MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES)

Fact Sheet

Permittee:	Bigfork County Water and Sewer District
Permit No.:	MT0020397
Receiving Water:	Flathead Lake
Facility Information:	
Name	Bigfork Wastewater Treatment Plant
Location	108 Harbor Heights Boulevard Bigfork, MT 59911 Township 27N, Range 20W, Section 36 Flathead County
Facility Contact:	Julie Spencer District Manager 108 Harbor Heights Boulevard Bigfork, MT 59911
Fee Information:	
Number of Outfalls	1 (for fee determination purposes)
Outfall – Type	001 – Major Publicly Owned Treatment Works (POTW)

I. Permit Status

This fact sheet has been drafted for renewal of Montana Pollutant Discharge Elimination System (MPDES) permit no. MT0020397. The existing permit was issued June 21, 2010, became effective August 1, 2010, and expired at midnight on July 31, 2015.

The Montana Department of Environmental Quality (DEQ) received an application from the Bigfork County Water and Sewer District for renewal of the Bigfork Wastewater Treatment Plant (WWTP) permit no. MT0020397 on February 2, 2015. DEQ deemed the application complete and the 2010-issued permit to be administratively continued in a letter dated February 25, 2015.

DEQ proposes the following changes with this permit renewal:

- Monitoring for the following parameters has been removed: antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, selenium, silver, and zinc.
- WET testing has been increased to quarterly.
- Ambient monitoring for aluminum and mercury in the Swan River is included in this permit renewal.
- Chlorine monitoring was removed from the permit. Chlorine disinfection is not used at the Bigfork WWTP.

II. Facility Information

1. Facility Description

The permittee operates a Membrane Bioreactor (MBR) facility. The original Bigfork WWTP was constructed in the 1960's and used a rock media trickling filter and chlorine disinfection. The plant was upgraded in 1987 to a tertiary treatment facility, and in 2008 the headworks was replaced with a new facility that includes fine screening, grit removal and flow measurement. In 2012 the Bigfork WWTP was upgraded to the MBR advanced treatment facility. The current facility design flow is 0.69 million gallons per day (mgd) for a design population of 8,100 in the summer and 6,500 in the winter.

All influent to the WWTP flows to the headworks building which consists of two flow regulated vertical bar screens, screenings grinder/compactor and a grit washer. The water from the screenings grinder/compactor and grit washer flow back to the influent prior to the bar screens. The influent from the headworks flows through an in-channel Parshall flume with an electric meter which is linked to a SCADA system as the primary flow measuring device. All influent then flows to a regulated splitter box where it can flow into the equalization basin or into one of the three treatment trains (all treatment trains are identical). The facility regulates flow throughout the day by regulating the amount of flow into and out of the equalization basin. All flow to the treatment trains enters a splitter box and is directed to one or more of the treatment trains. Alum is injected at the splitter box prior to entering a treatment train to aid in phosphorus removal. The treatment trains consist of an anoxic basin, a pre-aeration basin and a membrane basin. Effluent pulled through the membranes is funneled to one pipe which leads to an in-line effluent flow meter linked to the SCADA system and then continues to one of the two ultraviolet (UV) disinfection units. Each UV unit has 18 bulbs and alternates based on hours of use.

Discharge is continuous from Outfall 001. During months when Flathead Lake is maintained at or near full pool, discharge is directly to Bigfork Harbor, Flathead Lake at the mouth of the Swan River. The remainder of the year, when lake levels drop as much as eight feet when compared to full pool, discharge is considered to the Swan River. The discharge location is the same throughout the year, lake levels influence whether the discharge location is considered Bigfork Harbor or Swan River. **Table 1** summarizes the current WWTP design details.

Table 1: Current Facility Design Criteria Summary (Morrison Maierle, Inc. 2012)	
Facility Description: Continuous discharge, extended aeration, activated sludge treatment with alum phosphorus removal, membrane filtration, and ultraviolet (UV) disinfection	
Construction Date: 2012	Upgrade Date(s): 2029
Design Population: 8,100 summer 6,500 winter	Current Population: 3,360 summer 2,415 winter
Design Flow, Average (mgd): 0.69	Design Flow, Maximum Day (mgd): 1.26
Minimum Detention Time Total System (hours): unknown	
Design Biochemical Oxygen Demand (BOD_5) Removal (%): 85	Design BOD_5 Load (lb/day): 2,835 summer 1,690 winter
Design Total Suspended Solids (TSS) Removal (%): 85	Design TSS Load (lb/day): unknown
Estimated Inflow and Infiltration (I/I): 29,000 gallons per day (gpd)	Source: Lake levels and storm water infiltration
Collection System Combined [ ] Separate [X]	
Sanitary Sewer Overflow (SSO) Events (Y/N): Y, 2 (each self-reported) since 2010	Bypass Events (Y/N): N
Disinfection (Y/N): Y	Type: UV

Collections System

The permittee maintains approximately 47,000 feet of gravity sewer mains with on-going expansions and upgrades (PER MMI, 2006). As of 2017, there are 16 lift stations of various ages, the oldest being installed in 1963 (upgraded in 2008 and 2009) with the original sewer project for Bigfork. The most recent lift station upgrades occurred in 2017. The physical condition of the gravity collection system can be generally described as fair. The deficiencies of the system are related to infiltration, leakage, and potential health and safety risks. The following are the preliminary engineering activities and milestones to reduce the system deficiencies:

- Project Initiation and Project Management
- Gather and Prepare Background Information
- Wastewater Systems Analysis
- Identify System Deficiencies and Prepare Draft Report
- Public Meeting #1
- Develop Alternatives and Cost Estimates
- Public Meeting #2
- Prepare Final Document

2. Effluent Characteristics

A summary of effluent quality from facility Discharge Monitoring Reports (DMR) is given in **Table 2**. The Period of Record (POR) is June 2012 through June 2017.

Table 2: DMR Effluent Characteristics for POR June 2012 through June 2017.

Parameter	Location	Units	Previous Permit Limitation	Minimum Value	Maximum Value	Average Value	Number of Records
Flow	Effluent	mgd	(1)	0.12	0.48	0.23	61
	Influent	mgd	(1)	0.16	0.59	0.25	61
5-day Biochemical Oxygen Demand (BOD_5)	Influent	mg/L	(1)	134.3	331.9	209.3	61
	Effluent	mg/L	22/33 (2)	0.4/0.4	2.1/2.3	1.1/1.2	61
	Effluent	% removal	85	98	100	99.3	61
	Effluent	lb/day	125/188 (2)	0.7/0.8	5.9/6.2	2.2/2.5	61
Total Suspended Solids (TSS)	Influent	mg/L	(1)	147.0	341.1	214.4	61
	Effluent	mg/L	22/33 (2)	0.1/0.1	1.2/1.3	0.48/0.53	61
	Effluent	% removal	85	99	100	99.7	61
	Effluent	lb/day	125/188 (2)	0.1/0.2	2.9/3.2	0.92/1.09	61
E. coli Bacteria, (median monthly geometric mean value) (3)	Effluent	cfu per 100 mL	32/64(2)	1.0/1.0	2.0/2.0	1.03/1.05	61
pH (median value)	Effluent	s.u.	6.0-9.0	5.88(3)	8.13	--	61
Temperature, summer	Effluent	ºC	(4)	13.5	22.3	18.3	61
Temperature, winter	Effluent	ºC	(4)	12.7	19.9	14.4	61
Total Residual Chlorine	Effluent	mg/L	(4)	ND	ND	ND	0
Total Ammonia as N	Effluent	mg/L	(1)	0.01	4.49	0.21	61
Total Kjeldahl Nitrogen	Effluent	mg/L	(1)	0.53	2.68	0.83	61
Nitrate + Nitrite as N	Effluent	mg/L	(1)	4.59	17.08	9.25	61
Total Nitrogen (TN) (4)	Effluent	mg/L	(1)	5.30	18.05	10.09	61
		lb/day	42.1/52.2 (2)	9.90/11.10	32.40/51.10	18.37/22.47	61
Total Phosphorus as P (TP)	Effluent	mg/L	1.0	0.05	0.85	0.46	61
		lb/day	4.2	0.1	2.11	0.93	61
Dissolved Oxygen	Effluent	mg/L	(4)	7.07	9.07	7.95	61
Oil and Grease	Effluent	mg/L	<10 (6)	1	1	1	40
Total Dissolved Solids	Effluent	mg/L	(4)	410.00	959.00	567.86	21
Aluminum, dissolved	Effluent	µg/L	(1)	0.04	80.00	44.75	59
Antimony, Total Recoverable	Effluent	µg/L	(1)	0.50	3.00	2.00	7
Arsenic, Total Recoverable	Effluent	µg/L	(1)	<1.00	3.00	2.14	7
Beryllium, Total Recoverable	Effluent	µg/L	(1)	0.80	1.00	0.94	7

