Minnesota Pollution Control Agency

National Pollutant Discharge Elimination System (NPDES)/

State Disposal System (SDS) Permit Program Fact Sheet

Permit Reissuance

Permittee:	City of Delano PO Box 108 Delano, Minnesota 55328
Facility name:	Delano Wastewater Treatment Facility 1002 River St N Delano, Minnesota 55328
Current permit expiration date:	June 30, 2013
Public comment period begins:	**TBD**
Public comment period ends:	**TBD**
Receiving water:	Unnamed - Class 2B, 3C, 4A, 4B, 5, 6 water
Permitting contact:	Holly L. Christensen 714 Lake Avenue, Suite 220 Detroit Lakes, MN 56501 218-846-8104 holly.christensen@state.mn.us

Table of Contents

Page

Purpose and participation 4

Applicable statutes 4

Purpose 4

Public participation 4

Facility description 5

Background information 5

Facility location 5

Outfall location 5

Map of permitted facility 6

Components and treatment technology 7

Current information 7

Flow schematic 8

Changes to facility or operation 9

Significant industrial users (SIUs) 9

Recent compliance history 9

Table 1 Recent monitoring history 9

Receiving water(s) 10

Use classification 10

Impairments 10

Existing permit effluent limits 11

Technology based effluent limits (TBELs) 11

Water quality based effluent limits (WQBELs) 11

State Discharge Restrictions (SDRs) 12

Proposed permit effluent limits 12

Technology based effluent limits 12

State Discharge Restrictions (SDRs) 12

Water quality based limits 12

Additional requirements 22

Pollutant Minimization Plans 22

Compliance schedule 22

Salty Discharge Requirements 22

Nitrogen Monitoring Requirements 23

Priority Pollutants – Monitoring Requirements 23

Chronic Whole Effluent Toxicity (WET) Testing Requirements 23

Biosolids 23
Conditional Exclusion for No Exposure – Industrial Stormwater 23
Variances 23
Variability of Operation 23
Determination of Delano's "On/Off Switch" Flows 24
Total facility requirements 25
Nondegredation and anti-backsliding 25
Appendix A: South Fork Crow Rover Watershed Phosphorus Effluent Limit Analysis 26

Purpose and participation

Applicable statutes
This fact sheet has been prepared according to the 40 CFR § 124.8 and 124.56 and Minn R. 7001.0100, subp. 3 in regards to a draft National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit to construct and/or operate wastewater treatment facilities and to discharge into waters of the State of Minnesota.

Purpose
This fact sheet outlines the principal issues related to the preparation of this draft permit and documents the decisions that were made in the determination of the effluent limitations and conditions of this permit.

Public participation
You may submit written comments on the terms of the draft permit or on the Commissioner's preliminary determination. Your written comments must include the following:

1. A statement of your interest in the permit application or the draft permit.
2. A statement of the action you wish the Minnesota Pollution Control Agency (MPCA) to take, including specific references to sections of the draft permit that you believe should be changed.
3. The reasons supporting your position, stated with sufficient specificity as to allow the Commissioner to investigate the merits of your position.

You may also request that the MPCA Commissioner hold a public informational meeting. A public informational meeting is an informal meeting which the MPCA may hold to help clarify and resolve issues.

In accordance with Minn. R. 7000.0650 and Minn. R. 7001.0110, your petition requesting a public informational meeting must identify the matter of concern and must include the following: items one through three identified above; a statement of the reasons the MPCA should hold the meeting; and the issues you would like the MPCA to address at the meeting.

In addition, you may submit a petition for a contested case hearing. A contested case hearing is a formal hearing before an administrative law judge. Your petition requesting a contested case hearing must include a statement of reasons or proposed findings supporting the MPCA decision to hold a contested case hearing pursuant to the criteria identified in Minn. R. 7000.1900, subp. 1 and a statement of the issues proposed to be addressed by a contested case hearing and the specific relief requested. To the extent known, your petition should include a proposed list of witnesses to be presented at the hearing, a proposed list of publications, references or studies to be introduced at the hearing, and an estimate of time required for you to present the matter at hearing.

You must submit all comments, requests, and petitions during the public comment period identified on page one of this notice. All written comments, requests, and petitions received during the public comment period will be considered in the final decisions regarding the permit. If the MPCA does not receive any written comments, requests, or petitions during the public comment period, the Commissioner or other MPCA staff as authorized by the Commissioner will make the final decision concerning the draft permit.

Comments, petitions, and/or requests must be submitted by the last day of the public comment period to:

Holly Christensen
Minnesota Pollution Control Agency
714 Lake Avenue, Suite 220
Detroit Lakes, MN 56501

The permit will be reissued if the MPCA determines that the proposed Permittee or Permittees will, with respect to the facility or activity to be permitted, comply or undertake a schedule to achieve compliance with all applicable state and federal pollution control statutes and rules administered by the MPCA and the conditions of the permit and that all applicable requirements of Minn. Stat. ch. 116D and the rules promulgated thereunder have been fulfilled.

More detail on all requirements placed on the facility may be found in the Permit document.

Facility description

Background information

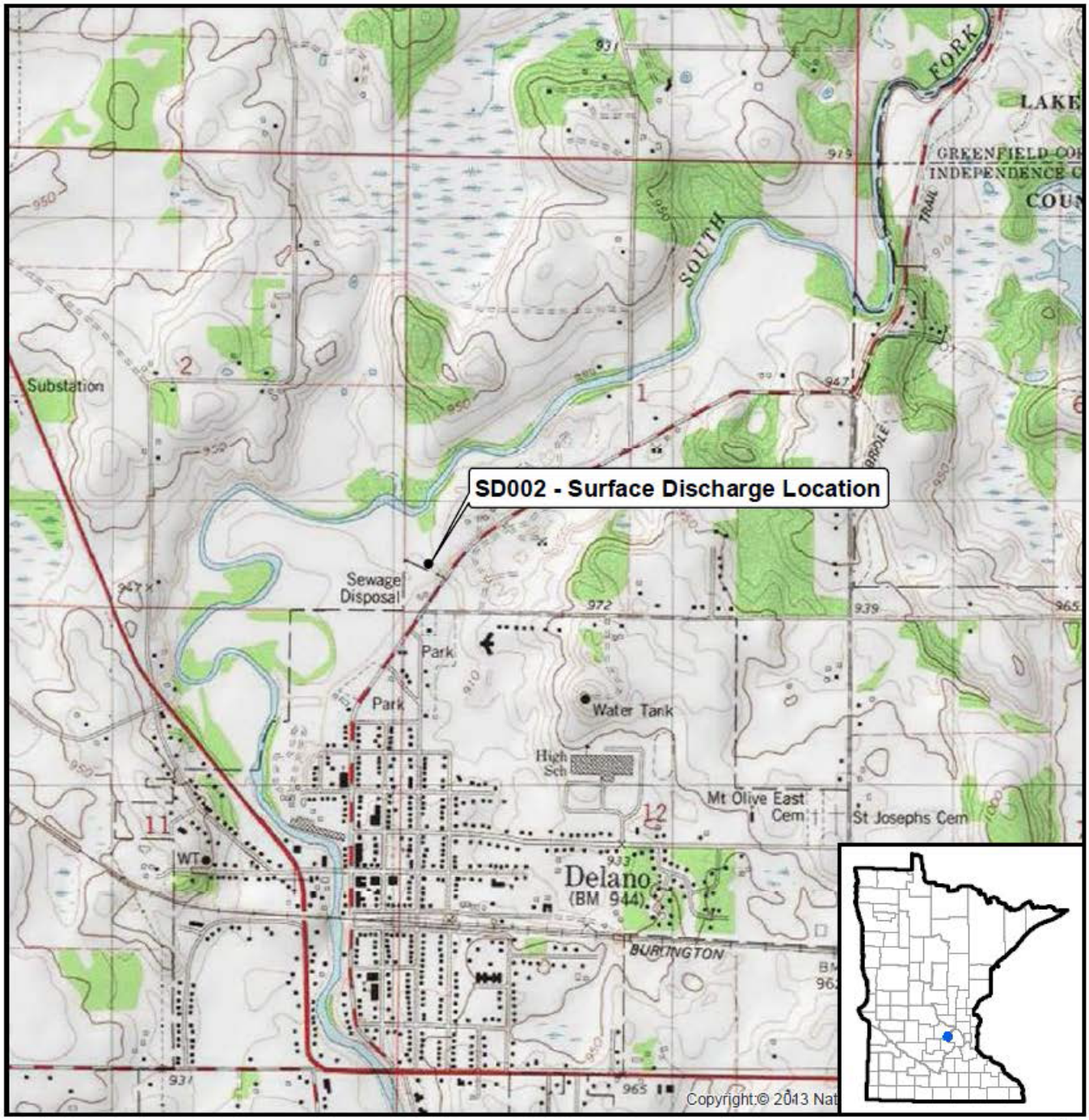
Facility location
The Delano Wastewater Treatment Facility (Facility) is located in the SW 1/4 of Section 1, Township 118 North, Range 25 West, Franklin Township, Wright County, Minnesota. The Facility is approximately 1/3 of a mile north of the City of Delano.

Outfall location
The discharge location for the Facility is also located in the SW 1/4 of Section 1, Township 118 North, Range 25 West, Franklin Township, Wright County, Minnesota.

Map of permitted facility

Topographic Map of Permitted Facility

MN0051250: Delano Wastewater Treatment Facility
T118N, R25W, Section 1
Franklin Township, Wright County, Minnesota



Map produced by: MPCA Staff, 5/13/2013
Source: USGS Quad, Delano WWTF
Scale: 1:20,000

0 0.2 0.4 0.8 Miles

N

Components and treatment technology

Current information

Major components of the Facility include:
1 Fine Screen
1 Grit Removal Unit
1 Flow Equalization (EQ) Tank – emergency pre-EQ tank
2 Activated Sludge Units - conventional, sequencing batch reactors (SBRs), biological phosphorus removal
Postaeration - less than two hours detention time
Ultraviolet Light
Flow Equalization Tank – post EQ tank for SBRs
Gravity Belt Thickener
3 Aerobic Storage Tank – aerated sludge holding tanks
2 Aerobic Storage Tank – waste activated sludge holding tanks
14 Reed Beds – four beds at 4,580 square feet and ten beds at 4,900 square feet
Biosolids Land Application

The existing Facility consists of a main lift station with a flood overflow pump, Rotomat Fine Screen, vortex grit removal, an emergency pre-EQ tank, two SBRs with biological phosphorus removal, denitrification and full nitrification, a post-equalization tank for the SBRs, ultraviolet disinfection, a gravity belt thickener, 3 aerated sludge holding tanks, 2 waste activated sludge tanks, four reed beds at 4,580 square feet and ten reed beds at 4,900 square feet for biosolids treatment and storage. When full, the reed beds are removed from service for 4-6 months for final dewatering and drying of biosolids. Biosolids are then landfilled or land applied. The biosolids treatment is designed to meet Class B pathogen reduction and vector attraction reduction requirements.

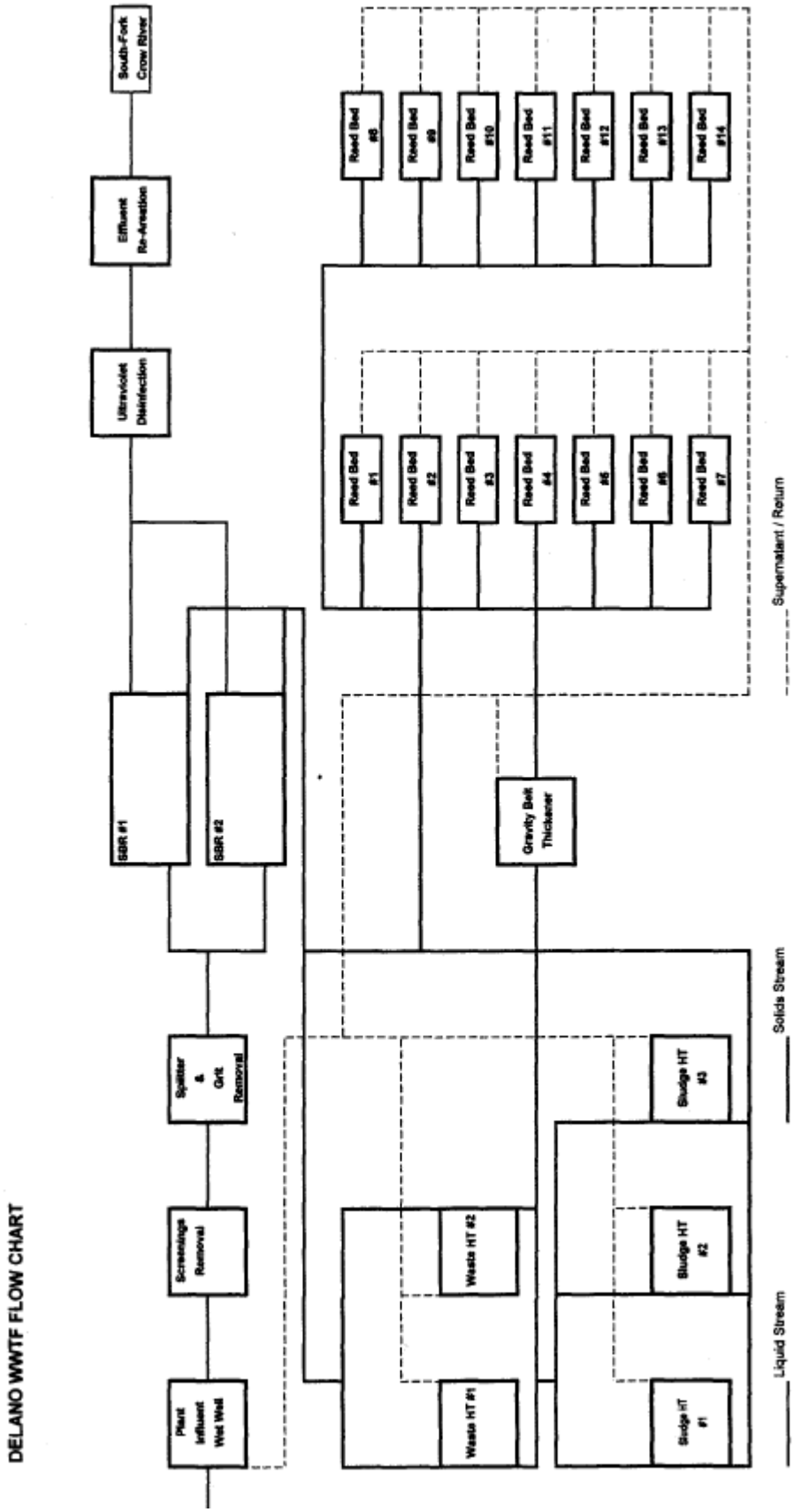
The existing Facility is designed to treat an average wet weather flow (AWWF) of 2.199 million gallons per day (mgd), an average dry weather flow of 1.17 mgd, an average annual design flow of 1.30 mgd, a mass loading of 2,400 pounds per day (lbs/day) of carbonaceous biochemical oxygen demand, 2,610 lbs/day of total suspended solids, and 108 lbs/day of total phosphorus. The Facility has a continuous discharge to an unnamed stream (Class 2B, 3C, 4A, 4B, 5, 6 Water) which leads to the South Fork of the Crow River.

