluent Data
Heart of the Valley MSD has monitored effluent *E. coli* from August 2022 – July 2023 and a total of 19 results are available. A geometric mean of 126 counts/100 mL was never exceeded, with a maximum monthly geometric mean of 82 counts/100 mL. Effluent data has never exceeded 410 counts/100 mL, with a maximum reported value of 150 counts/100 mL. **Based on this effluent data it appears that the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.**

PART 5 – PHOSPHORUS & TSS

Technology-Based Effluent Limit
Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of total phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit. Because the Heart of the Valley MSD currently has the limit of 1.0 mg/L, **this limit should be continued during the reissued permit term.** This limit remains applicable unless a more stringent concentration based WQBEL is given. In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality-Based Effluent Limits (WQBEL)
Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05, Wis. Adm. Code), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III, Wis. Adm. Code) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived WQBEL for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the discharge is to the Fox River, which is an impaired segment covered under an approved TMDL, the TMDL-based limit is protective of the immediate receiving water as well as downstream waters and can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

TMDL Limits – Phosphorus
Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (April 2020)* and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA is found in page 83 *of the Total Maximum Daily Load and Watershed Management Plan*

for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay Report (March 2012) and is expressed as maximum annual loads (lbs/year). For the Heart of the Valley MSD, this WLA is 3,467 lbs/year and 9.49 lbs/day.

The monthly average limit of 31.5 lbs/day and the 6-month average limit of 10.5 lbs/day were determined in the previous limit evaluation (May 2015). The 6-month average multiplier of 1.11 was chosen as described in the Department TMDL Implementation guidance using a coefficient of variation (CV) of 0.6 and a daily effluent monitoring frequency. For informational purposes the Heart of the Valley MSD has been monitoring for phosphorus daily where the current permit requires a monitoring frequency of 5x/wk.

This TMDL-based WQBEL will be re-evaluated if the annual WLA is not being met as described in the prior stated guidance. This is done by comparing each rolling sum of 12 consecutive months of total monthly mass discharges over the current permit term directly against the annual WLA. In this case, the TMDL limits are not effective because there is a compliance schedule in the current permit to meet them by 01/01/2026, so they do not need to be reevaluated at this time. **Therefore, the monthly and 6-month average limits of 31.5 and 10.5 lbs/day respectively will remain unchanged during the reissued permit term.**

Interim Limit – Phosphorus
An interim limit is needed when a compliance schedule is included in the permit to meet the TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. **Therefore, the TBEL of 1.0 mg/L as a monthly average is recommended to continue as the interim limit during the reissued permit term.** Although the facility has demonstrated to consistently achieve lower concentration levels than 1.0 mg/L, the TBEL would still be applicable once the mass based TMDL limits becomes effective. The following table lists the statistics for concentration and mass-based effluent phosphorus levels (January 2019 – August 2024) for informational purposes.

Phosphorus Effluent Data

Statistics	Conc. (mg/L)	Mass (lbs/day)
1-day P_{99}	1.0	49
4-day P_{99}	0.60	27
30-day P_{99}	0.41	15
Mean	0.33	10
Std	0.19	10
Sample Size	2,068	2,068
Range	0.07 - 2.81	0.39 - 193.55

TMDL Limits – TSS
TSS effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (April 2020)* and are based on the annual TSS WLA given in pounds per year. This WLA found in page 84 *of the Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay Report (March 2012)* and is expressed as maximum annual loads (lbs/year). For the Heart of the Valley MSD, this WLA is 147,003 lbs/year and 402 lbs/day.

The weekly average limit of 1,345 lbs/day and the monthly average limit of 801 lbs/day were determined in the previous limit addendum (June 2016). The weekly average multiplier of 3.34 and the monthly average multiplier of 1.99 were chosen as described in the Department TMDL Implementation guidance using a standard deviation value 1.72 and a daily effluent monitoring frequency. For informational purposes the Heart of the Valley MSD has been monitoring for TSS daily where the current permit requires a monitoring frequency of 5x/wk.

The standard deviation value of 1.99 was calculated by taking the facility-specific CV of 0.74 and multiplying by 2.327, which is the number of standard deviations from the mean to find the 99th percentile in a normally distributed dataset. This method is inconsistent with the Department TMDL Implementation guidance such that only the unaltered CV is used to calculate a multiplier.