Table 2: DMR Effluent Characteristics for POR June 2012 through June 2017.

Parameter	Location	Units	Previous Permit Limitation	Minimum Value	Maximum Value	Average Value	Number of Records
Cadmium, Total Recoverable	Effluent	µg/L	(1)	0.04	0.09	0.07	7
Chromium, Total Recoverable	Effluent	µg/L	(1)	1.00	10.0	2.86	7
Copper, Total Recoverable	Effluent	µg/L	(1)	5.00	9.00	7.29	7
Lead, Total Recoverable	Effluent	µg/L	(1)	0.30	0.60	0.46	7
Mercury, Total Recoverable	Effluent	µg/L	(1)	<0.005	0.010	0.009	7
Nickel, Total Recoverable	Effluent	µg/L	(1)	<2.00	10.00	7.71	7
Selenium, Total Recoverable	Effluent	µg/L	(1)	<1.00	1.00	1.00	7
Silver, Total Recoverable	Effluent	µg/L	(1)	<0.20	0.50	0.41	7
Thallium, Total Recoverable	Effluent	µg/L	(1)	<0.20	2.00	0.71	7
Zinc, Total Recoverable	Effluent	µg/L	(1)	26.0	68.0	44.1	7
Hardness, Total (as $CaCO_3$)	Effluent	mg/L	(1)	196.00	232.00	212.29	7
Whole Effluent Toxicity Testing, acute	Effluent	% Effluent	(1)	Pass			9

Footnotes:
ND – No data available.
(1) No effluent limitation in previous permit, monitoring requirement only.
(2) Limit shown as monthly average/weekly average.
(3) Calculated as the sum of Nitrite and Nitrate as N and TKN concentrations.
(4) Maximum daily.

3. Compliance History

Three MPDES compliance inspections have been conducted since June 2012 (November 28, 2012, January 22, 2015, and December 10, 2015). No deficiencies were identified in any of the three compliance inspections.

During the POR one numeric limit exceedance was documented for pH during the monitoring period ending May 31, 2016.

The permittee self-reported two Sanitary Sewer Overflow (SSO) events (occurring July 13, 2014 and March 6, 2014). Both incidents resulted in violation of the permit requirements.

On June 28, 2012, the permittee self-reported a spill of sludge due to operator error. The permittee immediately instituted procedures and operator training to prevent this kind of operator error. Contents of the spill were not released to state waters.

III. Technology-based Effluent Limitations

A. Scope and Authority

Technology-based effluent limits (TBELs) represent the minimum level of control that must be imposed by a permit issued under the MPDES program. DEQ must consider technology available to treat wastewater, and effluent limits that can be consistently achieved by the technology. TBELs are based on currently available treatment technologies and allow the permittee discretion to choose applicable controls to meet those standards.

The Montana Board of Environmental Review (BER) has adopted by reference 40 Code of Federal Regulations Part 133 which defines minimum requirements for secondary treatment for publicly owned treatment works (POTWs). Secondary treatment is defined in terms of effluent quality as measured by 5-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), percent removal of BOD_5 and TSS, and pH

DEQ will apply national secondary standards (NSS) to specify the minimum of effluent quality in terms of the parameters BOD_5, TSS and pH. For BOD_5 and TSS the monthly average shall not exceed 30 mg/L and the weekly average shall not exceed 45 mg/L. The monthly average percent removal for BOD_5 and TSS shall not be less than 85 percent. The effluent limits for pH must be maintained within the range of 6.0 to 9.0.

TBELs in the 2010-issued permit were based on NSS for pH, BOD_5, and TSS with 85 percent removal required for BOD_5 and TSS. These NSS limitations will be continued in this permit renewal (see **Table 5**).

B. Mass-based Expression of Limitations

The mass-based limits for BOD_5 and TSS for the Bigfork WWTP are calculated as follows:

Load (lb/day) = (Design Average Flow, mgd) x (Concentration Limitation, mg/L) x 8.34 (lb·L)/(mg·gal)

BOD_5 mass-based limitations:
Weekly load: 0.69 mgd x 45 mg/L x 8.34 (lb·L)/(mg·gal) = 259 lb/day
Monthly load: 0.69 mgd x 30 mg/L x 8.34 (lb·L)/(mg·gal) = 173 lb/day

TSS mass-based limitations:
Weekly load: 0.69 mgd x 45 mg/L x 8.34 (lb·L)/(mg·gal) = 259 lb/day
Monthly load: 0.69 mgd x 30 mg/L x 8.34 (lb·L)/(mg·gal) = 173 lb/day

Load limitations for technology-based parameters of concern (BOD_5 and TSS) will apply to the effluent and will be maintained at the more stringent of the nondegradation load allocations, mass-based loading limitations at the increased design flow, or water quality-based limitations calculated in this Fact Sheet.

C. Nondegradation

Nondegradation of water quality regulations apply to new or increased sources of pollution. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit previously issued by DEQ are not considered new or increased sources.

Nondegradation threshold values for the Bigfork WWTP were calculated for BOD_5 and TSS using a design flow of 0.50 mgd and total phosphorus (TP) using the current performance during the POR for the Bigfork WWTP. The nondegradation load allocations and the actual average loads discharged from the facility from the past five years are presented below in **Table 3**. These data indicate that the facility did not exceed the nondegradation load values calculated for BOD_5, TSS and TP. TP is not a technology-based parameter of concern and will be discussed further in Part IV.

Table 3: Calculated Nondegradation Allocated and Actual Annual Loads

Parameter	Monthly Allocated Load (lb/day)	Actual Monthly Average Loads (lb/day)				
		2013	2014	2015	2016	2017(2)
5-day Biochemical Oxygen Demand (BOD_5)(1)	125	0.98	1.08	2.36	3.99	3.82
Total Suspended Solids (TSS)(1)	125	0.30	0.30	0.94	1.96	1.87
Total Phosphorus as P	4.2	1.00	1.04	0.88	0.98	0.70

Footnotes:
(1) Calculated based on average daily design flow = 0.5 mgd. Load limits established in 2010-issued permit.
(2) 2017 actual monthly average loads (lb/day) are based on data from January through June.

In order to maintain compliance with the provisions of nondegradation, DEQ is not allowing an increase in the pollutant load beyond the nondegradation amounts. Pursuant to these nondegradation provisions, any increased source of pollutants is subject to significance review. The permittee may demonstrate conformance with these criteria by establishing that the increase is nonsignificant. Any relaxation of limits is subject to public notice requirements.

