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

Fact Sheet

PERMITTEE:	City of East Helena
PERMIT NUMBER:	MT0022560
RECEIVING WATER:	Prickly Pear Creek

FACILITY INFORMATION:

Name:	City of East Helena Wastewater Treatment Plant
Location:	3330 Plant Drive East Helena, MT 59635
Contact:	Steve Leitzke, Wastewater Superintendent P.O. Box 1170 East Helena, MT 59635

FEE INFORMATION:

Number of Outfalls:	1 (for fee determination purposes)
Type of Outfall:	001 – Minor, Publicly-Owned Treatment Works (POTW), aerated, activated sludge mechanical with UV disinfection, metals treatment and continuous discharge to surface water.

Summary of changes from the 2009 permit proposed in this Fact Sheet:

- Ammonia limits are removed
- Total residual chlorine limits are removed
- The limits for lead and zinc are removed
- Effluent and instream monitoring for several metals are removed
- Requirements to monitor dissolved oxygen, temperature and hardness in the effluent are removed
- The requirement to conduct whole effluent toxicity (WET) testing is removed
- The copper limit is relaxed
- Limits on total nitrogen and total phosphorus are revised to reflect nutrient variance regulations and to incorporate the requirement to implement a Pollutant Minimization Plan

I. Permit Status

The current Montana Pollutant Discharge Elimination System (MPDES) permit for the City of East Helena Wastewater Treatment Plant (WWTP) became effective on October 1, 2009. It expired September 30, 2014. The Montana Department of Environmental Quality (DEQ) received an application and fees for renewal of MT0022560 on June 25, 2014. DEQ deemed the application complete, and the 2009-issued permit was administratively extended in a letter dated June 25, 2014.

II. Facility Information

A. Facility Description

The East Helena WWTP serves the residents and businesses of the City of East Helena and surrounding area with service to an estimated population of 2,085 (2014 renewal application). The WWTP is an aerated, activated sludge, Biolac treatment system, with metals removal and seasonal UV disinfection. The facility discharges to Prickly Pear Creek via Outfall 001. The present facility design flow is 0.44 million gallons per day (mgd). Minimum detention time is 16.2 hours (Robert Peccia & Associates 1986 and HDR Engineering, Inc. 2002 Operation and Maintenance Manuals). The effluent is disinfected seasonally (April through October) using ultra-violet (UV) light.

Effluent flow monitoring occurs prior to the UV disinfection system (See Attachment A). Water for irrigation of facility grounds and plant non-potable water use are drawn off after the final effluent flow monitoring point. Table 1 is a summary of the East Helena WWTP design criteria from the Robert Peccia & Associates 1986 and HDR Engineering, Inc. 2002 Operation and Maintenance Manuals.

Table 1. Current Design Criteria Summary – East Helena WWTP

Facility Description: Continuous discharge, mechanical, Bio-Lac activated sludge treatment system with, metals removal, UV disinfection and aerobic sludge storage.	
Construction Date: 2002. Metals removal completed in 2014.	Modification Date: NA
Design Year: 2021	
Design Population: 3,578	Population Served: ~2,000
Design Flow, Average Daily (mgd): 0.44	Design Flow, Peak Daily (mgd): 1.48
Minimum Detention Time (Activated Sludge System): 16.2 hours	
Design BOD Removal (%): 94	Design Load (lb/day): 576 lb/day
Design TSS Removal (%): 91	Design Load (lb/day): 608 lb/day (192 mg/L)
Collection System: Combined [ ] Separate [X]	
SSO Events (Y/N): yes	Number: one
Bypass Events: none reported	Number: NA
Inflow and Infiltration contribution (mgd): 0.010	Source: Inflow from curbs and gutters during run-off events

Disinfection: Yes	Type: UV
Discharge Method: Continuous	
Effluent Flow Primary Device: v-notch weir and staff gauge installed prior to plant non-potable water and irrigation draw off points.	
Effluent Secondary Flow Device: TN Tech Ultrasonic meter	
Sludge Storage: aerobic digester/stabilization	

The City of East Helena does not have a pretreatment program.

Inflow and Infiltration (I/I) is estimated at 0.3 mgd during run-off events and when Prickly Pear Creek is frozen. The City continues to try to locate the source(s) of I/I, but has not found them (2014 renewal application).

Biosolids are land applied on agricultural fields.