On March 2, 1998, the MPCA approved a facility plan addendum and subsequently issued a permit for a change in the design AWWF of 0.864 mgd and associated mass loadings.

On October 2, 2002, the Permittee submitted a request for a voluntary facility expansion to increase the design AWWF and associated mass loadings. The Permittee proposed a two-part expansion to accommodate a population increase. Part I, which was completed in June 2005, has an AWWDF of 2.199 mgd and Part II (estimated completion in 2025), will result in an AWWDF of 2.953 mgd. The permit review process included a nondegradation review for Part I of the expansion in accordance with Minn. R. 7050.0185. An Environmental Assessment Worksheet (EAW) was prepared and public noticed for Part I and II of the expansion. The Facility completed construction and initiated operation of Part I of the voluntary expansion on June 30, 2005.

In this permit reissuance, the Permittee was assigned a new total phosphorus effluent limit of 0.53 mg/L, calendar month average, June – Sept. The existing Facility is not designed to achieve compliance with this new total phosphorus limit and as a result, the permit includes a compliance related construction schedule (5.13.35 – 5.13.51) for the Permittee to complete the operational and facility modifications necessary to achieve compliance with the new total phosphorus effluent limit as soon as possible, but no later than June 30, 2021.

Flow schematic



Changes to facility or operation
There have been no changes to the Facility or its operation from the previous permit.

Significant industrial users (SIUs)
This Facility has no SIUs.

Recent compliance history
The most recent MPCA-inspection of the Facility occurred on May 3, 2011. The inspection consisted of a visual inspection of the Facility and a discussion with the Facility Operator. In addition, there was a review of the monthly Discharge Monitoring Reports (DMRs) for the time period from 10/1/2008 to 5/1/2011. The Facility's collection system was not inspected. Based on the results of the inspection, one violation of the terms and conditions set forth in the National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit was noted. The Facility reported one effluent limit violation during the month of January 2010. The lab result for total ammonia nitrogen is 12.8 milligrams per liter (mg/L); however, the limit is 5 mg/L. There were no corrective actions and no other violations listed in the inspection report.

Table 1 Recent monitoring history

Parameter Name	Limit	Units	Limit Type	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
CBOD5	208.1	kg/d	CalMoAvgSc	1.1	0.9	1.2	1.6	1.2	1.1	1.1	2.5	3.4			
CBOD5	25	mg/L	CalMoAvgSc	0.91	0.67	0.94	1.1	0.6	0.7	0.7	1.7	2.2			
CBOD5	124.7	kg/d	CalMoAvgTr	1.1	0.9	1.2							3.2	3.1	2.6
CBOD5	15	mg/L	CalMoAvgTr	0.91	0.67	0.94							2	1.9	1.5
CBOD5	332.9	kg/d	MxCalWkAvS	1.3	1.6	2.2	2.2	0.9	1.8	1.2	2.9	6.3			
CBOD5	40	mg/L	MxCalWkAvS	1.1	1.2	1.6	1.5	0.6	1	0.7	2.1	3.9			
CBOD5	208.1	kg/d	MxCalWkAvT	1.3	1.6	2.2							4.6	4.9	4.2
CBOD5	25	mg/L	MxCalWkAvT	1.1	1.2	1.6							2.8	3.1	2.2
CBOD5 % Removal	85	%	MnCalMoAvg	98.9	98.5	97.1	98.5	99	99.3	99.2	98.8	98.2	98.4	98.1	98.5
Fecal Coliform	200	#/100ml	CalMoGeoMn	1.1	1.2	1.4	2.4	1						1	2
Mercury, Total (as Hg)		ng/L	CalQtrMax	0.76			8.2			0.619			2.25		
Nitrogen, Ammonia	41.6	kg/d	CalMoAvg								0.2	0.3	1		
Nitrogen, Ammonia	41.6	kg/d	CalMoAvg							0.2					
Nitrogen, Ammonia	182.9	kg/d	CalMoAvg											15.4	3.8
Nitrogen, Ammonia	5	mg/L	CalMoAvg								0.15	0.18	0.61		
Nitrogen, Ammonia	5	mg/L	CalMoAvg							0.1					
Nitrogen, Ammonia	22	mg/L	CalMoAvg											9.81	2.21
Nitrogen, Ammonia	64.8	kg/d	CalMoAvgSc		0.1	0.2	0.6								
Nitrogen, Ammonia	64.8	kg/d	CalMoAvgSc	0.1											
Nitrogen, Ammonia	208	kg/d	CalMoAvgSc					0.2	0.2						
Nitrogen, Ammonia	7.8	mg/L	CalMoAvgSc		0.1	0.12	0.43								
Nitrogen, Ammonia	7.8	mg/L	CalMoAvgSc	0.1											
Nitrogen, Ammonia	25	mg/L	CalMoAvgSc					0.12	0.14						
Nitrogen, Ammonia	9.2	kg/d	CalMoAvgTr		0.1	0.2									
Nitrogen, Ammonia	9.2	kg/d	CalMoAvgTr	0.1											
Nitrogen, Ammonia	1.1	mg/L	CalMoAvgTr		0.1	0.12									
Nitrogen, Ammonia	1.1	mg/L	CalMoAvgTr	0.1											
Oxygen, Dissolved		mg/L	CalMoMinSc	8.2	8.1	7.8	7.32	7.81	8.12	7.56	9.11				
Oxygen, Dissolved	6	mg/L	CalMoMinTr	8.2	8.1	7.8						9.48	9.73	10.33	8.63
pH	9	SU	CalMoMax	7.6	7.7	7.7	7.6	7.66	7.71	7.76	7.62	8.06	7.71	7.72	7.65
pH	6	SU	CalMoMin	7.4	7.5	7.5	7.5	7.48	7.45	7.46	7.45	7.76	7.42	7.39	7.4
Phosphorus, Total	1	mg/L	12MoMovAve	0.49	0.53	0.57	0.64	0.63	0.64	0.62	0.62	0.62	0.63	0.62	0.62
Phosphorus, Total	3,034	kg/yr	12MoTotal	231	247	272	26.5	301	314	313	318	323	326	328	329
Phosphorus, Total		mg/L	CalMoAvg	0.52	0.61	0.69	0.64	0.74	0.72	0.62	0.8	0.54	0.47	0.55	0.53
Phosphorus, Total		kg/mo	CalMoTot	19	26	28	26.5	29.6	33.2	29.6	35.3	23.1	21.7	24.3	26.4
TSS	249.4	kg/d	CalMoAvg	3.7	4.2	3.6	6.2	4.2	4.4	4.5	9.3	8.7	8.4	9.6	6.8
TSS	30	mg/L	CalMoAvg	3	3	2.8	4.4	3.2	2.8	2.9	6.6	5.5	5.3	5.9	4
TSS	374	kg/d	MxCalWkAvg	4.9	4.5	4.8	8.3	5.6	5.1	6.6	13.3	9.4	9.2	12.7	8.7
TSS	45	mg/L	MxCalWkAvg	4	3.3	4	5.7	4.3	3	4	10	6	5.7	6.7	5
TSS % Removal	85	%	MnCalMoAvg	99	99	99	96.8	95.9	98.7	98.4	97.8	98.7	98.2	97.1	98.6

Receiving water(s)

Use classification

The receiving water (unnamed stream) is a Class 2B, 3C, 4A, 4B, 5, and 6 Water. There are no endangered or threatened species living in the receiving water.

7050.0200 Water Use Classifications For Waters Of The State

Subp. 3. Class 2 waters, aquatic life and recreation. Aquatic life and recreation includes all waters of the state which do or may support fish, other aquatic life, bathing boating or other recreational purposes, and where quality control is or may be necessary to protect aquatic or terrestrial life or their habitats, or the public health, safety, or welfare.

Subp. 4. Class 3 waters, industrial consumption. Industrial consumption includes all waters of the state which are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Subp. 5. Class 4 waters, agriculture and wildlife. Agriculture and wildlife includes all waters of the state which are or may be used for any agriculture purposes, including stock watering and irrigation, or by waterfowl or other wildlife, and for which quality control is or may be necessary to protect terrestrial life and its habitat or the public health, safety, or welfare.

Subp. 6. Class 5 waters, aesthetic enjoyment and navigation. Aesthetic enjoyment and navigation includes all waters of the state which are or may be used for any form of water transportation or navigation, or fire prevention, and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Subp. 7. Class 6 waters, other uses. Other uses includes all waters of the state which are or may serve the above listed uses or any other beneficial uses not listed herein, including without limitation any such uses in this or any other state, province, or nation of any waters flowing through or originating in this state, and for which quality control is or may be necessary for the above declared purposes, or to conform with the requirements of the legally constituted state or national agencies having jurisdiction over such waters, or any other considerations the agency may deem proper.

Impairments

Although there are several impairments in the receiving waters, there are no Wasteload Allocations (WLAs) assigned to this Facility.

Table 2 Impairments

AUID or Lake ID#	AUID Description	Assessment Category	Impairment
07010205-508	Crow River, South Fork	5B	Mercury, Chloride, Fecal Coliform, IBI Fish
07010205-508	Crow River (South Fork to Mississippi River)	5A	Mercury, Fecal Coliform, IBI-Fish/Macroinvertebrates, DO, Turbidity

South Fork of the Crow River – The impairments of fecal coliform, turbidity, fish bioassessment, and chloride are part of the South Fork Crow River Major Watershed project. Monitoring began in 2012 and the project is projected to be completed in 2016.

Minnesota State-wide Mercury Total Maximum Daily Load (TMDL) – In addition to the impairments listed above, this section of the Crow River is also impaired for mercury. This draft permit contains requirements for mercury monitoring

and for submittal of an updated Mercury Minimization Plan (MMP). These requirements were added in response to the U.S. Environmental Protection Agency's approval of the Minnesota state-wide Mercury TMDL plan. More information on the TMDL can be found on the MPCA internet site at http://www.pca.state.mn.us/wfhy9ef.

Crow River - The impairments of fecal coliform and turbidity in this section of the Crow River are part of the North Fork Lower Crow River – Bacteria, Turbidity, and dissolved oxygen TMDL project. This TMDL did not assign WLAs to facilities that discharge into the South Fork Crow River watershed.

Crow River – A strategy to address the impairments of fish bioassessment and dissolved oxygen is under development.

Mississippi River – Impairments for fecal coliform are being addressed by the Upper Mississippi River Bacteria TMDL which is in development and scheduled to be completed in 2015. The TMDL will not establish a WLA for this facility, because it is only addressing discharges that are directly to the impaired reaches in the project area.

Mississippi River – Impairments for turbidity are being addressed by the South Metro Mississippi TSS TMDL project which has been on public notice and staff is currently in the process of addressing extensive public comments. The draft TMDL contains the following TSS WLAs for this Facility:

WLA = 249.4 kilograms per day (kg/day) TSS = 2.199 mgd x 30 mg/L x 3.785
WLA = 91,031 kilograms per year (kg/year) TSS = kg/day WLA x 365

The WLA is the existing TSS effluent limit in this draft permit, which the Facility is currently meeting.

Lake Pepin – A draft TMDL for Lake Pepin is on hold until a site specific water quality standard is approved in connection with the next iteration of Minnesota Rules Chapter 7050. Until that time, pre-TMDL water quality based effluent limits (WQBELs) are being developed. Because the Facility has been determined to cause or contribute to the excess nutrient impairment in Lake Pepin, the Facility is required to have a WQBEL. The WQBEL of 2,430 kg/year (12 month moving total) was derived from the water quality standard that the receiving water must meet to support designated uses and has been included in the draft permit.

Existing permit effluent limits
The effluent limits and monitoring requirements in the current permit are presented in Table 3 at the end of this section. This Table lists water quality based and technology based effluent limits and state discharge restrictions.

Technology based effluent limits (TBELs)
The total suspended solids, percent removal and pH limits that have been included in this permit are technology based limits developed for achieving secondary treatment standards. These limits are specified in 40 CFR §133.102 and Minn. R. 7050.0211 and Minn. R. 7053.0215.

Water quality based effluent limits (WQBELs)
The five-day carbonaceous biochemical oxygen demand ($CBOD_5$), total ammonia nitrogen, total phosphorus (TP), and dissolved oxygen limits that have been included in this permit are WQBELs. WQBELs are established to meet applicable water quality standards. Under 40 CFR 122.44(d)(1)(i), all dischargers who have the reasonable potential to cause or contribute to an exceedance of a water quality standard are required to have a WQBEL.

Although the $CBOD_5$ limit is based on the advanced wastewater treatment requirements as reflected in Minn. R. 7053.0235, the Permittee has been approved for Variability of Treatment in accordance with Minn. R. 7053.0235, Advanced Wastewater Treatment, and is required to follow the special requirement procedures as listed in the permit when changing from the tertiary treatment mode of operation.

State Discharge Restrictions (SDRs)
The fecal coliform limit that has been included in this permit is based on State Discharge Restrictions. This limit is specified in Minn. R. 7053.0215, Subp. 1.