This TMDL-based WQBEL will be re-evaluated if the annual WLA is not being met as described in the prior stated guidance. This is done by comparing each rolling sum of 12 consecutive months of total monthly mass discharges over the current permit term directly against the annual WLA. In this case, the Heart of the Valley MSD has been 57% compliant meeting the annual WLA of 147,003 lbs/yr, or 27 of the 47 available rolling sums have exceeded the annual WLA during October 2020 – August 2024 since the TSS WQBELs became effective in the current permit in November 2019. The Heart of the Valley MSD is not considered to be meeting their annual WLA and the TMDL-based TSS WQBELs will be reevaluated at this time.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits to contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Heart of the Valley MSD is a municipal facility and is therefore subject to weekly average and monthly average TSS limits derived from TSS annual WLAs.

TSS Weekly Average Permit Limit = Daily WLA * Weekly multiplier
= 402 lbs/day * 1.74
= 699 lbs/day

TSS Monthly Average Permit Limit = Daily WLA * Monthly multiplier
= 402 lbs/day * 2.81
= 1,132 lbs/day

The multipliers used in the weekly average and monthly average calculations were determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 1.19. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as 5x/wk; if a different monitoring frequency is used, the stated limits should be reevaluated.

The weekly average and monthly average mass limits of 1,100 and 700 lbs/day respectively are recommended during the reissued permit term, rounding to 2 significant figures. The limits are equivalent to the concentrations of 16 and 9.9 mg/L respectively at an effluent flow of 8.5 MGD. **These**

TMDL-based mass effluent limitations should be included in the permit along with the effective TSS concentration limits in the current permit.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent TSS concentration and mass-based data are shown in the table below from November 2019 – August 2024 since the TSS WQBELs became effective in the permit in November 2019.

TSS Effluent Data

Statistics	Conc. (mg/L)	Mass Discharge (lbs/day)
1-day P_{99}	38	2,398
4-day P_{99}	24	1,296
30-day P_{99}	17	676
Mean	13	420
Std	7.2	498
Sample Size	1,758	1,763
Data Range	1.2 - 76	14 - 9,361
Date Range	November 2019 – August 2024	

In comparison between the calculated 7-day rolling weekly average mass TSS data against the weekly average TMDL limit, the Heart of the Valley MSD would have been 96% compliant meeting the limit, or 67 of the 1,739 available weekly averages have exceeded the limit during November 2019 – August 2024. Their last exceedance would have been in October 2023. In comparison between the calculated monthly average mass TSS data against the monthly average TMDL limit, the Heart of the Valley MSD would have been 88% compliant meeting the limit, or 7 of the 58 available monthly averages have exceeded the limit during November 2019 – August 2024. Their last exceedance would have been in April 2023. Based on the effluent TSS data alone, a compliance schedule and interim limit(s) would be recommended to meet the TMDL limits. However, the facility expects to meet the TSS TMDL limits without the use of water quality trading via the addition of their tertiary treatment via 6 Kruger media disk filters since first quarter 2024. **Therefore, a compliance schedule and an interim limit are not needed in the permit to meet the TMDL limits.**

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s.

NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from January 2019 – August 2024.

The table below summarizes the maximum temperatures reported during monitoring from July 2014 – March 2015 along with the calculated limits. The complete thermal calculations are included as attachment #3.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)**	Daily Maximum Effluent Limitation (°F)
JAN	54	54	NA	120
FEB	53	53	NA	120
MAR	52	52	NA	120
APR*			115	120
MAY*			114	120
JUN*			NA	120
JUL	64	65	NA	120
AUG	65	66	NA	120
SEP	65	66	NA	120
OCT	64	65	NA	120
NOV	61	62	NA	120
DEC	57	58	NA	120

* Effluent temperature data is not available for these months.
** NA denotes "Not Applicable" when the calculated weekly average limit is greater than or equal to 120 °F.

Effluent temperature is not available for the months of April – June. Comparing the effluent temperature data collected for March and July against those months, it is likely reasonable potential would not be demonstrated given the similar seasons. At temperatures above approximately 103° F, conventional biological treatment systems do not function properly and experience upsets. There is no indication that this has ever occurred in this treatment system, so there is no reasonable potential for the discharge to exceed this limit. **Therefore, temperature limits or monitoring are not recommended during the reissued permit term.**

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional

judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (2022).*

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC is 9% based on dilution of 10 parts lake water to 1-part effluent, as specified in s. NR 106.06(4)(b)2, Wis. Adm. Code, or a factor of 1 in 11 to calculate the IWC.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

- Shown below is a tabulation of all available WET data for Outfall 001. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Therefore, only tests conducted from June 2005 to present are shown in the table below:

WET Data History

Date Test Initiated	Acute Results LC_{50} %				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
10/18/2005	70.7	56.6	Fail	No	26.1	22.6	Pass	No	1
06/24/2008	>100	>100	Pass	Yes					Retest
07/29/2008	>100	>100	Pass	Yes					Retest
08/09/2011	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
04/08/2014	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
03/03/2015	>100	>100	Pass	Yes	9.1	>100	Fail	Yes	
04/07/2015					NA	>100	Pass	No	QA Restart

04/09/2019	>100	>100	Pass	Yes	95	>100	Pass	Yes	
03/03/2020	>100	>100	Pass	Yes	23.4	>100	Pass	Yes	
10/05/2021	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
08/23/2022	>100	>100	Pass	Yes	65.7	>100	Pass	Yes	
04/18/2023	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
02/27/2024	>100	>100	Pass	Yes	>100	>100	Pass	Yes	

Footnotes:
1. *Data Not Representative.* Previous limit evaluation (August 2009) noted failure was due to high ammonia nitrogen levels in the effluent. Toxicity reduction evaluation (TRE)-related activities at the facility have enabled the achievement of relatively low levels of ammonia since August 2007.

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.

  Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]

  According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUc effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC_{50}, IC_{25} or $IC_{50} \geq 100\%$).

  Acute Reasonable Potential = 0 < 1.0, **reasonable potential is not shown, and a limit is not required.**

  Chronic Reasonable Potential = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/9.1 = 11	2.6 Based on 4 detects	9%

[(TUc effluent) (B)(IWC)] = 2.6 > 1.0

Therefore, reasonable potential is shown for a chronic WET limit using the procedures in s. NR 106.08(6), Wis. Adm. Code, and representative data from August 2011 – February 2024.

Expression of WET limits

Chronic WET limit = [100/IWC] TU_c = **11 TU_c expressed as a monthly average.**

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET

limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: https://dnr.wisconsin.gov/topic/Wastewater/WET.html.