B. Effluent Characteristics

DEQ used June 2014 through August 2017 as the Period of Record (POR) for effluent characterization. This time frame is selected because the City of East Helena added a metals removal facility and brought it online in June 2014. Effluent data prior to that date is no longer representative of the facility's effluent quality. Data from the facility Discharge Monitoring Reports (DMR) for the POR are summarized in Table 2.

Table 2. DMR Effluent Characteristics for POR June 2014 through August 2017.

Parameter	Location	Units	Previous Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	mgd	(1)	0.13	0.78	0.25	39
Biochemical Oxygen Demand (BOD_5)	Influent	mg/L	(1)	50.6	334	168	39
	Effluent	mg/L	45/30 (2)	2.5	65	5.1	39
	Effluent	% removal	85	94	99	97	39
	Effluent	lb/day	163/109 (2)	3.1	33	9.9	39
Total Suspended Solids (TSS)	Influent	mg/L	(1)	56	821	163	39
	Effluent	mg/L	45/30 (2)	4.0	104	5.6	39
	Effluent	% removal	85	89	99	96	39
	Effluent	lb/day	163/109 (2)	4.1	45	11	39
E. coli Bacteria (5)	Effluent	#/100 mL	252/126 (7)	1	16.5	3.7	23
E. coli Bacteria (6)	Effluent	#/100 mL	1260/630 (7)	1.1	53	4.3	15
pH	Effluent	s.u.	6.5-9.0	6.5	8.9	8.0	39
Temperature	Effluent	ºC	(1)	2.6	22	11.2	39
Total Ammonia as N	Effluent	mg/L	1.72 (4)	<0.05	0.13	1.32	39
Total Kjeldahl Nitrogen	Effluent	mg/L	(1)	0.4	2.8	1.0	39
Nitrate + Nitrite as N	Effluent	mg/L	(1)	5.5	29.4	13.0	39
Total Nitrogen (TN) (9)	Effluent	mg/L	(1)	4.5	45.1	13.5	39
		lb/day	75.8/53.3 (2)	10.4	62.6	26.2	39
Total Phosphorus as P (TP)	Effluent	mg/L	(1)	0.09	1.75	0.69	39
		lb/day	16.5/11.2 (2)	0.35	4.4	1.5	39
Dissolved Oxygen (10)	Effluent	mg/L	(1)	0.8	8.7	4.2	39
Aluminum, Dissolved	Effluent	mg/L	(1)	<0.03	<0.03	<0.03	13
Antimony, Total Recoverable	Effluent	mg/L	(1)	<0.001	<0.003	<0.025	13
Arsenic, Total Recoverable	Effluent	mg/L	(1)	0.004	0.019	0.0097	13
Cadmium, Total Recoverable	Effluent	mg/L	(1)	<0.00008	<0.001	<0.0001	13
Copper, Total Recoverable	Effluent	mg/L	0.014/0.009 (3)	<0.001	0.017	0.008	35
Lead, Total Recoverable	Effluent	mg/L	0.078/0.003 (3)	<0.0005	0.003	0.0006	35
Zinc, Total Recoverable	Effluent	mg/L	0.12/0.12(3)	0.01	0.04	0.02	35
Oil and Grease	Effluent	mg/L	10 (4)	<1	<1	<1	39
Hardness (as $CaCO_3$)	Effluent	mg/L	(1)	34	126	111	39

Footnotes:
(1) No effluent limit in previous permit, monitoring requirement only.
(2) Weekly Average/Monthly Average Value.
(3) Daily Maximum/Monthly Average Value.
(4) Daily Maximum
(5) Sample period is April 1 through October 31.
(6) Sample period is November 1 through March 31.
(7) Weekly Geometric Mean Value/Monthly Geometric Mean Value.
(8) Instantaneous/Daily Maximum Value.
(9) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.
(10) Daily Minimum

C. Compliance History

The City of East Helena was cited for multiple violations of effluent limitations and permit conditions from the 2009 permit issuance until mid-2011. Water Protection Bureau compliance staff referred the City to the DEQ Enforcement Division for formal enforcement in July 2011. On January 22, 2013 DEQ and the City entered into an Administrative Order on Consent (Consent Order). The City implemented corrective actions to return to compliance. DEQ determined the City had satisfied the terms of the Consent Order and terminated it on February 26, 2016.