Proposed permit effluent limits
Technology based effluent limits
The total suspended solids, percent removal and pH limits that have been included in this permit are technology based limits developed for achieving secondary treatment standards. These limits are specified in 40 CFR §133.102 and Minn. R. 7050.0211 and Minn. R. 7053.0215.

State Discharge Restrictions (SDRs)
The fecal coliform limit that has been included in this permit is based on State Discharge Restrictions. This limit is specified in Minn. R. 7053.0215, Subp. 1.

Water quality based limits
The five-day carbonaceous biochemical oxygen demand ($CBOD_5$), total ammonia nitrogen, total phosphorus, and dissolved oxygen limits that have been included in this permit are WQBELs. WQBELs are established to meet applicable water quality standards. Under 40 CFR 122.44(d)(1)(i), all dischargers who have the reasonable potential to cause or contribute to an exceedance of a water quality standard are required to have a WQBEL.

Although the $CBOD_5$ limit is based on the advanced wastewater treatment requirements as reflected in Minn. R. 7053.0235, the Permittee remains approved for Variability of Treatment in accordance with Minn. R. 7053.0235, Advanced Wastewater Treatment, and is required to follow the special requirement procedures as listed in the permit when changing from the tertiary treatment mode of operation.

Reasonable Potential for Chemical Specific Pollutants (40CFR122.44(d)(1))
Federal regulations require MPCA to evaluate the discharge to determine whether the discharge has the reasonable potential (RP) to cause or contribute to a violation of water quality standards. The MPCA must use acceptable technical procedures, accounting for variability (coefficient of variation, or CV), when determining whether the effluent causes, has the RP to cause, or contribute to an excursion of an applicable water quality standard. Projected effluent quality (PEQ) derived from effluent monitoring data is compared to Preliminary Effluent Limits (PELs) determined from mass balance inputs. Both determinations account for effluent variability. Where PEQ exceeds the PEL, there is RP to cause or contribute to a water quality standards excursion. When RP is indicated, the permit must contain a WQBEL for that pollutant.

Background for Reasonable Potential Review
The Delano Facility is listed as an existing major discharger. The discharge dry weather design flow is 1.17 mgd. The discharge is to the South Fork of the Crow River whose annual 7Q10 is 1.2 cubic feet per second (cfs) (0.77 mgd). The Facility has submitted priority pollutant scans, whole effluent toxicity tests, and data from effluent low level mercury and effluent copper monitoring. Reaches of the South Fork of the Crow River have been listed as impaired for mercury fish consumption and is subject to the state-wide mercury TMDL. The Facility is listed in Appendix B of the TMDL report.

Seven priority pollutant scans of the effluent were submitted and evaluated using RP procedures. All but two of the organic priority pollutants were below the level of detection. Since these pollutants were at low enough levels not to be detected, RP to cause or contribute to a water quality standards excursion is not indicated. Chloroform and TCE were detectable in only one of the samples, and are likely the result of contamination. Therefore, no limit is needed in either case.

From Table 3 shown below, chromium (Cr), lead (Pb), nickel (Ni), zinc (Zn), and mercury (Hg) indicated no RP to cause or contribute to an excursion above the applicable water quality standard. Therefore, no effluent limits for these parameters are needed at this time.

Reasonable Potential Conclusions for Mercury
Total Mercury- Monitoring results of the effluent include 29 data points at a calculated CV of 0.56. The PEQ is derived as an upper bound value from the highest value measured (3.6 nanograms per liter (ng/l)), and the determined variability (CV = 0.56) and number of data points (29). The PEL calculation assumes that the background mercury concentration is at the water quality standard (6.9 ng/l) when the listed stream impairment is for fish consumption advice, and no local river water column analytical data exist. To assure that the discharge does not cause or contribute to a water quality standards excursion for mercury impaired waters, the numeric water quality standard (6.9 ng/l) is applied at the point of discharge for the mass balance equation for the subsequent PEL calculations. Where PEQ exceeds the PEL, there is reasonable potential to cause or contribute to a water quality standards excursion. Since PEQ does not exceed the PEL in this case, RP to cause or contribute to an excursion above water quality standards is not indicated. Therefore, a WQBEL is not needed.

Table 3. Reasonable Potential Analysis

Parameter	**Cr (ug/l)****	**Cu (ug/l)**	**Pb (ug/l)**	**Ni (ug/l)**	**Zn (ug/l)**	**Hg (ng/l)**
Maximum measured effluent value	0.77	11	0.36	1.8	73.1	2.1
# data points, PEQ	7	24	7	7	7	29
Plant design flow (ADW)	1.17	1.17	1.17	1.17	1.17	1.17
Receiving water design flow (mgd)	0.776	0.776	0.776	0.776	0.776	0.776
Background concentration	0.16	0.95	0.978	5.468	8.615	6.9*
Continuous standard (cs) @ 250 Hd	11	23.21	10.2	342	230	6.9
Maximum standard (ms) @ 250 Hd	16	65.44	262	3079	254	2400
Final acute value (FAV) @ 250 Hd	32	131	526	6158	509	4900
Mass Balance -cs	16.9	31.13	16.3	565	377	6.9
Mass Balance -ms	25.2	88.38	435	5116	417	3251.20
Coefficient of Variation (CV)	0.6	0.6	0.28	0.6	0.6	0.4544
Long Term Average: LTA cs	8.82	16.42	8.62	298.3	199.1	5.71
Long Term Average: LTA ms	8.1	28.38	139	1643	134	1303.53
Preliminary Effluent Limits (PELs): Daily Max	25.2	51.14	26.8	929	417	14.24
Preliminary Effluent Limits (PELs): Monthly Average	15	29.52	15	536	241	9.11
Reasonable Potential PEQ>PEL (Dmax/FAV)	No	No	No	No	No	No

*Mercury background assumed to be at the standard because of the statewide mercury TMDL.
**ug/l = micrograms per liter

Monitoring:
Copper monitoring should be continued to capture potential high values in the future permits.

Total mercury monitoring should be twice per year. Dissolved mercury should be collected with a concurrent TSS grab sample.

Chronic Whole Effluent Toxicity Monitoring

The Delano Facility has chronic Whole Effluent Toxicity (WET) monitoring as a requirement. The Facility has chronic WET testing because the ratio of the 7Q10 low flow of the receiving water compared to the Facility's ADW flow is less than or equal to 20:1.

An RP evaluation was done on the chronic WET tests to determine if there was cause to exceed the WET monitoring threshold value of 1.66 TUc (Toxic Unit chronic). No RP was found to exceed the monitoring threshold of 1.66 TUc. Because no RP has been found, a monitoring threshold value of 1.66 TUc has been established. This is a threshold value, not a WET limit.

The following monitoring has been included in the draft permit: annual WET testing. If the threshold value of 1.66 TUc is exceeded for any one WET test, the Facility will perform two WET retests to determine if a Toxicity Reduction Evaluation (TRE) is needed.

Total Phosphorus (TP) Effluent Limits Analysis

Federal law [40 CFR 122.44(d)] restricts mass increases of pollutants upstream of an impaired water and requires water quality based effluent limits (WQBEL) to be established for pollutant parameters where it is found that a NPDES discharger has the reasonable potential (RP) to cause or contribute to an excursion above a state water quality standard. An effluent limits analysis was completed for the Delano WWTF to determine if the WWTF's discharge has RP to cause or contribute to an exceedance of a state water quality standard or contribute to any downstream impairment.
As a result of the analysis total phosphorus effluent limits for the Delano WWTF were established to ensure protection of downstream waters and comply with Lake Eutrophication Standards (LES), River Eutrophication Standards (RES), and State Discharge Restrictions (SDR). A summary of the effluent limit analysis and the assigned total phosphorous limits is included below. For additional detail regarding the effluent limits analysis, please see the *South Fork Crow River Watershed Effluent Limits Analysis, MPCA, July 1, 2015,* Appendix A to this fact sheet.

Lake Eutrophication Standards (LES)

Since 2008, MPCA has set effluent limits for WWTFs upstream of lakes and reservoirs consistent with LES. Eutrophication standards for lakes, shallow lakes, and reservoirs can be found in MN Rule 7050.0222. Effluent from the Delano WWTF is discharged upstream of Lake Pepin, a reservoir on the Mississippi River. In 2002, Lake Pepin was placed on the federal Clean Water Act Section 303(d) list of impaired waters due to excess nutrients. A TMDL study is currently delayed; however, a significant portion of the modeling analysis has been completed. Phosphorus is the primary nutrient responsible for excess algal growth in Lake Pepin.

Federal law [40 CFR 122.44(d)] restricts mass increases upstream of impaired waters and states that all NPDES dischargers that have the RP to cause or contribute to downstream impaired waters are required to have a WQBEL. When determining RP, the Code of Federal Regulations also states that the MPCA shall use procedures which account for existing controls on point and nonpoint sources of pollution. Permittees are found to have RP for TP if: 1) they discharge upstream of a nutrient impaired waterbody, 2) they discharge at TP concentrations greater than the ambient target, and 3) there is no geographical barrier capable of trapping a significant mass of nutrients between the outfall and the impairment. For all reasons listed above, the Delano WWTF is found to have RP for TP upstream of Lake Pepin. Therefore, the Delano WWTF is required to have a 12-month moving total mass TP WQBEL derived from a draft TMDL Waste Load Allocation (WLA). Draft WLAs in combination with other point and nonpoint reductions are sufficient to meet draft criteria in Lake Pepin designed to support the designated uses of this water resource.

The TP effluent limit assigned to the Delano WWTF to protect for the eutrophication impairment in Lake Pepin is 2,430.4 kg/yr, 12 month moving total.

River Eutrophication Standards (RES)

A watershed scale analysis was used to determine RP and establish total phosphorus effluent limits to protect for RES. Guidance for the analysis, determination of RP, and WQBEL setting process is defined in the *Procedures for Implementing River Eutrophication Standards for NPDES Wastewater Permits in Minnesota* (Wasley 2014), which can be found at https://www.pca.state.mn.us/sites/default/files/wq-wwprm2-15.pdf.

The Delano WWTF is located within the South Fork Crow River Watershed (SFCRW). There are twenty-two active NPDES WWTFs located within the SFCRW that currently discharge via a surface discharge station. The analysis, determination of RP, and WQBEL setting process to protect for RES within the SFCRW was completed on all twenty-two NPDES WWTFs concurrently. Information regarding the complete SFCRW review and resulting limits can be found in the MPCA memorandum titled *South Fork Crow River Watershed Effluent Limits Analysis, MPCA, July 1, 2015,* Appendix A to the fact sheet.

The Delano WWTF was shown to cause and contribute to elevated total phosphorus and Chl-a concentrations within the SFCRW. The Delano WWTF was therefore assigned a WQBEL of 0.53 mg/L, June-September, which was derived from water quality at river reaches within the SFCRW and further downstream in the Mississippi River.

The RES criteria that apply to the SFCRW is ≤ 0.150 mg/L total phosphorus and ≤ 0.035 mg/L (Chl-a). There was five reaches in the SFCRW with sufficient RES data (Table 1) that was used to conduct the RES analysis. The data from the outlet of the SFCRW near Rockford, MN (AUID 07010205-508) exceeds the RES. Thus, all facilities, including the Delano WWTF, discharging during the RES summer window (June-September) was found to have RP to cause or contribute to the exceedance of RES under current discharge conditions.

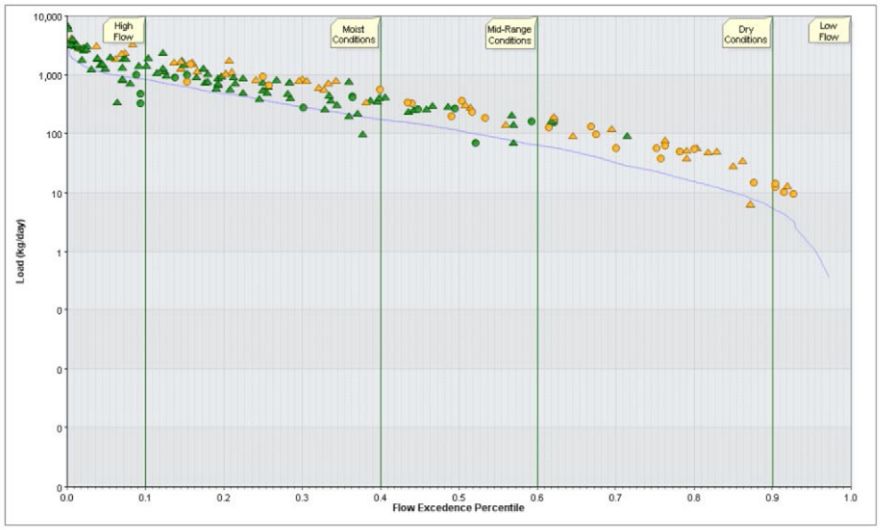
Table 1. SFCRW river reach water quality summary

Reach AUID	Chl-a Count	Chl-an Avg. mg/L	TP Count	TP Avg.	Facilities discharging upstream of AUID
07010205-508	30	**0.101**	113	**0.322**	All Facilities
07010205-513	22	**0.036**	69	**0.293**	Hector, Buffalo Lake, MN Energy
07010205-638	61	0.028	192	**0.387**	Hector, Buffalo Lake, MN Energy, Stewart, Brownton, Seneca, Glencoe
07010205-502	22	0.012	79	**0.210**	No Facilities
07010205-510	15	**0.055**	39	**0.383**	AB Mauri Foods, Hutchinson WWTP, Hutchinson Technologies

Exceedance of the RES criteria maked in Red.

The RP watershed analysis looked at the total phosphorus contribution from all twenty two active NPDES WWTFs during low flow. Point sources can have a disproportionate impact on receiving waters during low flow conditions. A load duration curve was developed to analyze conditions when flow is equal to the 80th percent flow exceedance (when, on average, 80% of the flow exceeds the respective flow value). This typically occurs during June - September (Figure 1). This analysis showed total phosphorus concentrations exceeding RES (total phosphorus ≤ 0.150 mg/L) at the SFCRW outlet, during low flow conditions. Using Equation 1, a concentration was calculated at the outlet during low flow conditions (80% exceed). Facilities were shown to have RP (CR= 0. 536mg/L over the RES of 0.150mg/L) at low flow conditions with current phosphorus limits (Table 2).