The TP mass-based (2017) limitation is based on the Bigfork WWTP's current average design flow of 0.69 mgd. The 30-day mass-based load calculation is shown below.

$$30 - day\ load = 0.69\ mgd\ x\ 1.0 \frac{mg}{L} x\ 8.34\ (lb \cdot L)(mg \cdot gal) = 5.75\ lb/day$$

Table 4 shows the comparison between the new mass-based limits and the existing nondegradation limits.

Table 4: Comparison of New Mass-Based Limits against Existing Nondegradation Limits

Parameter	Averaging Time	Mass-Based (2017)	Nondegradation Allocation	Most Stringent
		lb/day	lb/day	lb/day
5-day Biochemical Oxygen Demand (BOD_5)	Monthly	173	**125**	**125**
Total Suspended Solids (TSS)	Monthly	173	**125**	**125**
Total Phosphorus as P	Monthly	5.75	**4.2**	**4.2**

D. Proposed TBELs for Outfall 001

Table 5. Outfall 001 Proposed TBELs

Parameter	Concentration (mg/L)		Load (lb/day)	
	Average Monthly Limitation (1)	Average Weekly Limitation (1)	Average Monthly Limitation (1)	Average Weekly Limitation (1)
5-day Biochemical Oxygen Demand (BOD_5)	30	45	125	259
BOD_5 % Removal	85			
Total Suspended Solids (TSS)	30	45	125	259
TSS % Removal	85			
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			

Footnotes:
(1) See Definition section at end of permit for explanation of terms

IV. Water Quality-based Effluent Limitations (WQBELs)

A. Scope and Authority

The Montana Water Quality Act states that a permit may only be issued if DEQ finds that the issuance or continuance of the permit will not result in pollution of any state waters. Montana water quality standards require that no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. MPDES permits shall include limitations on all pollutants which will cause, or have a reasonable potential to cause an excursion of any water quality standard, including narrative standards. The purpose of this section is to provide a basis and rationale for establishing facility effluent limitations in this permit, based on Montana water quality standards that will protect designated uses of the receiving stream.

Permits are required to include WQBELs when technology-based effluent limitations are not adequate to protect state water quality standards. No wastes may be discharged that can reasonably be expected to violate any state water quality standards. Montana water quality standards define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses. New sources are subject to Montana Nondegradation Policy and regulations.

B. Receiving Water

The Bigfork WWTP discharges from Outfall 001 to the Bigfork Harbor near the confluence of the Swan River and Flathead Lake. The top eight feet of Flathead Lake are regulated by Kerr Dam in relation to the water management strategies of the US Bureau of Reclamation. In normal water years, lake levels are allowed to rise between May and June until full pool is reached around the beginning of July. The portion of Flathead Lake that the Bigfork WWTP discharges to is located in the Pend Oreille watershed.

The receiving water in the area of discharge is under the influence of flow from the Swan River as it enters Flathead Lake either at the point of discharge (May through November) or approximately ½ mile upstream of the confluence with Flathead Lake the remainder of the year.

The existence of Bigfork Harbor is driven by lake level. When the lake is at low pool, the area of discharge is dominated by the Swan River and the confluence with the Flathead Lake shore is nearly ½ mile downstream from the outfall location. Between approximately May and November, discharge is directly to Bigfork Harbor as part of Flathead Lake when lake levels have risen. During the high-water months, discharge at Outfall 001 is from a pipe located approximately eight feet below the lake surface and about 30 feet from shore. The remainder of the year when lake levels are low, the outfall pipe is exposed at the surface level of the Swan River and only about 10 feet from shore.

Flathead Lake is located within the US Geological Survey (USGS) Hydrological Unit Code 17010208 - Flathead Lake; Montana waterbody identification number MT76O003_010.

Except for TN and TP, the critical upstream flow value is the weekly average expected to occur every 10 years (7Q10) of 273 cubic feet per second (cfs)(176.44 mgd). This value was determined using the most current data published by the U.S. Geological Survey (USGS). The USGS maintains flow measuring capabilities on the Swan River near Bigfork, MT located miles southeast of Bigfork just downstream of Swan Lake at gauging station number 12370000.

Because of the proximity to Flathead Lake, the lake is considered to be the receiving water and has been identified as such in previous permits. Flathead Lake is classified A-1 according to Montana Water-Use Classifications. As the lake is considered to be the receiving water for this discharge, the renewal permit is developed to be protective of the A-1 classification. Waters classified A-1 are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities; water quality must be maintained suitable for bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

Flathead Lake is listed as impaired in DEQ's final 2016 303(d) list. Flathead Lake is fully supporting drinking water, primary contact recreation, and agriculture but is not fully supporting aquatic life. The probable causes of impairments are: mercury, nitrogen (total), phosphorus (total), and polychlorinated biphenyls (PCBs). Probable sources of impairment include: upstream impoundments, atmospheric deposition, municipal point source dischargers, unspecified urban stormwater, silviculture harvesting, and impacts from hydrostructure flow regulation.

The 1990-issued permit set the monthly average effluent limitation for TP at 1.0 mg/L in response to the 1984 document, *The Strategy for Limiting Phosphorus in Flathead Lake*. This TP concentration limit will be continued with this permit cycle. The TP monthly load limit will be maintained at 4.2 lb/day, which is based on the design flow from 1993 of 0.50 mgd.

TMDLs have been completed for total nitrogen (TN) and total phosphorus (TP) in the 2001 document, *Nutrient Management Plan and Total Maximum Daily Load for Flathead Lake, Montana*. Phase I of the TMDL does not specify numeric wasteload allocations for TN or TP, rather a target concentration (0.5 µg/L for TP and 95 µg/L for TN) and 25% percent reduction. Phase II of the TMDL, including wasteload allocations specifically for TN and TP, has not been completed.

Because DEQ has not adopted base numeric nutrients standards for TN and TP for the receiving waters, DEQ is proposing that the TN limitations for the Bigfork WWTP be based on current performance for the WWTP. The TN limit will be held to the most stringent limit, either the 2010-issued TN limit or the current performance of the WWTP, using the TN effluent data from the DMRs from Outfall 001 for the POR (June 2012 through June 2017).

Flathead Lake/Swan River in the vicinity of the discharge is considered high quality water pursuant to Montana's Nondegradation Policy. Degradation of high quality water is not allowed unless authorized by DEQ.

Table 6 summarizes ambient water quality data for the Swan River above the outfall location and Bigfork Harbor/Flathead Lake.

Table 6. Swan River/Flathead Lake at Bigfork Harbor Ambient Water Quality Data

Parameter	Units	Number of Samples	75th Percentile	Monitoring Data Source
pH	s.u.	60	8.20	MTWTRSHD_WQX - Montana Watershed Data, MDEQ_WQ_WQX - Montana DEQ WQPB, USGS Montana Water Science Center
Temperature	°C	44	16.63	
Total Hardness as $CaCO_3$[(2)]	mg/L	6	80.03	USGS Montana Water Science Center
Total Ammonia as N	mg/L	6	0.02	
Nitrate/Nitrite as N	mg/L	40	0.03	MTWTRSHD_WQX - Montana Watershed Data, MDEQ_WQ_WQX - Montana DEQ WQPB,
Total Nitrogen	mg/L	63	0.11	
Total Phosphorus as P	mg/L	89	.0069	

Table 6. Swan River/Flathead Lake at Bigfork Harbor Ambient Water Quality Data				
Parameter	Units	Number of Samples	75th Percentile	Monitoring Data Source
				USGS Montana Water Science Center
Dissolved Oxygen (2)	mg/L	18	9.71	MTWTRSHD_WQX - Montana Watershed Data, USGS Montana Water Science Center
Total Dissolved Solids	mg/L	16	109.5	USGS Montana Water Science Center
Aluminum, Total Recoverable (1)	µg/L	2	<1.00	MDEQ_WQ_WQX - Montana DEQ WQPB
Antimony, Total Recoverable (1)	µg/L	2	<1.00	
Arsenic, Total Recoverable	µg/L	2	1.00	
Beryllium, Total Recoverable (1)	µg/L	2	<1.00	
Cadmium, Total Recoverable	µg/L	2	0.32	
Chromium, Total Recoverable (1)	µg/L	2	<1.00	
Copper, Total Recoverable (1)	µg/L	2	<1.00	
Lead, Total Recoverable (1)	µg/L	2	<1.00	
Mercury, Total Recoverable (1)	µg/L	2	<0.10	
Nickel, Total Recoverable (1)	µg/L	2	<10.00	
Selenium, Total Recoverable (1)	µg/L	2	<1.00	
Silver, Total Recoverable (1)	µg/L	2	<1.00	
Thallium, Total Recoverable (1)	µg/L	2	<1.00	
Zinc, Total Recoverable	µg/L	2	1.00	

Footnotes:
(1) If samples were recorded as non-detect, the minimum detection level of the analytical method was used.
(2) 25th percentile of the data is used for hardness and dissolved oxygen.

C. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded. Mixing zones must have the smallest practicable size, a minimum practicable effect on water uses, and definable boundaries. DEQ must determine the appropriateness of a mixing zone when applied for and will grant a mixing zone, deny the mixing zone, or grant an alternative or modified mixing zone.

Although certain standards may be exceeded in the mixing zone, a mixing zone may not block passage of aquatic organisms nor may it cause acutely toxic conditions. No mixing zone will be granted that will impair beneficial uses. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of the mixing zone. Acute standards may not be exceeded in any part of the mixing zone.

Acute standards for aquatic life may not be exceeded in any portion of a mixing zone, unless the department specifically finds that allowing minimal initial dilution will not threaten or impair existing beneficial uses. DEQ will set the available dilution flow to achieve acute and chronic limitations for specific parameters when applicable. For this permit renewal DEQ will use one percent (1%) of the 7Q10 (2.73 cfs) for acute conditions and 10% of the 7Q10 (27.3 cfs) for chronic conditions for RP determination for total ammonia. These dilution amounts will be granted because of the large dilution ratio between Swan River and the Bigfork WWTP effluent and the first order decay rate ammonia and total residual chlorine undergo.

DEQ will also utilize (.75% of the 7Q10) for the following parameters: nitrite and nitrate, aluminum, antimony, copper and zinc. If increased dilution is needed in the future the Bigfork WWTP may be required to provide DEQ with more water quality information.

DEQ will establish the dimensions of any mixing zone as a radius of 200 feet from the outfall location. For a lake, the area of a source specific mixing zone must not exceed five percent of the area of the lake or extend more than a 200-foot radius from the point of discharge, whichever is more restrictive.

D. Basis for Proposed Water Quality-based Effluent Limitations

Permits are required to include WQBELs when TBELs are not adequate to protect water quality standards, and no waste may be discharged that can reasonably be expected to violate any standard.

DEQ develops WQBELs for any pollutant of concern (POC) for which there is reasonable potential (RP) to cause or contribute to exceedances of instream numeric or narrative water quality standards. Pollutants and parameters are identified as POC for one or more of the following reasons:

- Listed TBELs;
- Identified as needing limits in the previous permit;
- Identified as present in the effluent through monitoring or otherwise expected present in the discharge; or
- Associated with impairment which may or may not have a WLA in a TMDL.

DEQ evaluated pollutants of concern in **Table 7**.

Table 7. Identification of Pollutants of Concern	
Parameter	**Basis for POC Identification**
5-day Biochemical Oxygen Demand (1)	TBEL, previous permit
Total Suspended Solids	TBEL, previous permit
pH	TBEL, previous permit
Ammonia, as N	Known present
Nitrate+Nitrite, as N	Known present
Total Nitrogen	Known present, completed TMDL
Total Phosphorus	Known present, completed TMDL
Aluminum, Dissolved	Used in treatment process

Permits are required to include WQBELs when TBELs are not adequate to protect water quality standards, and no waste may be discharged that can reasonably be expected to violate any standard. Pollutants typically present in effluent from facilities treating domestic sewage include conventional pollutants such as BOD_5, TSS, pH, oil and grease, and *E. coli* bacteria; and non-conventional pollutants such as low DO, nitrate + nitrite, nutrients, and total ammonia, TRC; and the carcinogenic and toxic pollutants such as volatile organic carbon compounds, and dissolved aluminum.

The need for WQBELs is determined based on Reasonable Potential (RP) analysis for certain pollutants to determine if numeric or narrative water quality standards may be exceeded. RP calculations utilize the receiving water concentration; the maximum projected effluent concentration, the design flow of the wastewater treatment facility, and the applicable receiving water flow.

DEQ uses a mass balance equation to determine RP (Equation 1). Equation 1 is used to determine the concentration of a pollutant of concern after accounting for other sources of pollution in the receiving water and any dilution by a mixing zone.

$$C_r = \frac{C_d Q_d + C_s Q_s}{Q_s + Q_d} \quad \text{(Equation 1)}$$

Where:

Q_s = receiving water, low flow rate before discharge available for dilution (mgd)
C_s = upstream receiving water pollutant concentration (mg/L), 75th percentile
Q_d = effluent flow rate (mgd), average daily design flow
C_d = critical effluent pollutant concentration (mg/L)
C_r = receiving water pollutant concentration (after dilution; mg/L)

If C_r > standard, then RP exists and a WQBEL must be developed.

The critical effluent concentration is obtained following the method recommended by the EPA *Technical Support Document for Water Quality-based Toxics Control.* A multiplier is determined using the TSD methods, based on dataset statistics (the data set, coefficient of variation, and sample size at the 95% confidence interval),

DEQ is proposing effluent limits for pollutants with RP for which adequate data exist, as discussed in the following section. A complete RP analysis is included in **Attachment A**.

1. Conventional Pollutants

BOD_5, TSS and pH– These parameters are typical effluent quality indicators for domestic wastewater treatment facilities and are regulated as TBELs. The facility provides a significant reduction in biological material, solids and pH. The permit will maintain BOD_5, TSS and pH TBELs based on secondary treatment meeting national secondary standards and nondegradation load allocations granted in the 2010-issued permit. No additional WQBELs will be required for these parameters.

Oil and Grease (O&G) – The 2010-issued permit included an O&G instantaneous maximum limit of <10 mg/L and required monthly effluent monitoring. Montana regulations require state waters be free from substances attributable to municipal discharges that will result in concentrations of oil and grease at or in excess of 10 mg/L. The limit and monitoring will be retained in the proposed permit.

***Escherichia coli* (*E. coli*) Bacteria –** Pathogens are known municipal wastewater contaminants. The average weekly and average monthly *E. coli* limits are maintained at the final effluent limits in the 2010-issued permit. The state has promulgated E. coli standards to protect the beneficial uses of receiving waters from pathogens. The standards for A-1 classified waters are:

a. The geometric mean number of E. coli bacteria may not exceed 32 colony forming units (cfu) per 100 milliliters (mL) or most probable number (MPN) and 10% of the total samples may not exceed 64 cfu per 100 mL or MPN during any monthly period if resulting from domestic sewage.

No mixing zone is granted for pathogenic bacteria and the effluent will be required to meet the *E. coli* bacteria water quality standards at end of the discharge pipe at Outfall 001. These standards are included in the proposed permit as monthly and average weekly limits.

1. Non-conventional Pollutants

Total Ammonia as N – Determination of RP for total ammonia as N (ammonia) and development of applicable limits are based on water quality standards that account for a combination of pH and temperature at critical conditions in the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. The instream critical condition for both pH and temperature is the 75^{th} percentile of the data. Salmonid fishes and their early life stages are presumed present in Flathead Lake year-round based on "*Spawning Times of Montana Fishes*".