WET Checklist Summary

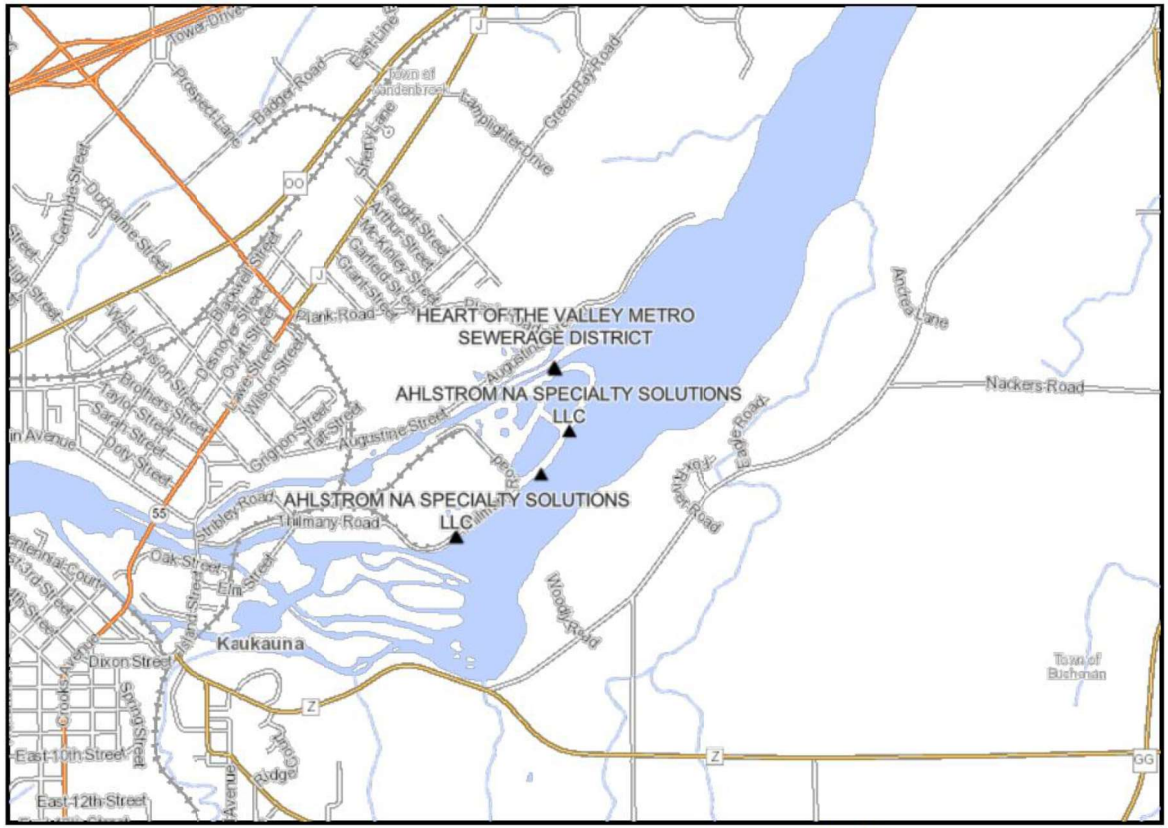
	Acute	Chronic
AMZ/IWC	Not applicable. **0 Points**	IWC = 9%. **0 Points**
Historical Data	Eleven tests used to calculate RP. No tests failed. **0 Points**	Nine tests used to calculate RP. One test failed. **0 Points**
Effluent Variability	Multiple mass TSS limit exceedances. One chlorine limit exceedance. Otherwise little variability, no violations or upsets, consistent WWTF operations. **5 Points**	Same as acute. **5 Points**
Receiving Water Classification	WWSF community. **5 Points**	Same as acute. **5 Points**
Chemical-Specific Data	No reasonable potential for limits based on ATC; Ammonia nitrogen and chlorine limits carried over from the current permit. Multiple substances detected. Additional Compounds of Concern: Antimony, selenium, thallium detected. **5 Points**	No reasonable potential for limits based on CTC; Ammonia nitrogen and chlorine limits carried over from the current permit. Multiple substances detected. Additional Compounds of Concern: Antimony, selenium, thallium detected. **5 Points**
Additives	One biocide and three water quality conditioners added. Permittee has proper P chemical SOPs in place: No. **21 Points**	All additives used more than once per 4 days. **21 Points**
Discharge Category	Eleven industrial contributors. **15 Points**	Same as acute. **15 Points**
Wastewater Treatment	Secondary or better. **0 Points**	Same as acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as acute. **0 Points**
Total Checklist Points:	**51 Points**	**51 Points**
Recommended Monitoring Frequency (from Checklist):	2x/yr acute tests recommended.	2x/yr chronic test recommended.
Limit Required?	No.	Limit = 11 TU_c
TRE Recommended? (from Checklist)	No.	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, **2x/yr acute and chronic WET tests are recommended in the reissued permit.** Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued). **If a satisfactory phosphorus chemical SOP is established and implemented at the facility prior to permit reissuance, then acute and chronic WET testing can be reduced to annual in the reissued permit.**

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. **The chronic WET limit shall be expressed as 11 TUc as a monthly average in the effluent limits table of the permit.**

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Heart of the Valley MSD Outfall 001 Discharge Area



Legend

- Permits
  - Surface Water Outfalls
- Basemaps
  - Hydro
    - 24K Hydro (Cached) Inland Water Resources
      - Rivers and Streams
      - Intermittent Streams
      - Open Water
      - Great Lakes water

Notes

WPDES viewer, WDNR

1:23,860

0 1500 3000 ft

Service layer credits:
WI DNR, Water Division | WI Dept. of Natural Resources, Division of Water

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Date Printed: 10/02/2024

Attachment #3

Temperature Limits for Receiving Waters with Unidirectional Flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Heart of the Valley MSD		**7-Q_{10}:**	970.00	cfs		
Outfall(s):	001		**Dilution:**	25%		**Start:** NA	01/01/19
Date Prepared:	11/11/2024		**f:**	0		**End:** NA	06/24/24
Design Flow (Qe):	8.50	MGD	**Stream type:**	Lower Fox River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	18.4	:1		
			Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	35	49	76	970	6.4	12.4	0			NA	120
FEB	35	50	76	970	5.4	7.9	0			NA	120
MAR	38	52	77	970	9.5	22.0	0			NA	120
APR	50	55	80	970	13.0	17.9	0			115	120
MAY	62	65	83	970	9.6	16.5	0			114	120
JUN	73	76	85	970	6.4	10.8	0			NA	120
JUL	77	81	87	970	7.7	12.2	0			NA	120
AUG	76	80	86	970	8.1	13.1	0			NA	120
SEP	68	73	85	970	9.4	18.5	0			NA	120
OCT	53	61	80	970	10.9	20.3	0			NA	120
NOV	42	50	78	970	6.6	11.3	0			NA	120
DEC	35	49	76	970	6.0	10.8	0			NA	120