Figure 1. Load Duration Curve and RES Standard from the outlet of the South Fork Crow River Watershed. Flow based on station H19001001 (years of flow data) and TP surface water monitoring station S001-255 (June- Sept 1998-2014).



Equation 1. TP concentration of primary water of interest based on permitted flow for SFCRW facilities.

$$Cr = \frac{(Qs * Cs) + (Qe * Ce)}{Qr}$$

Table 2. SFCRW (07010205 outlet) Equation 1 values and descriptions

Variable	Value	Description	Source – Reference
Cr	0.536 mg/L	Concentration of river at critical flow (80th percentile exceeds flow) at design 70% flow and Potential Facility Loading	Equation 1
Qs	13.91 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Cs	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss 50% RES standard was used as background concentration
Qe	13.32 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	Water Quality Delta Database
Ce	0.997 mg/L	Concentration of effluent based on existing or Lake Pepin WLA based ad 70% permitted flow	Water Quality Delta Database
Qr	27.23 mgd	Flow of stream without WWTF(s) + Design flow of WWTF (Qr= Qs + Qe)	HYDSTRA, Water Quality Delta Database

Of the twenty-two active NPDES WWTFs located within the SFCRW, only sixteen of the active NPDES WWTFs discharge during the summer period (excluding lakes and no summer discharge facilities). Using Equation 2, a Waste Load Allocation (WLA) of 11.51 kg/day was established for the sixteen NPDES WWTF discharges in the SFCRW (Table 3). The WLA is the phosphorus loading that can be discharged by NPDES WWTF discharges within the SFCRW and still meet the phosphorus criterion during the 80th percent flow exceedance at the outlet reach (AUID 07010205).

Equation 2. Wasteload allocation for SFCRW facilities to meet RES of 0.150 mg/L.

$$WLA = \frac{(RES * (Qs + Qe)) - (Qs * Cs)}{Qe}$$

Table 3. SFCRW (AUID 07010205 outlet) phosphorus waste load values and description

Variable	Value	Description	Source – Reference
RES	0.150 mg/L	South RER Phosphorus Standard	
Qs	13.91 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Qe	13.32 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	Discharge Monitoring
Cs	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss, 50% RES standard was used as background concentration
WLA Conc.	0.228 mg/L	Effluent concentration to meet RES	Equation 1
WLA Load	11.51 kg/d	Point Source load permissible under the RES bases limits	$WLA\ Load = \frac{WLA\ conc}{QE * 3.785\ gal/L}$

Given that each contributing NPDES WWTF is a different size and that total phosphorus removal is typically more economical and easier to implement at larger facilities, the gross WLA was not simply divided evenly among the total number of contributing facilities. Instead, concentration multipliers, based on facility size and type, were applied to the 70% of the AWWDF for each facility to achieve individual WLAs. Target concentrations were modified until the total mass was at or below the gross WLAs. The WLA concentration determinations started with giving largest facility a WLA concentration at the phosphorus criteria (0.15 mg/L). This allowed smaller facilities to have WLA concentrations above the phosphorus criteria. Table 4 shows the WLA concentration and the associated mass calculated from that facility based on 70% of their AWWDF. The table also shows the total facility WLA mass which is slightly under the WLA that is needed to meet the RES, WLA of 11.51 kg/day.

Table 4 Facility RES Limit Summary

Facility [1,2]	Permit ID	QE mgd[3]	Pond	Facility Type		WLA mg/L[4]	WLA kg/d[5]	Proposed RES Limit mg/L[6]
Brownton WWTP	MN0022951	0.1372		Small	Domestic	0.47	0.24	1.0
Delano WTP[7]	MNG640123	0.15		Small	Industrial	0.05	0.03	0.29
Delano WWTP	MN0051250	1.54		Major	Domestic	0.25	1.46	0.53
Glencoe WWTP	MN0022233	1.82		Major	Domestic	0.25	1.72	0.53
Lester Prairie WWTP	MN0023957	0.2548		Large	Domestic	0.30	0.28	0.63
Mayer WWTP	MN0021202	0.3045		Large	Domestic	0.30	0.35	0.63
New Germany WWTP	MN0024295	0.0364	y	Small	Domestic	0.95	0.13	2.00
Stewart WWTP	MNG580077	0.0798	y	Small	Domestic	0.95	0.29	2.00
Watertown WWTP	MN0020940	0.8834		Major	Domestic	0.25	0.84	0.53
Winsted WWTP	MN0021571	0.574		Large	Domestic	0.30	0.65	0.63
513 Subwatershed								
Hector WWTP	MN0025445	0.462		Large	Domestic	0.30	0.52	0.63
Buffalo Lake WWTP	MN0050211	0.1155	y	Small	Domestic	0.95	0.42	2.00
Minnesota Energy	MN0063151	0.04		Small	Industrial	1.00	0.15	2.10
510 Subwatershed								
AB Mauri Food Inc.	MNG250099	3		Major	Industrial	0.15	1.70	0.32
Hutchinson Technology Inc.	MN0055506	0.125		Small	Industrial	0.26	0.12	0.54
Hutchinson WWTP	MN0055832	3.801		Major	Domestic	0.15	2.16	0.32
							kg/d Total	kg/d Needed to Meet RES WLA
			513 Sub-watershed				0.68	0.74
			510 Sub Watershed				3.98	4.78
			Full watershed				10.65	11.51

[1]Facilities that do not typically discharge in the summer are excluded
[2]Facilities discharging to immediate lakes are excluded
[3]QE = 70% AWWDF for Domestic Max Design Flow for Industrial Facilities
[4]Target Concentration value dependent on facility type
[5] Target Load = Target concentration mg/L TP x QE x 3.785 L/gal
[6] RES Limits = Target Concentration x 2.1 (effluent variability)

Once the target effluent concentration was set for all sixteen NPDES WWTF discharges, individual WWTF limits were developed. The assigned WLAs must be achieved over a long term-average period to ensure compliance with RES. As a result, using a 2.1 multiplication factor, a monthly limit was calculated for each NPDES WWTF. The 2.1 multiplication factor takes into account variability of treatment, but ensures that the WLA will be achieved over the long-term average period. The calculations used to assign the 0.53 mg/L limit to the Delano WWTF are included below.

Calculations used to develop Delano WWTF total phosphorous limit:
Delano WWTF Target Mass Concentration: **1.46 kg/day** = (0.25 mg/L (target concentration) * 1.54 mgd (70% AWWDF) * 3.785 L/gal)

Delano WWTF Limit Calculation: **0.53 mg/L** = (0.25 mg/L (target concentration) * 2.1 (variability of treatment))

In order to determine if a mass or concentration limit is appropriate to protect for RES a sensitivity analysis was performed. The analysis concluded that if facilities within the watershed were discharging at the RES target mass concentrations, downstream waters would exceed RES standards. As a result the limit assigned to the Delano WWTF discharge is the concentration limit of 0.53 mg/L; June - September. Compliance with the assigned effluent limit will ensure compliance with downstream RES standards over the long term-average period.

State Discharge Restriction Limits (based on Minn. R. 7053.0255)
Given that the Delano WWTF is not expanding and does not affect a downstream lake, as defined by Minn.R. 7053.0255, it is not required by State Rules to receive a 1.0 mg/L TP limit.

The 12-month moving average limit of 1.0 mg/L was assigned to the Delano WWTP at initiation of operation of their upgraded facility in 2005 that included biological phosphorus removal.

Table 4. Proposed Limits and Monitoring Requirements for Station SD002

Parameter	Discharge limitations			Monitoring requirements		
	Limit and Units			**Frequency**	**Sample type**	**Effective period**
Bicarbonates (HCO3)	Monitor only. calendar month maximum		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
BOD, Carbonaceous 05 Day (20 Deg C)	25 calendar month average secondary	40 maximum calendar week average secondary	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
BOD, Carbonaceous 05 Day (20 Deg C)	208.1 calendar month average secondary	332.9 maximum calendar week average secondary	kilograms per day	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
BOD, Carbonaceous 05 Day (20 Deg C)	15 calendar month average tertiary	25 maximum calendar week average tertiary	milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
BOD, Carbonaceous 05 Day (20 Deg C)	124.7 calendar month average tertiary	208.1 maximum calendar week average tertiary	kilograms per day	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
BOD, Carbonaceous 05 Day % Removal	85 minimum calendar month average		percent	3 times per week	Calculation	Jan-Dec (Sep-Aug) (Oct-Sep)
Calcium, Total (as Ca)	Monitor only. calendar month maximum		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Chloride, Total	Monitor only. calendar month maximum		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Copper, Total (as Cu)	Monitor only. calendar quarter average and daily maximum		Micrograms per liter	Once per quarter	Grab	Mar, Jun, Sep, Dec
Fecal Coliform, MPN or Membrane Filter 44.5C	200 calendar month geometric mean		organisms per 100 milliliter	3 times per week	Grab	Apr-Oct
Flow	Monitor only. calendar month average	Monitor only. calendar month maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec (Sep-Aug) (Oct-Sep)
Flow	Monitor only. calendar month total		million gallons	once per day	Measurement, Continuous	Jan-Dec (Sep-Aug) (Oct-Sep)
Hardness, Calcium & Magnesium, Calculated (as CaCO3)	Monitor only. calendar month maximum		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Magnesium, Total (as Mg)	Monitor only. calendar month maximum		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Mercury, Dissolved (as Hg)		Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep
Mercury, Total (as Hg)		Monitor only. calendar month maximum	nanograms per liter	once per month	Grab	May, Sep
Nitrite Plus Nitrate, Total (as N)	Monitor only. calendar month average		milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Nitrogen, Ammonia, Total (as N)	5 calendar month average		milligrams per liter	3 times per week	24-Hour Flow Composite	Dec-Mar
Nitrogen, Ammonia, Total (as N)	41.6 calendar month average		kilograms per day	3 times per week	24-Hour Flow Composite	Dec-Mar
Nitrogen, Ammonia, Total (as N)	7.8 calendar month average secondary		milligrams per liter	3 times per week	24-Hour Flow Composite	Jun-Sep
Nitrogen, Ammonia, Total (as N)	64.8 calendar month average secondary		kilograms per day	3 times per week	24-Hour Flow Composite	Jun-Sep
Nitrogen, Ammonia, Total (as N)	1.1 calendar month average tertiary		milligrams per liter	3 times per week	24-Hour Flow Composite	Jun-Sep
Nitrogen, Ammonia, Total (as N)	9.2 calendar month average tertiary		kilograms per day	3 times per week	24-Hour Flow Composite	Jun-Sep
Nitrogen, Ammonia,	22 calendar month		milligrams per	3 times per	24-Hour Flow	Apr-May

Total (as N)	average			liter	week	Composite	
Nitrogen, Ammonia, Total (as N)	182.9 calendar month average			kilograms per day	3 times per week	24-Hour Flow Composite	Apr-May
Nitrogen, Ammonia, Total (as N)	25 calendar month average secondary			milligrams per liter	3 times per week	24-Hour Flow Composite	Oct-Nov
Nitrogen, Ammonia, Total (as N)	208 calendar month average secondary			kilograms per day	3 times per week	24-Hour Flow Composite	Oct-Nov
Nitrogen, Ammonia, Total (as N)	5.2 calendar month average tertiary			milligrams per liter	3 times per week	24-Hour Flow Composite	Oct-Nov
Nitrogen, Ammonia, Total (as N)	43.2 calendar month average tertiary			kilograms per day	3 times per week	24-Hour Flow Composite	Oct-Nov
Nitrogen, Kjeldahl, Total	Monitor only. calendar month average			milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Oxygen, Dissolved	6.0 calendar month minimum tertiary			milligrams per liter	once per day	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)
Oxygen, Dissolved	Monitor only. calendar month minimum secondary			milligrams per liter	once per day	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)
pH	6.0 calendar month minimum		9.0 calendar month maximum	standard units	once per day	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)
Phosphorus, Total (as P) Phase 1	Monitor only. calendar month average			milligrams per liter	once per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Phosphorus, Total (as P) Phase 1	Monitor only. calendar month average			kilograms per day	once per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Phosphorus, Total (as P) Both Phases	2430.4 12-month moving total	kilograms per year			once per month	Calculation	Jan-Dec (Sep-Aug) (Oct-Sep)
Phosphorus, Total (as P) Both Phases			1.0 12-month moving average	milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Phosphorus, Total (as P) Phase 2			0.53 calendar month average	milligrams per liter	once per month	24-Hour Flow Composite	Jun-Sep
Phosphorus, Total (as P) Phase 2	Monitor only. calendar month average			milligrams per liter	once per week	24-Hour Flow Composite	Oct-May
Phosphorus, Total (as P) Phase 2	Monitor only. calendar month average			kilograms per day	once per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Potassium, Total (as K)	Monitor only. calendar month maximum			milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Sodium, Total (as Na)	Monitor only. calendar month maximum			milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Solids, Total Dissolved (TDS)	Monitor only. calendar month average			milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
Solids, Total Suspended (TSS)	30 calendar month average	45 maximum calendar week average		milligrams per liter	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
TSS	249.4 calendar month average	374 maximum calendar week average		kilograms per day	3 times per week	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)
TSS % Removal	85 minimum calendar month average			percent	3 times per week	Calculation	Jan-Dec (Sep-Aug) (Oct-Sep)
TSS, grab (Mercury)	Monitor only. calendar month maximum			milligrams per liter	once per month	Grab	May, Sep
Specific Conductance	Monitor only. calendar month maximum			micromhos per cm	once per month	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)
Sulfate, Total (as SO4)	Monitor only. calendar month maximum			milligrams per liter	once per month	24-Hour Flow Composite	Jan-Dec (Sep-Aug) (Oct-Sep)

Additional requirements

Pollutant Minimization Plans

Mercury Minimization Plan (MMP)

This draft permit contains requirements for mercury monitoring and for submittal of an updated Mercury Minimization Plan (MMP). These requirements were added in response to the U.S. Environmental Protection Agency's approval of the Minnesota state-wide Mercury Total Maximum Daily Load (TMDL) plan. Guidance for completing the MMP is available on the MPCA internet site at http://www.pca.state.mn.us/gp0rb25. More information on the TMDL can be found on the MPCA internet site at http://www.pca.state.mn.us/wfhy9ef.