Table 8 presents the total ammonia water quality standards for Flathead Lake using the ambient water quality data in **Table 6**.

Table 8. Total Ammonia as N Water Quality Standards for the Flathead Lake/Swan River.

Condition	Period	Salmonids Present	Early Life Stages Present	Ambient Condition (1)		Water Quality Standard (2) (mg/L)
				pH (s.u.)	Temperature (°C)	
Acute	Annual	Yes	Yes	8.20	NA	3.83
Chronic	Annual	Yes	Yes	8.20	16.63	1.56

Footnotes: NA – Not Applicable
(1) Based on 75th percentile of data set.
Acute – used to develop maximum daily limit; Chronic – used to develop monthly average limit.

RP to exceed the acute water quality standard for ammonia was assessed using *Equation 1*, where

C_r = receiving water concentration (RWC) after mixing, mg/L
C_d = maximum projected effluent concentration, 4.35 mg/L
C_s = RWC upstream of discharge, 0.02 mg/L
Q_s = applicable receiving water flow, 1% of the 7Q10, 1.76 mgd
Q_d = facility design effluent flow rate, 0.69 mgd

The projected maximum concentration for total ammonia (C_d) was found following the TSD Method. A multiplier of 0.97 was determined using the TSD methodology, using a CV of 3.29, and a sample size of 61. The maximum reported effluent concentration for total ammonia was 4.49 mg/L. The maximum concentration times the multiplier is 4.35 mg/L (4.49 mg/L * 0.97).

$$C_r = \frac{(4.35 * 0.69) + (0.02 * 1.76)}{(0.69 + 1.76)} = 1.24 \text{ mg/L}$$

$C_{r\text{-acute}}$ (1.24 mg/L) is below the acute ammonia standard of 3.83 mg/L for Flathead Lake. Similarly, RP to exceed the chronic water quality standard for ammonia with 10% dilution was also assessed using *Equation 1* and $C_{r\text{-chronic}}$ (0.18 mg/L) is less than the chronic ammonia standard of 1.57 mg/L. Therefore, a permit limit will not be necessary for this permit renewal.

Extended calculations are included in **Attachment A**.

Nitrate plus Nitrite (N+N): Nitrate and nitrite are toxic components of total nitrogen, which is a common constituent of domestic wastewater. The human health standard for N+N is 10 mg/L.

RP to exceed the human health standard for N + N was assed using Equation 1, where:

C_r = receiving water concentration (RWC) after mixing, mg/L
C_d = maximum projected effluent concentration, 16.96 mg/L
C_s = RWC upstream of discharge, 0.03 mg/L
Q_s = applicable receiving water flow, 0.75 % of the 7Q10, 1.32 mgd
Q_d = facility design flow rate, 0.69 mgd

The projected maximum concentration for N + N (C_d) was found following the TSD Method. A multiplier of 0.99 was determined using the TSD methodology, given a CV of 0.35, a sample size of

61. The maximum reported effluent concentration of N + N was 17.08 mg/L. The multiplier times the maximum concentration is 16.96 mg/L (0.99 * 17.08 mg/L).

$$C_r = \frac{(16.96 * 0.69) + (0.03 * 1.32)}{(0.69 + 1.32)} = 5.83 \text{ mg/L}$$

C_r (5.83 mg/L) is less than the N + N human health water quality standard, therefore, RP does not exist for this parameter and a limit is not necessary for this permit renewal. Effluent monitoring will be continued with this permit renewal (see Part VI). Extended calculations are included in **Attachment A**.

Dissolved Oxygen (DO) – Freshwater aquatic life standards are characterized by the fishery (cold-water for this receiving water) and by the presence or absence of fish in early life stages. Standards are further defined based on a time frame and required DO levels. DO standards for A-1 waters are given in **Table 9**.

Table 9: A-1 Water Classification Dissolved Oxygen Standards.

Dissolved Oxygen	monthly Mean (mg/L)	weekly Mean (mg/L)	weekly Mean Minimum (1) (mg/L)	1-Day Minimum (1) (mg/L)
Early Life Stages (2, 3)	N/A	9.5(6.5)	N/A	8.0(5.0)
Other Life Stages	6.5	N/A	5.0	4.0

Footnotes:
"N/A" means "Not Applicable".
(1) All minima should be considered as instantaneous concentrations to be achieved at all times.
(2) These are water column concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
(3) Includes all embryonic and larval stages and all juvenile forms of fish to 30 days following hatching.

The previous permit does not limit DO in the effluent but does require weekly monitoring for DO levels. The minimum DO concentration during the POR was 7.07 mg/L. Although the minimum effluent concentration is below the water quality standards, the 256:1 dilution ratio (receiving water flow: effluent flow) provides adequate mixing of the facility effluent therefore the DO levels in the Bigfork WWTP effluent are not expected to be a concern.

Total Nitrogen and Total Phosphorus – In July 2014, Montana adopted base numeric nutrient standards for wadeable streams. However, there are no approved numeric nutrient standards for lakes and reservoirs.

EPA approved the Flathead Lake nutrients TMDL in March 2001. The TMDL identified nitrogen and phosphorus as the pollutants of concern for the waterbody. Phase I of the TMDL set water quality goals/endpoints for Flathead Lake yet did not specify a date when these goals must be met. In the 2010-issued permit, effluent TN and TP final load limitations were established to serve as interim wasteload allocations for the POTW and apply at the end of pipe. No mixing zone was granted for TN and TP.

Total Nitrogen- The previous permit limits of 42.1 lb/day monthly average and 52.2 lb/day weekly average was developed based on capping the facility at its current performance. DEQ no longer includes weekly limits for TN since the effect is a longer-term effect.

Because DEQ has not adopted base numeric nutrient water standards for Flathead Lake, DEQ is proposing TN limitations for this permit cycle to address the 2001 TMDL for Flathead Lake. The TN limit is proposed to be based on current performance of the Bigfork WWTP, using TN effluent concentration reported on the DMRs for Outfall 001 for the POR.

TSD-method using Department Circular DEQ-12B variance limits based on the WWTF current performance average effluent concentration (10.09 mg/L average) x AML multiplier in TSD Table 5-2 (1.29) x average daily design flow (0.69 mgd) x 8.34 = **74.90 lb/day**
The TMDL requires a 25% reduction in TN therefore the calculated load will be multiplied by 0.75; this results in 74.9 x 0.75= **56.18 lb/day.**

Since the current facility effluent data are less stringent than the 2010-issued TN load limitations, the Bigfork WWTP will maintain the 2010-issued average monthly limitation of **42.1 lb/day**, year round. Monthly TN monitoring will be continued with this permit renewal (see Part VI).

Total Phosphorus –
The 2010-issued TP effluent limitation will be continued with this permit cycle at 1.0 mg/L in response to the document *Strategy for Limiting Phosphorus in Flathead Lake* (1984). The TP load will be maintained at the mass-based expression of the 1.0 mg/L concentration limit and the facility design flow (0.5 mgd) on April 29, 1993 (4.2 lb/day). The facility average design flow has since increased to 0.69 mgd, and the nondegradation load allocation will be maintained as the mass-based monthly average load limit at 4.2 lb/day. Weekly TP monitoring will be continued with this permit renewal (see Part VI).

Table 10. Outfall 001 Proposed TN and TP Load Limitations

Parameter	Load (lb/day)
	Average Monthly Limitation (1)
Total Nitrogen (2)	42.1
Total Phosphorus as P	4.2

Footnotes: NA = Not Applicable
(1) See Definition section at end of permit for explanation of terms.
(2) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

These load allocations may undergo complete revision as part of the Flathead Lake TMDL Phase II development. Future increases or reductions may result as part of the pending basin-wide TMDL.