Compliance schedule

The Delano WWTF discharge has been shown to contribute to elevated total phosphorus (TP) and chlorophyll-a (Chl-a) concentrations in the South Fork Crow River. In addition, the WWTF has reasonable potential (RP) to cause or contribute to the excess nutrient impairment in Lake Pepin. The existing limits in the permit were developed to protect for the excess nutrient impairment in Lake Pepin and in accordance with Minn. R. Ch. 7053.0255 but were found to not be sufficient to protect the South fork of the Crow River and the Crow River downstream. The Facility is therefore required to have water quality based effluent limits (WQBELs) designed to protect the receiving water reach of the South Fork Crow River as well as downstream waterbodies. The following WWTF TP limits will not change 2430.4 kg/yr, 12-month moving total, January - December and 1.0 mg/L, 12-month moving average, January - December. The following WQBEL for TP is new as a result of this analysis: 0.53 mg/L, calendar month average, June - September.

The Delano WWTF is not currently designed to meet the level of treatment required to ensure compliance with the newly assigned TP limit of 0.53 mg/L (since 2013 the average effluent phosphorous concentration was 0.74 mg/L, Jun – Sept). As a result, the City of Delano (City) needs time to make the necessary changes in operations and complete the capital improvements necessary to achieve compliance with the new limit. In order to allow the City the necessary time to complete pilot testing, plan, design, and make the necessary operational and capital improvements, the MPCA has include a 4.5 year compliance construction schedule in the permit in accordance with 40 CFR § 122.47. To develop the schedule and timeframe for completion MPCA staff worked with the City to identify the steps the City needed to take and the as soon as possible timeframe for completion of each step.

This draft permit includes a compliance related construction schedule that begins at permit issuance and ends as soon as possible, but not later than June 30, 2021. At that time, the Permittee is required to comply with the final total phosphorus effluent limit of 0.53 mg/L in addition to the current TP limits in the permit. Phase 1 of the permit includes the current TP limits assigned to the Facility. Phase 2 is when the Permittee is required to comply with the newly assigned TP limit of 0.53 mg/L. The TP limits assigned to the Facility are as follows:

Phase 1 (interim) requirements – effective at permit issuance:
2430.4 kg/yr, 12-month moving total, Jan - Dec
1.0 mg/L, 12-month moving average, Jan - Dec

Phase 2 (final) requirements - effective as soon as possible, but no later than June 30, 2021:
2430.4 kg/yr, 12-month moving total, Jan - Dec
1.0 mg/L, 12-month moving average, Jan - Dec
0.53 mg/L, calendar month average, June – September

Salty Discharge Requirements

Because this Facility has a receiving water stream flow to effluent dilution ration of less than 5:1, the Facility is required to monitor for salty discharge parameters. Monitoring of bicarbonates, calcium, chloride, hardness, magnesium, potassium, sodium, total dissolved solids (TDS), specific conductance, and sulfate shall be sampled once per month from the effluent waste stream (SD002). With the exception of total chloride and TDS, the Permittee may request a reduction

in monitoring if, after two years of data, the monitoring does not indicate a reasonable potential to exceed a limit. If monitoring results indicate a reasonable potential for any of the parameters, the Permittee will be required to submit an application for permit modification and, if necessary, a compliance schedule will be added to the Permit to ensure progress towards meeting the water quality standards.

Nitrogen Monitoring Requirements
The draft permit requires additional monitoring for nitrite plus nitrate-nitrogen and total Kjeldahl nitrogen, at a frequency of once per month for the five-year term of the permit. TDS is part of this monitoring; however, the Permittee is required to monitor for this analyte as part of the salty discharge monitoring requirements, sampling once per month. The data will be recorded on a custom supplemental form provided by the MPCA and must be submitted with the DMR for the month when the sample is collected. These additional parameters are being added to every permitted municipal facility with a design AWWF of 100,000 gallons per day or greater.

Priority Pollutants – Monitoring Requirements
This draft permit includes the requirements for priority pollutant monitoring on the effluent three times during the life of the permit. Sampling events will need to be done at least one year apart. This draft permit includes requirements to fulfill the priority pollutant monitoring requirements in the current U.S. Environmental Protection Agency (EPA) application form (EPA Form 3510-2A).

Chronic Whole Effluent Toxicity (WET) Testing Requirements
An annual requirement to submit chronic toxicity test batteries is required in the draft permit. The first set of annual chronic WET results is due six months after permit issuance and annually thereafter.

Biosolids
This draft permit requires biosolids to be treated to meet specific standards, and specifies monitoring, recordkeeping, reporting, and general requirements for biosolids that are applied to the land. Unless they are exceptional quality biosolids, sites to which biosolids are applied are approved by the MPCA by the procedures found in Minn. R. 7041.0800.

Conditional Exclusion for No Exposure – Industrial Stormwater
On April 5, 2010, the Industrial Stormwater General Permit (MNR050000) was issued. This permit addresses stormwater discharges associated with industrial activity for facilities that discharge stormwater to waters of the state, including Municipal Separate Storm Sewer Systems. The General Permit also addressed stormwater discharges associated with industrial activities at facilities that provide on-site infiltration of industrial stormwater discharges associated with the facility.

For both industrial and municipal wastewater facilities, in lieu of obtaining coverage under both the General Permit and the individual NPDES permit, the MPCA has added the necessary industrial stormwater requirements language to this permit so that coverage under this NPDES permit alone will cover both permits. Because the Permittee applied for and received “No Exposure” certification on May 13, 2013, the “No Exposure” language has been added to this permit. There will be no sampling and monitoring required at this time for industrial stormwater. The Permittee is required to submit a request for permit termination if it is currently covered under a general industrial stormwater permit.

Variances
The draft permit does not include any variances to water quality standards.

Variability of Operation
The Permittee operates an advanced wastewater treatment facility and has chosen to exercise the variability of operation option in Minn. Stat. Section 115 and/or Minn. R. 7053. Only winter receiving water sampling is practical because no bridges are located downstream between the SD002 discharge location and the confluent or the receiving

water (South Fork of the Crow River) with the North Fork of the Crow River. During the open water part of the year, the "cut-off" streamflow values determined for the Crow River at Rockford will determine the variability of operation eligibility. The flow at USGS Streamflow Gauge at Rockford must be greater than the "cutoff" values in order to utilize the variability of operation option.

When the Permittee is exercising the variability of operations option available under Minn. R. 7053.0235, the following effluent limits apply: 1) 25 mg/L for CBOD5; 2) 7.8 mg/L for ammonia-N during June-September; and 3) 25 mg/L for ammonia-N during October-November. The minimum DO (dissolved oxygen) effluent limit would not apply provided that the receiving water's DO concentration exceeds the minimum standard of 6 mg/L.

Table 5 Variability of "cutoff" flows:

Delano Discharge in MGD[1]	Flow at USGS Streamflow Gauge at Rockford in cfs[2]			
	June-Sept	Oct-Nov	Dec-March	April-May
1.17	130	130	160	150

1 Million gallons per day
2 Cubic feet per second

The receiving water "cutoff" flows are referenced to the U.S. Geological Survey's continuous flow recording station on the Crow River at Rockford. Current or "real time" flow is accessible online at the following USGS website: http://water.usgs.gov/realtime.html.

Determination of Delano's "On/Off Switch" Flows
Currently no continuous streamflow gauging station is located on the South Fork of the Crow River in Delano, Minnesota. The nearest continuous streamflow gauging station is downstream of Delano on the Crow River at Rockford. Streamflow data from the Rockford station were used as a basis to estimate streamflow at Delano, and these estimated flows are the basis for estimation of stream/effluent dilution ratios. Streamflow data from the Rockford station are available online on a "real time" basis from the USGS (U.S. Geological Survey) website. Seasonal streamflows were determined for Rockford and used as a basis to define "cutoff values" that served as an "on/off switch" for the variability of operations option at Delano. These "cutoff" streamflows, in effect, determine the eligibility of the Delano Facility to elect the variability of operations option as specified in Minnesota Rules 7053.0235.

Point source impacts of wastewater discharge on receiving waters are generally adverse at dilution factors under 10 parts receiving water to 1 part effluent (10:1). The "cutoff" streamflows determined for the USGS gauging station at Rockford were calculated on the basis of a 10:1 dilution factor for estimated seasonal (spring, summer, and fall) streamflows at Delano relative to the average dry weather flow of 1.17 MGD for the Delano Facility. The ADW flow of the Delano Facility multiplied times 10 is 18.1 cfs. This streamflow was matched to seasonal flow duration values computed from the discharge record for the USGS gauge at Mayer, Minnesota, which is located upstream of Delano. The gauge at Mayer was a continuous record station with a period of record from 1935 to 1979. Associated with the matched flow at Mayer were percent exceedance values. The percent exceedance values at Mayer were then matched to values calculated from the discharge record at Rockford. The streamflows at Rockford associated with the matching exceedance values are used as the "cutoff" streamflows for the Delano Facility. The spring, summer, and fall "cutoff" flows were 150, 130, and 130 cfs, respectively.

During winter, reliable streamflow data from the Rockford gauging station are often unavailable because of ice. During periods of sufficient ice cover collection of receiving water samples to determine DO levels and concentrations of ammonia nitrogen provide the basis for determination of the eligibility of the Delano Facility to elect the variability of

operations. When streamflow is used to determine eligibility to use variability of operations during winter, the cumulative discharges from downstream facilities at Greenfield, Rockford, Saint Michael, and Ostego are added to the discharge from the Delano Facility to determine the "cutoff" streamflow. The cumulative streamflow from these facilities is 6.2 MGD. A 20:1 dilution flow relative to a discharge of 8 cfs (6.2 cfs + 1.8 cfs) was used to compute a "cutoff" value of 160 cfs.

Total facility requirements
All NPDES permits issued in the State of Minnesota contain certain conditions that remain the same regardless of the size, location, or type of discharge. The standard conditions satisfy the requirements outlined in 40 CFR 122.41. These conditions are listed in the Total Facility Requirements chapter of an NPDES permit. These requirements cover a wide range of areas including recordkeeping, sampling, equipment calibration, equipment maintenance, reporting, facility upsets, bypass, solids handling, changes in operation, facility inspections, and permit reissuance.

Nondegredation and anti-backsliding
In accordance with MPCA rules regarding nondegradation for all waters that are not Outstanding Resource Value Waters, nondegradation review is required for any new or expanded significant discharge (Minn. R. 7050.0185). A significant discharge is 1) a new discharge (not in existence before January 1, 1988) that is greater than 200,000 gallons per day to any water other than a Class 7 water or 2) an expanded discharge that expands by greater than 200,000 gallons per day that discharges to any water other than a Class 7 water or 3) a new or expanded discharge containing any toxic pollutant at a mass loading rate likely to increase the concentration of the toxicant in the receiving water by greater than one percent over the baseline quality. The flow rate used to determine significance is the design average wet weather flow. The January 1, 1988, design AWWF for this Facility is 0.601 mgd.

This Permit also complies with Minn. R. 7053.0275 regarding anti-backsliding.

Any point source discharger of sewage, industrial, or other wastes for which a NPDES permit has been issued by the MPCA that contains effluent limits more stringent than those that would be established by parts 7053.0215 to 7053.0265 shall continue to meet the effluent limits established by the permit, unless the permittee establishes that less stringent effluent limits are allowable pursuant to federal law, under section 402(o) of the Clean Water Act, United States Code, title 33, section 1342.

Appendix A
South Fork Crow Rover Watershed Phosphorus Effluent Limit Analysis
July 1, 2015

The information included in Appendix A is intended to provide additional background information regarding the development of the Total Phosphorus limit for the Delano WWTP. Comments submitted during the public notice period for the Delano WWTP NPDES/SDS Permit can only address the Delano WWTP permit requirements.

Purpose
DATE : 7/1/2015

TO : File
FROM : Matt Lindon
Effluent Limits Unit
Environmental Analysis and Outcomes Division

PHONE : 651/757-2530

SUBJECT : South Fork Crow River Watershed Phosphorus Effluent Limit Analysis

VERSION : 1.2

Table of Contents

Table of Contents 1
Introduction 2
River Eutrophication Based Effluent Limits 2
Evaluation - Step 1 4
Reasonable Potential - Step 2 5
Wasteload Allocation - Step 3 6
Convert WLA to effluent limits - Step 4 8
Verify Final Limits - Step 5 10
Lake Eutrophication Based Effluent Limits 11
Lake Pepin TMDL 12
Conclusion 14
References 15

DRAFT

Introduction

The purpose of this memorandum is to determine wastewater total phosphorus (TP) effluent limits to protect waters of the South Fork Crow River Watershed (SFCRW) and water further downstream. There are twenty two active NPDES wastewater treatment facilities (WWTFs) in this watershed that currently discharge via a surface discharge station (Table 1 and Figure 2) . Federal law [40 CFR 122.44(d)] restricts mass increases upstream of impaired waters and states that all NPDES dischargers that have the reasonable potential (RP) to cause or contribute to downstream impaired waters are required to have a water quality based effluent limit (WQBEL). Since 2008, MPCA has set effluent limits for wastewater treatment facilities (WWTFs) upstream of lakes and reservoirs consistent with lake eutrophication standards (LES). The MPCA recently adopted river eutrophication Standards (RES) applicable across the state. This memo describes the analysis used to determine if wastewater dischargers in the SFCRW have reasonable potential to cause or contribute to exceedances phosphorus standards downstream. It also describes the limits necessary to meet the respective River and Lake Eutrophication Standards. In rivers, the process used to determine RP and derive WQBELs is defined in *Implementing River and Lake eutrophication standards for NPDES wastewater permits* (Wasley 2014).

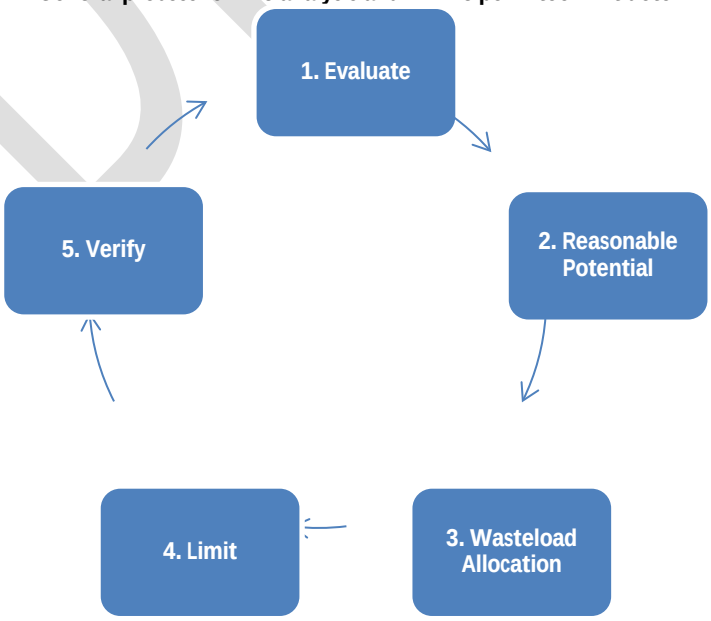
River Eutrophication Based Effluent Limits

The process for reviewing TP limits to protect for River Eutrophication in the SFCRW included a five-step process (Figure 1). Methods for the analysis and limit determinations were consistent with MPCA guidance on implementing river eutrophication standards (Wasley, 2014). The five step process was completed for the NPDES facilities in the SFCRW as well as two subwatersheds. Using RES implementation guidance, it was determined that all facilities in three watersheds have RP to cause or contribute to the exceedance of applicable RES. Proposed Phosphorus effluent limits were calculated for facilities to ensure RES are met.

Critical aspects of RES (Minn. R. 7050.0222, Heiskary, 2013) include:

- Applicable only during June – September
- Criteria includes Phosphorus and response variable Chlorophyll-a
- RES are regionally based criteria
- The SFCRW is in the South River Eutrophication Region (RER) where the standard is ≤ 150 µg/L TP and ≤ 35 µg/L Chl-a
- Limits are assigned bases on calculated load allocation and a 2.1 multiplier (Wasley, 2015)

Figure 1: General process for RES analysis and NPDES permitee limit determination



DRAFT

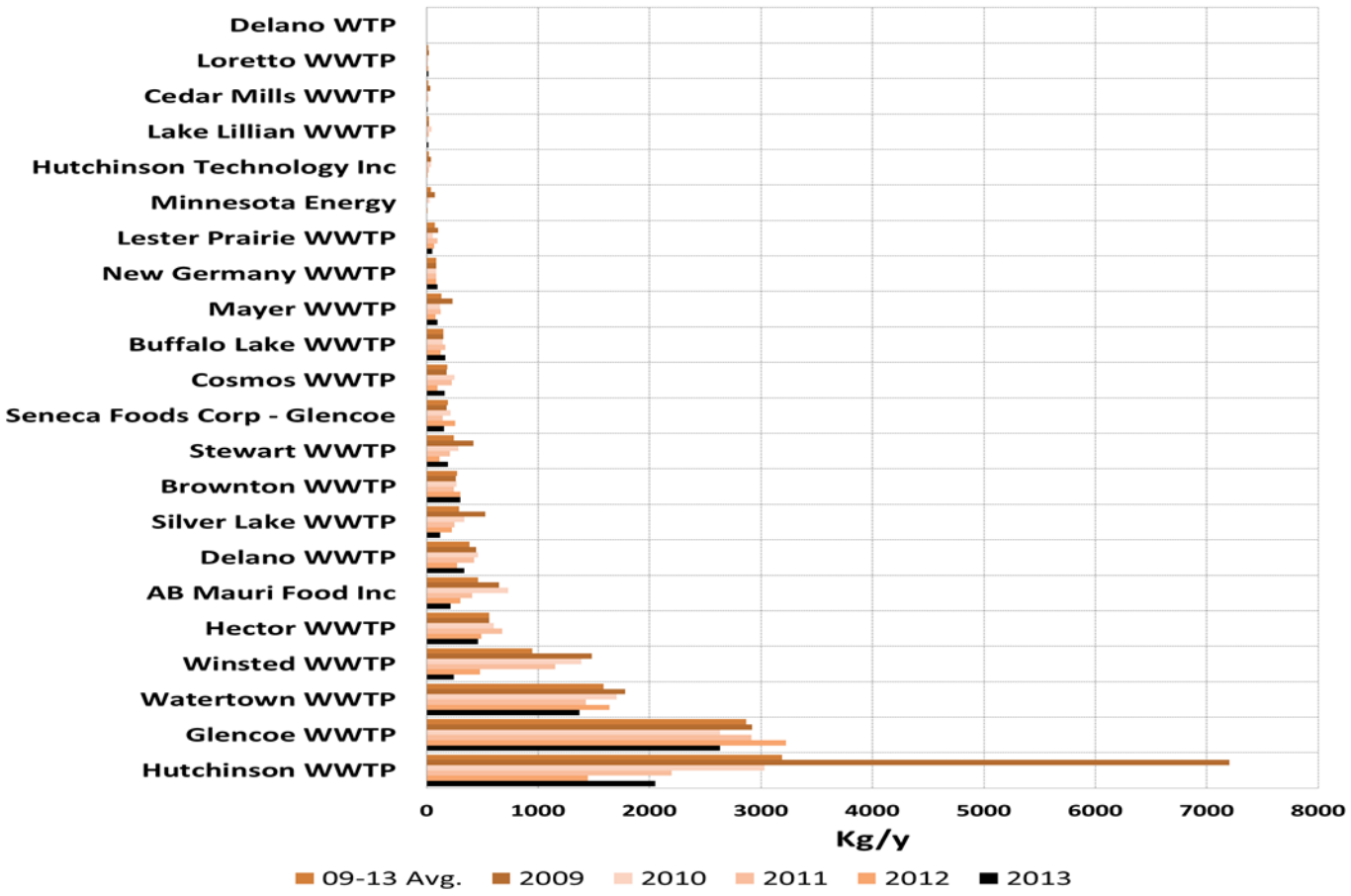
Background

The South Fork Crow River watershed covers 818,428 acres. It encompasses parts of Kandiyohi, Renville, Meeker, McLeod, Sibley, Wright, Carver, and Hennepin counties. The South Fork Crow River joins with the North Fork Crow at Rockford, and then joins the Mississippi River near Dayton. The South Fork Crow River watershed includes many lakes, streams, and wetlands. Buffalo Creek, a major tributary, flows into the South Fork Crow River downstream of Lester Prairie. Land use in the South Fork Crow River watershed is largely agricultural, with row crops and pasture/grass lands accounting for approximately 83% of the overall watershed acres.

Several lakes and river reaches of the SFCRW do not meet water quality standards for eutrophication. This accounts for algae blooms and low dissolved oxygen conditions in summer months. The South Fork Crow Watershed intensive monitoring project began in 2012 with the collection of biological, chemical and hydrological data throughout the watershed. Data collection continued through the 2013 monitoring season. Assessments and Stressor ID work is in progress. It is important to note that future water quality assessments could mean more restrictive limits are needed to protect Lakes and streams as new data becomes available.

SFCRW drainage includes 22 NPDES permitted surface water discharges. Point source phosphorus discharge loading varies among facilities, with Hutchinson, Glencoe, Watertown and Winsted accounting for the majority of the point source phosphorus (Figure 2 and 3). Some SFCRW facilities (Hutchinson, Winsted, Hector and AM Mauri Foods) show recent reduction in phosphorus discharge.

Figure2. South Fork Crow River NPDES facility Phosphorus yearly discharge 2009-2013



Evaluation - Step 1

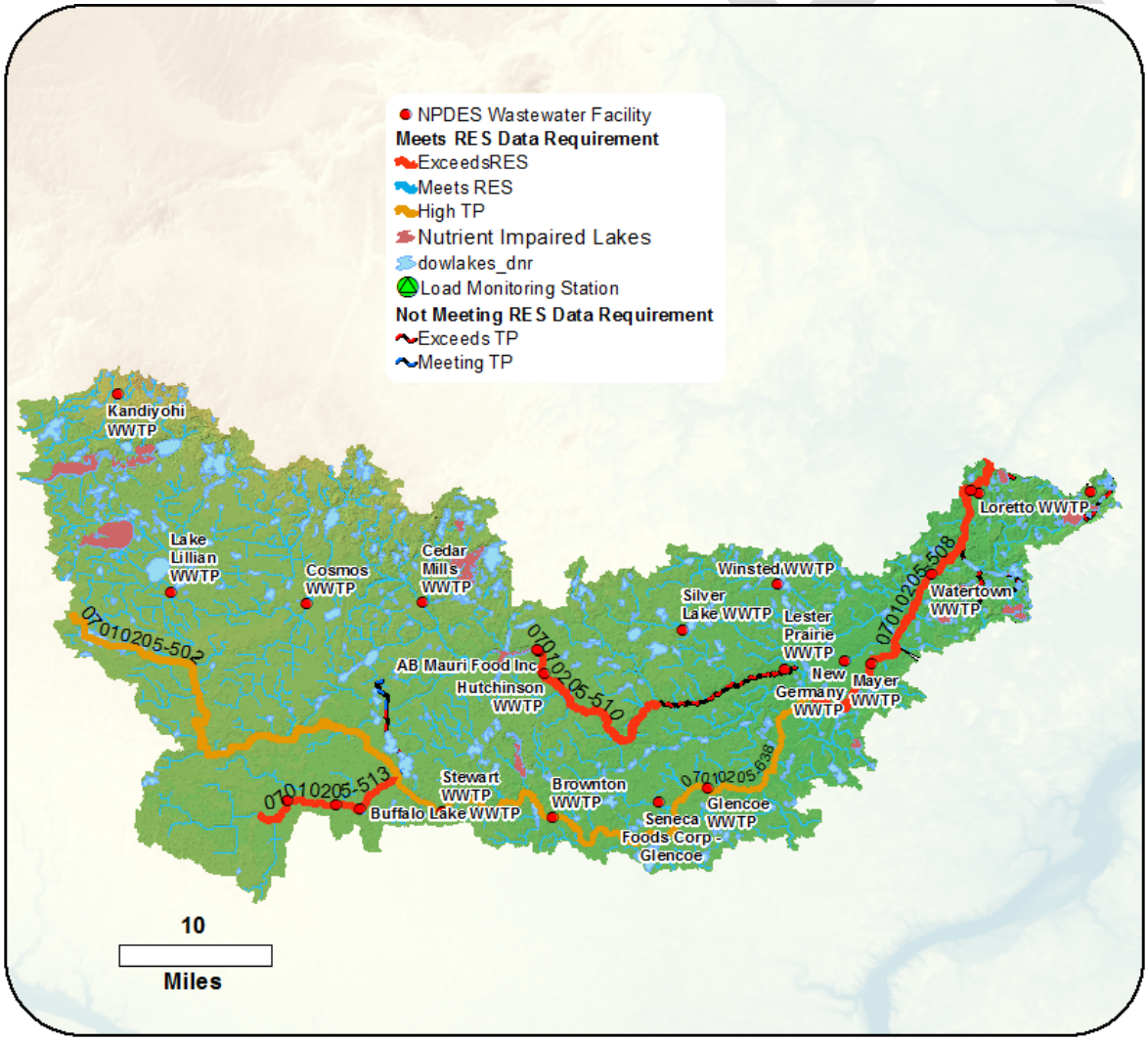
The SFCRW is located in the South RNR and has a criteria of ≤ 0.150 mg/L TP and ≤ 0.035 mg/L (Chl-a) (Minn. R. 7050.0222, Heiskary, 2013). Currently there are five reaches in the SFCRW with sufficient RES data (Table 8 and Figure 7) to conduct RES analysis. The data from the outlet of the SFCRW near Rockford (AUID 07010205-508 exceeds the RES. Thus, facilities discharging during the RES summer window (June-September) have RP to cause or contribute to the exceedance of RES under current discharge conditions.

Table 1. SFCRW river reach water quality summary

Reach AUID	Chl-a Count	Chl-an Avg. mg/L	TP Count	TP Avg.	Facilities discharging upstream of AUID
07010205-508	30	**0.101**	113	**0.322**	All Facilities
07010205-513	22	**0.036**	69	**0.293**	Hector, Buffalo Lake, MN Energy
07010205-638	61	0.028	192	**0.387**	Hector, Buffalo Lake, MN Energy, Stewart, Brownton, Seneca, Glencoe
07010205-502	22	0.012	79	**0.210**	No Facilities
07010205-510	15	**0.055**	39	**0.383**	AB Mauri Foods, Hutchinson WWTP, Hutchinson Technologies

Exceedance of the RES criteria maked in Red.

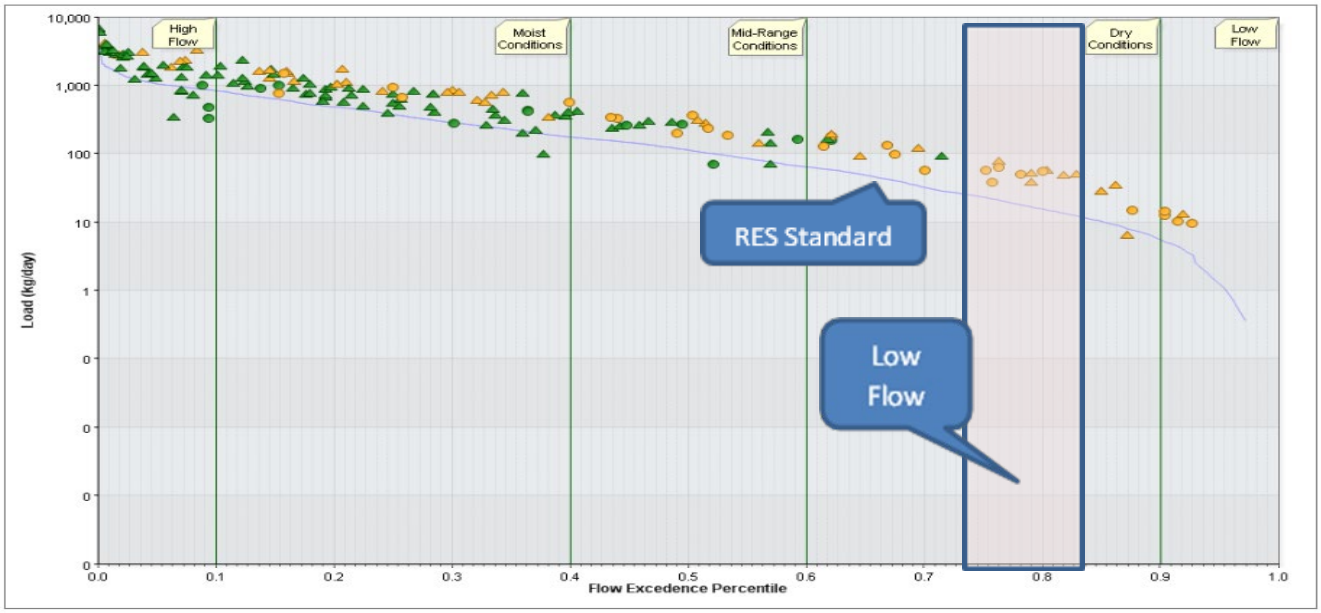
Figure 3. South Fork Crow NPDES wastewater treatment facilities and water quality summary map.