3. Toxic Pollutants

Total Recoverable Metals – Flathead Lake is listed as impaired for mercury due to the presence of mercury in the water column and fish tissue samples. The receiving water has not been listed for impairment due to metals in the total recoverable form. The standards for metals in the receiving

water (presented in **Table 11**) are based on the 25th percentile hardness values measured for the Swan River/Flathead Lake at Bigfork Harbor (80.03 mg/L as $CaCO_3$). Extended RP calculations are included in **Attachment B**.

Table 11. Flathead River Total Recoverable Metals Standards

Parameter	Units	Maximum Effluent Concentration for POR	Human Health Standard	Aquatic Life Standard (1)		Required Reporting Value (RRV)
				Acute	Chronic	
Aluminum, Dissolved	µg/L	80	--	750	87	9
Antimony, Total Recoverable	µg/L	3	5.6	--	--	0.5
Arsenic, Total Recoverable	µg/L	3	10	340	150	1
Beryllium, Total Recoverable	µg/L	1	4	--	--	0.8
Cadmium, Total Recoverable (1)	µg/L	0.09	5	1.67	0.71	0.03
Chromium, all forms	µg/L	10	100	--	--	10
Copper, Total Recoverable (1)	µg/L	9	1,300	11.35	7.71	2
Lead, Total Recoverable (1)	µg/L	0.6	15	61.49	2.40	0.3
Mercury, Total Recoverable	µg/L	0.01	0.05	1.70	0.91	0.005
Nickel, Total Recoverable (1)	µg/L	10	100	420.19	46.72	2
Selenium, Total Recoverable	µg/L	1	50	20.00	5.00	1
Silver, Total Recoverable (1)	µg/L	0.5	100	3.24	--	0.2
Thallium	µg/L	2	0. 24	--	--	0.2
Zinc, Total Recoverable (1)	µg/L	68	7,400	99.21	99.21	8

Footnotes:
Applicable total recoverable metals standards calculated using the 25th percentile upstream total hardness value of 80.03 mg/L as $CaCO_3$.

Aluminum - The Bigfork WWTP utilizes alum for phosphorus removal. The acute aquatic life standard for dissolved aluminum is 750 µg/L and the chronic standard is 87 µg/L. With minimal initial dilution (0% for acute and 0.75% for chronic), there was no RP to exceed the water quality standards. No dissolved WQBEL is developed in this permit renewal. Monthly monitoring for dissolved aluminum will be continued with this permit renewal (Part VI).

Copper - Annual copper data was used to perform a reasonable potential analysis and with minimal initial dilution (0.75%) for the acute and chronic conditions there was no reasonable potential to exceed the acute and chronic water quality standards, 11.35 µg/L and 7.71µ/L respectively. Therefore, no WQBEL is developed.

Mercury – Flathead Lake is listed as impaired for mercury. An RP analysis was completed using the Bigfork WWTP's monitoring data. The acute and chronic aquatic life standard for mercury is 1.70 µg/L and 0.91 µg/L and the human health standard for mercury is 0.05 µg/L. There was no RP to exceed the mercury water quality standards. Therefore, no WQBEL is developed.

Thallium - The Bigfork WWTP reported annual thallium data for the effluent during the POR; however, there is not enough representative upstream thallium data for the Swan River to accurately perform an RP analysis. Annual thallium monitoring will be continued with this permit renewal and annual upstream monitoring for thallium will also be required with this permit renewal (see Part VI).

Antimony, Arsenic, Beryllium, Cadmium, Chromium, Lead, Nickel, Selenium, Silver, and Zinc - During the POR, the permittee reported annual total recoverable metals data for the effluent including: antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, selenium, silver, and zinc. An RP analysis was conducted for all the metals listed above and RP to exceed the water quality standard does not exist (see Attachments B and C). No total recoverable metals limitations will be developed in this permit renewal. The Bigfork WWTP will not be required to continue monitoring for antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, selenium, silver and zinc.

Whole Effluent Toxicity Testing – Water quality standards require that state water be free from substances attributable to municipal waste that create conditions which are harmful or toxic to human, animal, plant or aquatic life, and provides the basis for whole effluent toxicity (WET) requirements in MPDES permits. The following endpoints define acute and chronic toxicity as measured in a WET test:

- During an acute WET test acute toxicity occurs when 50 percent mortality is observed for any tested species at any effluent concentration (i.e., LC50 < 100% effluent)

- During a chronic WET test chronic toxicity occurs when the 25% inhibition concentration (IC25) for any tested species is less than or equal to the percent effluent represented by the effluent concentration in the receiving water after accounting for any allowable dilution.

If DEQ determines there is RP for a discharge to cause acute and/or chronic toxicity, the MPDES permit may be updated to included limits for WET based on one, or both, of the endpoints above.

The dilution ratio (Swan River 7Q10: WWTP average daily design flow) is 256:1. Therefore, since the dilution ratio is greater than 100:1, the appropriate WET test is for acute toxicity. Quarterly acute WET testing using two species will be required of the facility starting the first full quarter after the permit effective date.

Confirmation of acute toxicity in the effluent will trigger the standard toxicity identification/toxicity reduction (TIE/TRE) requirements of the permit. Standard WET language will be included in the permit and will describe the test methods, test conditions, endpoints, test acceptability criteria, reporting requirements, and accelerated testing-TIE/TRE requirements.

If the results for four consecutive quarters of testing indicate no acute toxicity, Bigfork may request for DEQ to reduce acute WET monitoring to semi-annual a two species twice per year. DEQ will process this request as a minor modification.

V. Proposed Final Effluent Limitations

A. Outfall 001

Starting the effective date of the permit and lasting for the duration of the permit cycle, the following effluent limitations are in effect, as summarized in **Table 12**.

Table 12. Outfall 001 Proposed Final Effluent Limitations

Parameter	Units	Average Monthly Limitation (1)	Average Weekly Limitation (1)	Maximum Daily Limitation (1)
5-day Biochemical Oxygen Demand, BOD_5	mg/L	30	45	--
	lb/day	125	259	--
	% Removal	85	NA	--
Total Suspended Solids, TSS	mg/L	30	45	--
	lb/day	125	259	--
	% Removal	85	NA	--
E. coli Bacteria	Number of organisms/100 mL	32 (2)	64 (2)	--
Total Nitrogen (3)	lb/day	42.1	--	--
Total Phosphorus as P	mg/L	1.0	--	--
	lb/day	4.2	--	--
Oil and Grease	mg/L	--	--	<10
pH(4)	s.u.	6.0-9.0 (Instantaneous)		

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Geometric mean value.
(3) Calculated as the sum of Nitrate + Nitrite as N and TKN concentrations.
(4) pH shall remain between 6.0 and 9.0 s.u. (instantaneous minima and maxima). For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation for the conditions of this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts.
There shall be no discharge which causes visible oil sheen in the receiving stream.

VI. Monitoring Requirements

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. Samples will reflect the nature and volume of the discharge.

A. Influent and Effluent Monitoring

The sampling and monitoring location for the influent shall be established at the headworks prior to any return or recycle flows. Effluent shall be sampled at the last point of control prior to discharge to the Swan River/Flathead Lake at Bigfork Harbor. Influent and Effluent monitoring requirements are shown in **Table 13**. The permittee will monitor select total recoverable metals concentrations in the effluent, assuring that annual samples are scheduled to be collected for each calendar quarter of the year throughout the permit cycle. For example, when planning a monitoring schedule, in the first calendar year of the permit cycle the sample is to be collected during the last month of the first calendar quarter; in the second calendar year of the permit cycle the sample is to be collected during the last month of the second calendar quarter; and in the third calendar year of the permit cycle the sample is to be collected during the last month of the third calendar quarter, etc.

Table 13. Monitoring Requirements – Outfall 001

Parameter	Units	Sample Location	Sample Frequency	Sample Type (1)	Reporting Requirement	ML (2)
Flow	mgd	Influent	Continuous (4)	Instantaneous	Daily Maximum Daily Average	.01
	mgd	Effluent	Continuous (4)	Instantaneous		.01
5-day Biochemical Oxygen Demand, BOD_5	mg/L	Influent	3/Week	Composite	Monthly Average	5
	mg/L	Effluent	3/Week	Composite	Monthly Average Weekly Average	5
	lb/day	Effluent	1/Month	Calculated		0.1
	% Removal	Effluent	1/Month	Calculated	Monthly Minimum	0.1
Total Suspended Solids, TSS	mg/L	Influent	3/Week	Composite	Monthly Average Weekly Average	10
	mg/L	Effluent	3/Week	Composite		10
	lb/day	Effluent	1/Month	Calculated		0.1
	% Removal	Effluent	1/Month	Calculated	Monthly Minimum	0.1
pH	s.u.	Effluent	Daily	Instantaneous	Daily Minimum Daily Maximum	0.1
Temperature	°C	Effluent	Daily	Instantaneous	Monthly Average Daily Maximum	0.1
E. coli Bacteria	Number of organisms/ 100 mL(3)	Effluent	3/Week	Grab	Monthly Average Weekly Average	1/100 mL
Oil and Grease	mg/L	Effluent	1/Month	Grab	Monthly Average Weekly Average	1
Total Ammonia as N	mg/L	Effluent	1/Month	Composite	Monthly Average	0.07
Nitrate + Nitrite as N	mg/L	Effluent	1/Week	Composite	Monthly Average	0.01
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Week	Composite	Monthly Average	0.225
Total Nitrogen (5)	mg/L	Effluent	1/Month	Composite	Monthly Average	0.1
	lb/day	Effluent	1/Month	Calculated		0.1
Total Phosphorus as P	mg/L	Effluent	1/Week	Composite	Monthly Average	0.001
	lb/day	Effluent	1/Month	Calculated		0.1

Table 13. Monitoring Requirements – Outfall 001

Parameter	Units	Sample Location	Sample Frequency	Sample Type (1)	Reporting Requirement	ML (2)
Aluminum, Dissolved (6)	µg/L	Effluent	1/Month	Composite	Monthly Average	9
Thallium, Total Recoverable (7) (6)	µg/L	Effluent	Semi-annual	Composite	Single Sample	0.2
Whole Effluent Toxicity Testing, acute	% Effluent	Effluent	1/Quarter	Composite	Pass/Fail	---

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) ML is the minimum detection level.
(3) Number of organisms may be expressed as cfu (colony forming unit) or MPN (most probable number).
(4) Permittee shall report daily average and daily maximum flow in mgd on DMR
(5) Calculated as the sum of Nitrate + Nitrite as N and TKN concentrations.
(6) Metals shall be analyzed as total recoverable with the exception of aluminum which is measured in the dissolved form.
(7) When monitoring for thallium the permittee must use an approved method that can measure to a minimum detection level of 0.20 µg/L.

B. Ambient Monitoring

The sampling and monitoring location for the Swan River ambient data must be prior to the location of the Bigfork WWTP. The Swan River ambient monitoring requirements are shown in **Table 14**. Aluminum is used in the water treatment process at the Bigfork WWTP, therefore quarterly in-stream aluminum monitoring will be required in the Swan River for the duration of this permit. Semi-annual thallium monitoring will be included with this permit renewal to provide sufficient Swan River ambient water quality data.

Table 14. Swan River Ambient Monitoring

Parameter	Unit	Sample Frequency	Sample Type (1)	Reporting Requirement	ML(2)
Aluminum, Dissolved (3)	µg/L	1/Quarter	Composite	Monthly Average	9
Thallium	µg/L	Semi-Annual	Composite	Monthly Average	0.2

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) ML is the minimum detection level.
(3) Metals shall be analyzed as total recoverable with the exception of aluminum which is measured in the dissolved form.

VI. Public Participation

A. Public Notice

DEQ issued Public Notice No. MT-18-01 dated February 12, 2018. The public notice states that a tentative decision has been made to issue an MPDES permit to the Permittee and that a draft permit, fact sheet and environmental assessment (EA) have been prepared. Public comments are invited any time prior to the close of the business on March 14, 2018. Comments may be directed to:

Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620

or

DEQWPBPublicComments@mt.gov

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments and issue a final decision within sixty days of the close of the public comment period or as soon as possible thereafter.

All persons, including the applicant, who believe any condition of a draft permit is inappropriate or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing).

B. Notification of Interested Parties

Copies of the public notice were mailed to the discharger, state and federal agencies and interested persons who have expressed an interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this permit. In addition to mailing the public notice, a copy of the notice and applicable draft permit, fact sheet and EA were posted on DEQ’s website for 30 days.

Any person interested in being placed on the mailing list for information regarding this MPDES permit should contact DEQ, reference this facility, and provide a name, address, and email address.

C. Public Hearing

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

D. Permit Appeal

After the close of the public comment period, DEQ will issue a final permit decision. A final permit decision means a final decision to issue, deny, modify, revoke and reissue, or, terminate a permit. A permit decision is effective 30 days after the date of issuance unless a later date is specified in the decision, a stay is granted, or the applicant files an appeal pursuant to 75-5-403, MCA.

The Applicant may file an appeal within 30 days of DEQ's action to the following address:

Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
PO Box 200901
Helena, Montana 59620-0901

E. Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at 406-444-3080.

VII. Information Sources

Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended 1973-1983, 1987, 1988, 1990-1992, 1994, 1995 and 1996.

US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.

Montana Code Annotated (MCA), Title 75-5-101, *et seq*., "Montana Water Quality Act,".

Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
Subchapter 2 - *Water Quality Permit and Application Fees.*
Subchapter 5 - *Mixing Zones in Surface and Ground Water*.
Subchapter 6 - *Montana Surface Water Quality Standards and Procedures*.
Subchapter 7- *Nondegradation of Water Quality*
Subchapter 12 - *MPDES Standards.*
Subchapter 13 - *MPDES Permits*.

Montana Department of Environmental Quality Circular DEQ-7, Montana Numeric Water Quality Standards, May 2017.

Montana Department of Environmental Quality Circular DEQ-12A, Montana Base Numeric Nutrient Standards, July 2017.

MPDES Permit Number MT0020397:

- Administrative Record
- Renewal Application EPA Form 1 and 2A, February 2, 2015

US EPA *Technical Support Document for Water Quality-Based Toxics Control*, EPA/505/2-30-001, March 1991.

US EPA NPDES *Permit Writers' Manual*, EPA 833-B-96-003, September 2010.

2016 Integrated 303(d) Water Quality Report for Montana.

Montana Department of Health and Environmental Services, Water Quality Bureau, *Strategy for Limiting Phosphorus in Flathead Lake*, April 1984.

Montana Department of Environmental Quality *Flathead Lake Phosphorus Control Strategy Progress Report*, December 1995.

Montana Department of Environmental Quality Circular DEQ-2, *Design Standards for Wastewater Facilities,* September 1999.

Montana Department of Environmental Quality *Nutrient Management Plan and Total Maximum Daily Load for Flathead Lake, Montana*, December 2001.

Montana Department of Fish Wildlife and Parks, *Spawning Times of Montana Fishes*, March 2001.

Allied Engineering, *Wastewater Treatment Facility Operation and Maintenance Manual*, Bigfork, Montana, 1988.

Preliminary Engineering Review, Morrison-Maierle, Inc., May 2006.

US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.