Reasonable Potential - Step 2

The RP evaluation included a look at the contribution from point sources during low flow. Point sources can have a disproportionate impact on receiving waters during low flow conditions. A load duration curve was developed to analyze conditions when flow is equal to the 80th percent flow exceedance (when, on average, 80% of the flow exceeds the respective flow value). This typically occurs during June - September (Figure 4). This analysis showed TP concentrations exceeding RES (TP ≤ 0.150 mg/L) at the SFCRW outlet, during low flow conditions. Using Equation 1, a concentration was calculated at the outlet during low flow conditions (80% exceed). Facilities were shown to have RP (CR= 0. 536mg/L over the RES of 0.150mg/L) at low flow conditions with current phosphorus limits (Table 2).

Figure 4. Load Duration Curve and RES Standard from the outlet of the South Fork Crow River Watershed. Flow based on station H19001001 (years of flow data) and TP surface water monitoring station S001-255 (June- Sept 1998-2014).



Equation 1. TP concentration of primary water of interest based on permitted flow for SFCRW facilities.

$$Cr = \frac{(Qs * Cs) + (Qe * Ce)}{Qr}$$

Table 2. SFCRW (07010205 outlet) Equation 1 values and descriptions

Variable	Value	Description	Source – Reference
Cr	0.536 mg/L	Concentration of river at critical flow (80th percentile exceeds flow) at design 70% flow and Potential Facility Loading	Equation 1
Qs	13.91 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Cs	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss 50% RES standard was used as background concentration
Qe	13.32 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	Water Quality Delta Database
Ce	0.997 mg/L	Concentration of effluent based on existing or Lake Pepin WLA based ad 70% permitted flow	Water Quality Delta Database
Qr	27.23 mgd	Flow of stream without WWTF(s) + Design flow of WWTF (Qr= Qs + Qe)	HYDSTRA, Water Quality Delta Database

Wasteload Allocation - Step 3

Of the 22 facilities in the SFCRW, only 16 discharge to rivers during the summer period (excluding lakes and no summer discharge facilities). Using Equation 2, a Waste Load Allocation (WLA) of 11.51 kg/day was determined for the South Fork Crow River (Table 3 **).** Facility loading would need to be below this WLA order to achieve a river TP concentration of <0.150 mg/L during the June through September summer period at low flow.

A sub watershed analysis completed on reaches with sufficient RES data downstream of dischargers (07010205-510 and 07010205-513) determining WLA's specific to upstream facilities (Table 4 and 5). Facilities upstream of 07010205-510 (Hutchinson WWTP, Hutchinson Technology, and AB Mauri Foods) are downstream of Otter Lake. This is a shallow nutrient impaired Lake. Drainage area to this AUID is 40.4 % of the SFCRW area (327,650 acres) WLA calculations assumed the upstream river concentration was at the LES standard for Otter Lake (0.090 mg/L) and the area proportional flow. AUID 07010205-513 receives wastewater from Hector, Buffalo Lake , and MN Power. Considering the small drainage (63,672 acres 7.8% of the SFCRW) area and limited dilution, the WLA calculated to meet the RES in the 07010205-513 reach is low at 0.74 kg/d (Table 5).

Language will be included

Equation 2. Wasteload allocation for SFCRW facilities to meet RES of 0.150 mg/L.

$$\boldsymbol{WLA} = \frac{(\boldsymbol{RES} * (\boldsymbol{Qs} + \boldsymbol{Qe})) - (\boldsymbol{Qs} * \boldsymbol{Cs})}{\boldsymbol{Qe}}$$

Table 3. SFCRW (AUID 07010205 outlet) phosphorus waste load values and description

Variable	Value	Description	Source – Reference
RES	0.150 mg/L	South RER Phosphorus Standard	
Qs	13.91 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Qe	13.32 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	Discharge Monitoring
Cs	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss, 50% RES standard was used as background concentration
WLA Conc.	0.228 mg/L	Effluent concentration to meet RES	Equation 1
WLA Load	11.51 kg/d	Point Source load permissible under the RES bases limits	$WLA\ Load = \frac{WLA\ conc}{QE * 3.785\ gal/L}$

DRAFT

Table 4. AUID 07010205-510 phosphorus waste load values and description

Variable	Value	Description	Source – Reference
RES	0.150 mg/L	South RER	
Qs	3.80	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Qe	6.93 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	Hutchinson WWTP, Hutchinson Technology, and AB Mauri Foods
Cs	0.090 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Used the Shallow LES based on drainage from Otter Lake
WLA Conc.	0.183 mg/L	Effluent concentration to meet RES	Equation 2
WLA Load	4.79 kg/d	$WLA\ Load = \frac{WLA\ conc}{QE * 3.785\ gal/L}$	

Table 5. AUID 07010205-513 phosphorus waste load values and description

Variable	Value	Description	Source – Reference
RES	0.150 mg/L	South RER	
Qs	1.37 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
Qe	0.62 mgd	Facility Design Flows (70% of WWDF for municipals 100% MDF for industrial)	
Cs	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss 50% RES standard was used as background concentration
WLA Conc.	0.316 mg/L	Effluent concentration to meet RES	Equation 3
WLA Load	0.74 kg/d	$WLA\ Load = \frac{WLA\ conc}{QE * 3.785\ gal/L}$	

DRAFT

Convert WLA to effluent limits - Step 4

Once the effluent concentrations based off the WLA were allocated for facilities, individual facility limits were set. Limits were set to meet the downstream WLA for each river reach of concern. Given that each contributing facility is a different size and that phosphorus removal is typically more economical and easier to implement at larger facilities, the gross WLA is not simply divided by the number of contributing facilities. Instead, concentration multipliers, based on facility size and type, are applied to 70% of AWWDF to achieve individual WLAs. Target concentrations are modified until the mass total is at or below the gross WLAs, using a categorical approach similar to the Lake Pepin TMDL (table 6).

Table 6 Facility RES Limit Summary

Facility [1,2]	Permit ID	QE mgd[3]	Pond	Facility Type		Target mg/L[4]	Target kg/d[5]	Proposed RES Limit mg/L[6]
Brownton WWTP	MN0022951	0.1372		Small	Domestic	0.47	0.24	1.0
Delano WTP	MNG640123	0.15		Small	Industrial	0.05	0.03	0.10
Delano WWTP	MN0051250	1.5393		Major	Domestic	0.25	1.46	0.53
Glencoe WWTP	MN0022233	1.82		Major	Domestic	0.25	1.72	0.53
Lester Prairie WWTP	MN0023957	0.2548		Large	Domestic	0.30	0.28	0.63
Mayer WWTP	MN0021202	0.3045		Large	Domestic	0.30	0.35	0.63
New Germany WWTP	MN0024295	0.0364	y	Small	Domestic	0.95	0.13	2.00
Stewart WWTP	MNG580077	0.0798	y	Small	Domestic	0.95	0.29	2.00
Watertown WWTP	MN0020940	0.8834		Major	Domestic	0.25	0.84	0.53
Winsted WWTP	MN0021571	0.574		Large	Domestic	0.30	0.65	0.63
513 Subwatershed								
Hector WWTP	MN0025445	0.462		Large	Domestic	0.30	0.52	0.63
Buffalo Lake WWTP	MN0050211	0.1155	y	Small	Domestic	0.95	0.42	2.00
Minnesota Energy	MN0063151	0.04		Small	Industrial	1.00	0.15	2.10
510 Subwatershed								
AB Mauri Food Inc.	MNG250099	3		Major	Industrial	0.15	1.70	0.32
Hutchinson Technology Inc.	MN0055506	0.125		Small	Industrial	0.26	0.12	0.54
Hutchinson WWTP	MN0055832	3.801		Major	Domestic	0.15	2.16	0.32
							kg/d Total	kg/d Needed to Meet RES WLA
			513 Sub-watershed				0.68	0.74
			510 Sub Watershed				3.98	4.78
			Full watershed				10.65	11.51

[1]Facilities that do not typically discharge in the summer are excluded
[2]Facilities discharging to immediate lakes are excluded
[3]QE = 70% AWWDF for Domestic Max Design Flow for Industrial Facilities
[4]Target Concentration value dependent on facility type
[5] Target Load = Target concentration mg/L TP x QE x 3.785 L/gal
[6] RES Limits = Target Concentration x 2.1 (effluent variability)

Lester Prairie Example

Target Mass Calculation = 0.28 kg/d = (0.30 mg/L (Target Concentration) x 0.2548 mgd (70% AWWDF) x 3.785 L/gal)

Limit Calculation = 0.63 mg/L = (0.30 mg/L (Target Concentration) x 2.1 (variability of treatment))

DRAFT

Mass Limit Sensitivity Analysis

In order to determine if mass or concentration limits are appropriate to meet RES., a sensitivity analysis was performed. Equation 3 is a slightly modified version of equation 1, using **actual average flows** instead of 70% average (AWWDF) and proposed limits. This calculation shows higher concentration in all three river reaches of concern, reflecting loss of dilution from equation 1 (Qe vs. Qe_s). The results show if facilities were discharging at the proposed RES mass limits, downstream waters would be over the RES standard of 0.150 mg/L (Table 7, 8 and 9). This analysis determined mass based RES limits are not protective for the river reaches of concern. Limits are expressed as concentration values in individual permits (Table 11).

Equation 3. Wasteload allocation using preposed limits to meet RES of 0.150 mg/L.

$$Crs = \frac{(Qs * Cs) + (Qes * Ces)}{Qrs}$$

Table 7 SFCRW (AUID 07010205 outlet) sensitivity analysis values and description

Variable	Value	Description	Source – Reference
CR_s	0.210mg/l	Concentration in the River with actual average flows and proposed mass Limits	Equation 3
QS	13.91mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow)	HYDSTRA database, Discharge Monitoring
CS	0.075mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss 50% RES standard was used as background concentration
QE_s	5.47 mgd	actual average effluent flow for The Facilities June – September, 2009 – 2013	Discharge Monitoring
CE_s	0.56 mg/L	Concentration from average mass based effluent proposed limits and Actual Facilities flows June – September	$\mathrm{CEs} = \frac{WLA\ kg/d}{\mathrm{QE2} * 3.785\ \mathrm{gal/L}}$
QR_s	19.38 mgd	Sum of summer flows	$QS+QE_s$

Table 8. AUID 07010250-510 sensitivity analysis values and description

Variable	Value	Description	Source – Reference
CR_s	0.240 mg/l	Concentration in the River with actual average flows and proposed mass Limits	Equation 3
QS	3.80 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow) and drainage area ration	HYDSTRA database, Discharge Monitoring
CS	0.090 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Used the Shallow LES based on drainage from Otter Lake
QE_s	3.04 mgd	actual average effluent flow for The Facilities June – September, 2009 – 2013	Discharge Monitoring
CE_s	0.42 mg/L	Concentration from average mass based effluent proposed limits and Actual Facilities flows June – September	$\mathrm{CEs} = \frac{WLA\ kg/d}{\mathrm{QE2} * 3.785\ \mathrm{gal/L}}$
QR_s	6.87 mgd	Sum of summer flows	$QS+QE_s$