US Code of Federal Regulations, 40 CFR Part 403 – *General Pretreatment Regulations for Existing and New Sources of Pollution.*

US Code of Federal Regulations, 40 CFR Part 503 – *Standards for the Use or Disposal of Sewage Sludge.*

US Department of the Interior US Geological Survey, *Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2002*, Scientific Investigations Report 2004-5266, 2004.

US EPA *Technical Support Document for Water Quality-Based Toxics Control*, EPA/505/2-30-001, March 1991.

US EPA Region VIII NPDES *Whole Effluent Toxics Control Program*, August 1997.

US EPA Ref. 8EPR-EP, Flathead Lake (nutrients) Total Maximum Daily Load, March 2002.

US EPA *NPDES Compliance Inspection Manual*, EPA 305-X-03-004, July 2004.

Prepared by: Kaela Murphy 2017

Attachment A: Bigfork WWTP Reasonable Potential Analysis (2017)

			Ammonia (Acute)	Ammonia (Chronic)	N + N (Human Health)	Oil and Grease (Acute)	Oil and Grease (Chronic)
Flow							
critical stream flow	7Q10 or seasonal 14Q5	mgd	176.44	176.44	176.44	176.44	176.44
% of critical stream flow for dilution	as decimal	%	0.01	0.10	0.0075	0.00	0.00
Q_s	resulting critical stream flow Q_s = (critical stream flow for dilution)*(% of critical stream flow provided)	**mgd**	**1.76**	**17.64**	**1.32**	**0.00**	**0.00**
Q_d	critical effluent flow (avg. daily design flow)	**mgd**	**0.69**	**0.69**	**0.69**	**0.69**	**0.69**
Q_r	downstream flow (Q_s + Q_d)	mgd	2.45	18.33	2.01	0.69	0.69
Concentrations							
C_{max}	maximum effluent concentration for POR (from application or DMR data)	mg/L	**4.49**	**4.49**	**17.08**	**1.0**	**1.0**
n	number of samples in effluent data set		61	61	61	40	40
CV	0.6 if n < 10 calculated as $\sigma_{effluent}/\mu_{effluent}$ if n ≥ 10		3.29	3.29	0.35	0.16	0.16
P_n	%tile for n samples at 95% confidence level		0.95	0.95	0.95	0.93	0.93
Z_{Pn}	Z-score for P_n		1.67	1.67	1.67	1.46	1.46
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		0.97	0.97	0.993	1.03	1.03
C_d	critical effluent concentration - 95%tile (=max. effluent concentration * TSD multiplier)	**mg/L**	**4.35**	**4.35**	**16.96**	**1.03**	**1.03**
C_s	critical instream concentration (75%tile if n<=30, 95% UCL if n>30)	**mg/L**	**0.020**	**0.020**	**0.03**	**0.0**	**0.0**
C_r	**resulting or downstream pollutant concentration** $C_r = (C_dQ_d + C_sQ_s)/(Q_d+Q_s)$	**mg/L**	**1.24**	**0.18**	**5.83**	**1.030**	**1.030**
WQS	**water quality standard**	**mg/L**	**3.83**	**1.57**	**10.000**	**10.00**	**10.00**
Reasonable Potential			**no**	**no**	**no**	**no**	**no**

Attachment B: Bigfork WWTP Metals RP Analysis

		Aluminum		Antimony	Arsenic		Beryllium	Cadmium		Chromium, all forms		Copper		Nickel	
term	description	Acute	Chronic	Human Health	Acute	Chronic	Human Health	Acute	Chronic	Chronic	Human Health	Acute	Chronic	Acute	Chronic
Qs^1	critical stream flow (7Q10)	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44
% Qs	% of Qs being provided (as decimal, e.g. -.10 for 10%)	0	0.0075	0.0075	0	0	0	0	0	0	0	0.0075	0.0075	0	0
Qs^2	resulting critical stream flow (Qs^1 * %Qs)	0.00	1.32	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.32	0.00	0.00
Cs or B	critical instream concentration (75%tile if n<=30, 95% UCL if n>30)	1	1	1	1	1	1	0.32	0.32	1	1	1	1	10	10
Qd	critical effluent flow (design flow, units must match Qs)	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Cmax	maximum effluent concentration for POR (from application or DMR data)	80	80	3	3	3	1	0.09	0.09	10	10	9	9	10	10
n	number of samples in effluent data set	7	7	7	7	7	7	7	7	7	7	7	7	7	7
CV	coefficient of variation for effluent data (if n<10, use 0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Pn	%tile for n samples at 95% confidence level	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652
Z_{Pn}	Z-score for Pn	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390
TSD	calculated TSD multiplier (should be close to Table 3-2 value)	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005
Cd or E	critical effluent concentration - 95%tile (max. effluent concentration for POR * TSD multiplier)	160.418	160.418	6.016	6.016	6.016	2.005	0.180	0.180	20.052	20.052	18.047	18.047	20.052	20.052
Qr	downstream flow (Qs + Qd)	0.690	2.013	2.013	0.690	0.690	0.690	0.690	0.690	0.690	0.690	2.013	2.013	0.690	0.690
D	dilution ratio (Qs^2/Qd, may be entered instead of Qs and Qd)														
Cr or C	resulting or downstream pollutant concentration (term to solve for)	160.42	55.64	2.72	6.02	6.02	2.01	0.18	0.18	20.05	20.05	6.84	6.84	20.05	20.05
WQS	water quality standard (from DEQ-7 or rule)	750.00	87.00	5.60	340.00	150.00	4.00	1.53	0.66	71.81	100.00	11.35	7.71	388.58	43.20
	RP?	no	no	no	no	no	no	no	no	no	no	no	no	no	no

All concentrations are expressed in µg/L

Attachment C: Bigfork WWTP Metals RP Analysis Continued

		Mercury			Lead		Selenium		Silver		Zinc	
term	description	Acute	Chronic	HH	Acute	Chronic	Acute	Chronic	Acute	HH	Acute	Chronic
Qs^1	critical stream flow (7Q10)	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44	176.44
% Qs	% of Qs being provided (as decimal, e.g. - .10 for 10%)	0	0	0	0	0	0	0	0	0	0.0075	0.0075
Qs^2	resulting critical stream flow (Qs^1 * %Qs)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.32	1.32
Cs or B	critical instream concentration (75%tile if n<=30, 95% UCL if n>30)	0.1	0.1	0.1	1	1	1	1	1	1	1	1
Qd	critical effluent flow (design flow, units must match Qs)	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Cmax	maximum effluent concentration for POR (from application or DMR data)	0.01	0.01	0.01	0.6	0.6	1	1	0.5	0.5	68	68
n	number of samples in effluent data set	7	7	7	7	7	7	7	7	7	7	7
CV	coefficient of variation for effluent data (if n<10, use 0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Pn	%tile for n samples at 95% confidence level	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652	0.652
Z_{Pn}	Z-score for Pn	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390
TSD	calculated TSD multiplier (should be close to Table 3-2 value)	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005	2.005
Cd or E	critical effluent concentration - 95%tile (max. effluent concentration for POR * TSD multiplier)	0.020	0.020	0.020	1.203	1.203	2.005	2.005	1.003	1.003	136.355	136.355
Qr	downstream flow (Qs + Qd)	0.690	0.690	0.690	0.690	0.690	0.690	0.690	0.690	0.690	2.013	2.013
D	dilution ratio (Qs^2/Qd, may be entered instead of Qs and Qd)											
Cr or C	resulting or downstream pollutant concentration (term to solve for)	0.02	0.02	0.02	1.20	1.20	2.01	2.01	1.00	1.00	47.39	47.39
WQS	water quality standard (from DEQ-7 or rule)	1.70	0.91	0.05	61.49	2.40	20.00	5.00	2.77	100.00	99.21	99.21
	RP?	no	no	no	no	no	no	no	no	no	no	no

All concentrations are expressed in µg/L