DRAFT

Table 9. AUID 07010250-513 outlet sensitivity analysis values and description

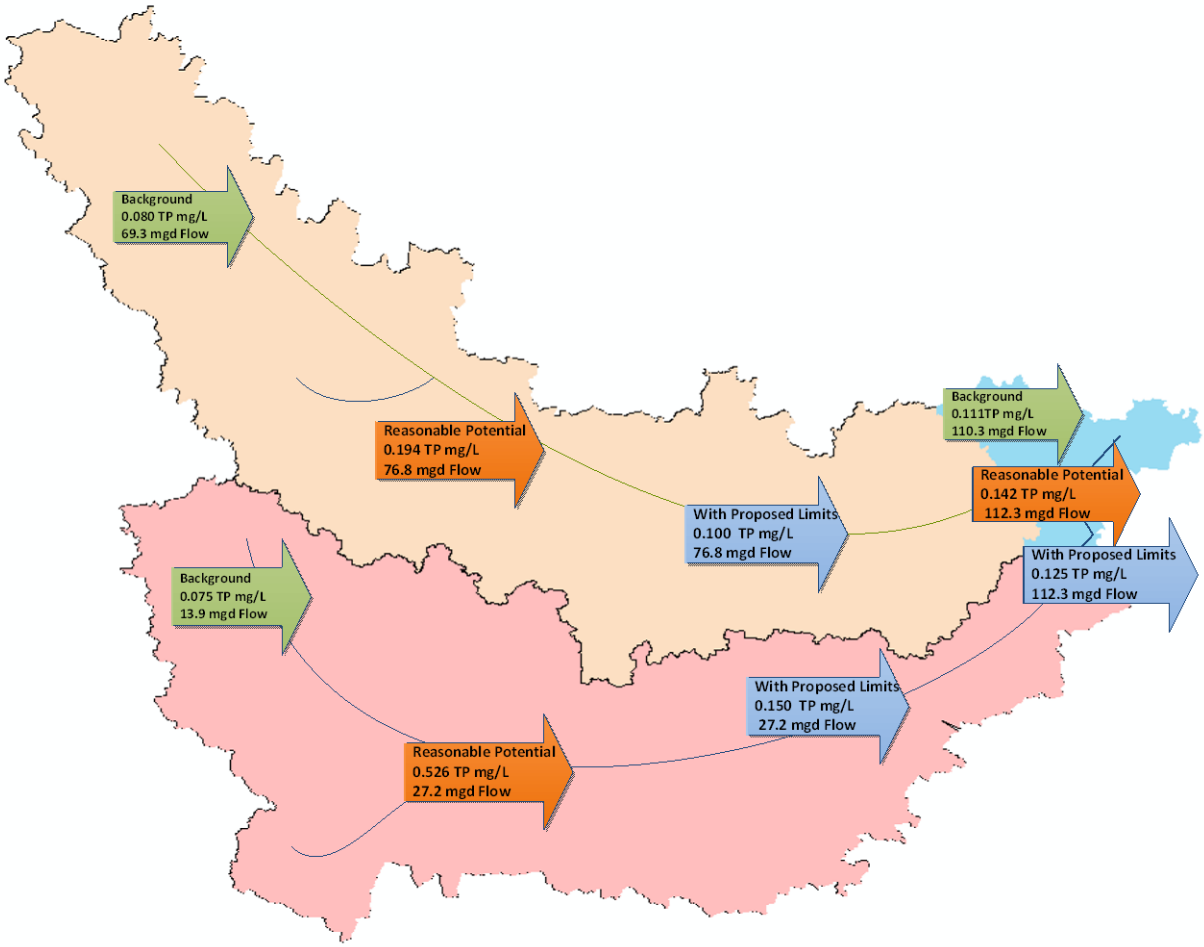
Variable	Value	Description	Source – Reference
CR_s	0.175 mg/l	Concentration in the River with actual average flows and proposed mass Limits	Equation 3
QS	1.37 mgd	flow of river without WWTFs (80% flow exceedance – actual WWTF flow) and drainage area ration	HYDSTRA database, Discharge Monitoring
CS	0.075 mg/L	Concentration of river without WWTFs (Low flow load in river – facility loads at low flow	Because of calculated point source transport loss 50% RES standard was used as background concentration
QE_s	0.33 mgd	actual average effluent flow for The Facilities June – September, 2009 – 2013	Discharge Monitoring
CE_s	0.59 mg/L	Concentration from average mass based effluent proposed limits and Actual Facilities flows June – September	$\mathrm{CEs} = \frac{WLA\ kg/d}{\mathrm{QE2} * 3.785\ \mathrm{gal/L}}$
QR_s	1.7 mgd	Sum of summer flows	$QS+QE_s$

Verify Final Limits - Step 5

It is generally assumed that limits set to support RES at the outlet of a major watershed will also be sufficient to protect other downstream waters. The next downstream reach from the SFCRW with sufficient RES water quality data is in the Greater Crow River watershed (aka Lower North Fork Crow River Watershed AUID 07010204-502). This reach has site-specific RES criteria of 125 µg/L TP and 35 µg/L Chl-a (Heiskary and Wasley, 2012). A mass balance equation bases on the proposed SFCRW Limits and 80% exceedance flow (Equation 4). It was determined that these limits are restrictive enough to protect downstream waters in the Lower Crow Watershed. Although the downstream reach has a lower TP criterion value (0.125 mg/L as compared to 0.150 mg/L), dilution from the North Fork Crow at the lower North RER (0.100mg/L) is sufficient to support RES (figure 5). A recent memo describing phosphorus limits the necessary to protect the Greater Crow (Lindon 2015) further describes requirements for protecting downstream waters.

DRAFT

Figure 5. Greater Crow River mass balance



Lake Eutrophication Based Effluent Limits

Since 2008, MPCA has set effluent limits for WWTFs upstream of lakes and reservoirs consistent with LES. Eutrophication standards for lakes, shallow lakes, and reservoirs can be found in MN Rule 7050.0222. For lakes, permittees are found to have RP for TP if: 1) they discharge upstream of a nutrient impaired waterbody, 2) they discharge at TP concentrations greater than the ambient target, and 3) there is no geographical barrier capable of trapping a significant mass of nutrients between the outfall and the impairment. Lake eutrophication computer models are then used to derive lake eutrophication limits. Many facilities in the SFCRW already have WQBELs for downstream lakes . Several total maximum daily load (TMDL) studies completed in the watershed have determined necessary phosphorus wasteloads from point sources to protect lakes, and include Lake Independence Phosphorus TMDL and South Fork Crow River Lakes Excess Nutrients. All of these TMDLs are designed to meet lake standards that have lower criteria values than applicable river eutrophication standards. In this way, it is reasonable to assume that limits designed to meet lake WLAs are therefore sufficient to protect intervening river reaches.

Three facilities (Cedar Mills, Cosmos, and Lake Lillian) discharge upstream of the Otter Lake. Otter Lake is a shallow reservoir adjacent to the city of Hutchinson on the South Fork of the Crow River in the Western Corn Belt Plains (WCBP) Ecoregion. Otter Lake (43-0084) was placed on the federal 303(d) list of impaired waters in 2010 for eutrophication due to excess nutrients (phosphorus). A 2012 memo Total Phosphorus Water Quality Based Effluent Limit Analysis: Otter Lake 43-0084 (Weiss 2012) determined WLA required to meet the applicable LES. The City of Lorreto discharges to Spurzen Lake, a lake exceeding the LES. The 2007 Lake Independence Phosphorus TMDL determined the WLA necessary to protect Spurzen Lake.

Lake Pepin TMDL

Effluent from all GCRW facilities is discharged upstream of Lake Pepin, a reservoir on the Mississippi River. In 2002, Lake Pepin was placed on the federal Clean Water Act Section 303(d) list of impaired waters due to excess nutrients. A TMDL study is currently delayed; however, a significant portion of the modeling analysis has been completed. Phosphorus is the primary nutrient responsible for excess algal growth in Lake Pepin. The Facilities were all shown to have RP for TP at Lake Pepin. Therefore, Facilities in the GCRW are required to have a TP WQBEL as well. It is recommended that the Facilities receive a 12-month moving total mass limit derived from a draft TMDL Waste Load Allocation (WLA), as described below (Table 10). Draft WLAs in combination with other point and nonpoint reductions are sufficient to meet draft criteria in Lake Pepin designed to support the designated uses of this water resource.

A computer reservoir model for Lake Pepin was developed by MPCA modeling consultant, LimnoTech, to evaluate site specific eutrophication criteria and the reductions necessary to achieve these criteria (LTI, 2009. Using the best available science, draft criteria for Lake Pepin were determined to be 0.100 mg/L for TP and 0.028 µg/L for Chl-a (Heiskary and Wasley 2012. Within the model, all major sources of TP upstream of Lake Pepin were considered, and 21 separate scenarios were developed. Scenario 17 achieved compliance with the draft criteria and predicted the following TP reductions from tributaries would be necessary: 50% from the Minnesota River and Cannon River and 20% from the Mississippi River upstream of Lock and Dam 1 and the St. Croix River. Again, per Code of Federal Regulations, it was assumed that reductions would be from both point and nonpoint sources. During the modeling process MPCA staff simultaneously developed draft WLAs compatible with scenario 17 reductions for all NPDES dischargers within the contributing watershed.

A categorical approach was used to develop individual WLAs for the draft Lake Pepin TMDL. Calculations use the general formula below.

> Facility WLA = Average Wet Weather Design Flow /Max Design Flow x categorical concentration mg/L TP x 3.785 L/gal x 365 days/yr.

Concentration categories are based on facility size and type (Table 10). Resulting Lake Pepin WLAs for individual facilities are expressed as 12-month moving total mass limits.

Table 10. Draft WQBELS for municipal and industrial WWTFs in the Lake Pepin drainage.

Facility (AWWDF or MDF*)	Components of mass limit to meet Lake Pepin WQBEL
> 20.0 mgd	AWWDF x 0.3 mg/L
1.0 – 20.0 mgd	AWWDF x 0.8 mg/L
0.2 – 1.0 mgd	AWWDF x 1.0 mg/L
Continuous <0.2 mgd	Maintain current discharge**
Stabilization ponds <0.2 mgd	Maintain current discharge**
WWTFs at conc. Below RES	Maintain current discharge***
Industrial Discharge with concentration > 1.0 mg/L	MDF x 1.0 mg/L
Industrial Discharge with concentration < 1.0 mg/L	Current load x 1.15
Other Industrial	Limits specified on a site specific basis

* MDF = Maximum Design Flow --> common value used to evaluate industrial discharges.
**Mass limits based on categorical concentration and AWWDF (Average Wet Weather Design Flow)

DRAFT

Proposed Phosphorus Limits for South Fork Crow Facility

The recommended limits both lakes and rivers are listed in Table 11. It is important to note that future water quality assessments could mean more restrictive limits are needed to protect lakes and streams as new data becomes available.

Table 11. Proposed South Fork Crow Facility Limits

		Lake Based Limits			State Discharge Restriction Limits[1]		RES Based Limits
		Lake Specific		Pepin WLA 12 month rolling	12 Month Moving Average	Calendar Monthly Average	June – Sept Monthly average
Facility Name	Facility ID	kg/d	kg/y	kg/yr	mg/L	mg/L	mg/L
AB Mauri Food Inc	MNG250099			207.2			0.32
Brownton WWTP	MN0022951			493.2			1.0
Buffalo Lake WWTP[3]	MN0050211			455.9			
Cedar Mills WWTP	MN0066605		44.2	44.2			
Cosmos WWTP	MNG580056		314.0	248.7[2]			
Delano WTP	MNG640123			20.7			0.10
Delano WWTP	MN0051250			2,430.4	1.0		0.53
Glencoe WWTP	MN0022233			2,873.6			0.53
Hector WWTP	MN0025445			911.8			0.63
Hutchinson Technology	MN0055506			92.6			0.54
Hutchinson WWTP	MN0055832			6,001.3			0.32
Lake Lillian WWTP	MNG580225		58.0[4]	147.1			
Lester Prairie WWTP	MN0023957			502.9	1.0		0.63
Loretto WWTP[3]	MN0023990	3.02		168.5			
Mayer WWTP	MN0021202			601.0	1.0		0.63
Minnesota Energy	MN0063151			871.7			2.10
New Germany WWTP	MN0024295			204[2]	1.0		2.00[5]
Seneca Foods Glencoe[3]	MN0001236			1,182.5			
Silver Lake WWTP[3]	MNG580164			672.1			
Stewart WWTP	MNG580077			315.0			2.00
Watertown WWTP	MN0020940			1,394.8			0.53
Winsted WWTP	MN0021571			1,132.9			0.63

1 State discharge restriction limits based upon Minn. R. 7053.0255

2 More restrictive limit Based on Mass Cap and previous facility design flow

3 Facilities typically do not discharge during the RES June – September Window. Language will be included in the permit to preclude discharge during that window.

4 More restrictive limit based on immediate lake

5. Limit not used

DRAFT

Conclusion

Actual average WWTF discharge was shown to cause and contribute to elevated TP and Chl-a concentrations in lakes and rivers within SFCRW. In addition, the Facilities have RP to cause or contribute to the excess nutrient impairment in Lake Pepin. Existing limits are not sufficient to protect immediate receiving waters or downstream waters. The Facilities are therefore required to have WQBELs derived from water quality at river reaches within the SFCRW and further downstream in the Mississippi River. Limits required to meet lake and river eutrophication standards are listed in Table 11. Finally, the permitees should be informed that more restrictive TP limits may be necessary for local water resources following the completion of the Lake Pepin TMDL study and additional water quality monitoring.

DRAFT

References

Heiskary, S. and D. Wasley. 2012. Mississippi River Pools 1 through 8: Developing River, Pool and Lake Pepin Eutrophication Criteria. MPCA St. Paul 81 pp

Heiskary, S., W. Bouchard Jr., and H. Markus. 2013. Minnesota Nutrient Criteria Development for Rivers MPCA St. Paul 176 pp

Minn. R. 7050.0222 https://www.revisor.mn.gov/rules/?id=7050.0222, Heiskary, 2013

LTI. 2008. Upper Mississippi River-Lake Pepin Quality Model. Development, Calibration and Application. Prepared for MPCA. LimnoTech Ann Arbor MI

Wasley, D.M. 2014 (draft). Implementing river and lake eutrophication standards for NPDES wastewater permits. MPCA St. Paul 25 pp

Wasley, D.M. 2013 (draft). Phosphorus effluent limit review: critical streamflow for river eutrophication standards. MPCA St. Paul 4 pp

Wasley, D.M. 2013 (draft). Phosphorus Effluent Limit Review: Minnesota River Basin. MPCA St. Paul 17 pp

Anderson, P. 2010 Assessment Report of Selected Lakes Within the North Fork Crow River Watershed Upper Mississippi River Basin MPCA St. Paul 143pp

Wasley, D.M. 2014 (draft). Implementing river and lake eutrophication standards for NPDES wastewater permits. MPCA St. Paul 25 pp

Wiess, S. 2010 (memo) Assessment of Phosphorus Loading to Rice Lake (#73-0196) and Phosphorus Limits for Contributing NPDES Dischargers, MPCA St. Paul 6pp

Weiss S. 2010 (memo) Phosphorus Effluent Limit Review: City of Darwin WWTP, MPCA St. Paul 3 pp

Wenck Associates, INC. North Fork Crow River TMDL Bacteria, Nutrients, and Turbidity, December 2014 http://www.pca.state.mn.us/index.php/view-document.html?gid=22091

Wenck Associates, INC. Rice Lake Excess Nutrient TMDL, April 2012 http://www.pca.state.mn.us/index.php/view-document.html?gid=17775

2007 Lake Independence Phosphorus TMDL Pioneer-Sarah Creek Watershed Commission Three Rivers Park District

Wasley, D.M. 2014 Total Phosphorus Effluent Limit Review: Mississippi River - Twin Cities Watershed (portion upstream of Minnesota River confluence

DRAFT