The City was cited for failing to collect an effluent sample in March 2017. Except for this minor violation, the City has remained in compliance with the permit since the termination of the 2013 Consent Order.

III. Proposed Technology-based Effluent Limits (TBELs)

A. Applicability

The Board of Environmental Review has adopted by reference 40 CFR 133 which set minimum treatment requirements for secondary treatment or equivalent for POTW (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by BOD_5, TSS, percent removal of BOD_5 and TSS, and pH [National Secondary Standards (NSS)]. National secondary treatment requirements are described in 40 CFR 133 and incorporated into all municipal permits.

The 2009 permit includes NSS limitations for BOD_5, BOD_5 percent removal, TSS, TSS percent removal and pH. These limits are maintained in this permit renewal.

ARM 17.30.1345(8) requires that all effluent limitations be expressed in terms of mass except for pollutants which cannot be appropriately expressed in terms of mass.

The following equation was used to calculate mass-based loading limits in pounds per day (lb/day) using NSS limitations at the facility design flow of 0.434 mgd.

Load (lb/day) = Design Flow x Concentration Limit (mg/L) x 8.34 (lb·L)/(mg·gal)

<u>BOD_5 and TSS Mass-based Load Limitations</u>:

30-day average load (lb/day) = (0.434 mgd)(30 mg/L)(8.34) = 109 lb/day
7-day average load (lb/day) = (0.434 mgd)(45 mg/L)(8.34) = 163 lb/day

Loading limits 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 allocations or mass-based loading limits calculated in this Fact Sheet.

B. Nondegradation Load Allocations

The provisions of ARM 17.30.701 - 718 (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the

conditions of their permit and do not exceed the limitations established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

Nondegradation threshold values for the East Helena WWTP were calculated for BOD_5 and TSS as part of the permit issuance in 1997 for the previous lagoon facility (design flow of 0.635 mgd). These nondegradation load allocations are maintained to determine if the facility is a new or increased source. The actual average loads discharged from the facility for the POR are presented below in Table 3. Actual loads for BOD_5 and TSS indicate that the facility did not exceed the nondegradation load values and the facility is not a new or increased source.

Table 3. Nondegradation and Actual Loads for POR

		Nondegradation Allocated Load	Actual 30-Day Annual Average Load				
Parameter	Units	30-Day Annual Average Load	2012	2013	2014	2015	2016
BOD_5	lb/day	158	8.7	7.7	13.7	11.9	5.8
TSS	lb/day	526	15.8	12.6	17.0	11.1	6.4

C. Proposed TBELS

Table 4. Outfall 001 Proposed TBELS

Parameter	Concentration (mg/L)		Load (lb/day)	
	Weekly Average (1)	Monthly Average (1)	Weekly Average (1)	Monthly Average (1)
BOD_5	45	30	163	109
TSS	45	30	163	109
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			
BOD_5 Percent Removal [1] (%)	85 %			
TSS Percent Removal [1] (%)	85 %			

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

IV. Water Quality-based Effluent Limits (WQBELs)

A. Scope and Authority

The Montana Water Quality Act (Act) states that a permit may only be issued if the Department 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 must include limits 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 effluent limits, based on Montana water quality standards, that will protect designated uses of the receiving stream.

B. Receiving Water

The East Helena WWTP discharges to Prickly Pear Creek (PPC) approximately 500 meters downstream of the crossing at Wylie Drive. PPC is in the Upper Missouri River watershed as identified by USGS Hydrologic Unit Code 10030101, and Montana stream segment MT41I006_030, PPC Highway 433 (Wylie Drive) Crossing to Helena WWTP Discharge.

PPC is classified "I". The goal of the state of Montana is for class I waters to fully support: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supplies [ARM 17.30.628(1)].

The 2016 303(d) list shows this segment of the creek as not fully supporting aquatic life, primary contact recreation, drinking water, and agricultural uses. Probable causes of impairment are identified as metals (arsenic, cadmium, copper, lead, and zinc), un-ionized ammonia, temperature, sedimentation/siltation, low flow alterations, physical substrate habitat alterations, total nitrogen, total phosphorus, and alteration in stream-side or littoral vegetative covers. The probable sources of these impairments include grazing in riparian or shoreline zones, irrigated crop production, on-site treatment systems (septic and similar decentralized systems), acid mine drainage, contaminated sediments, industrial point source discharge, habitat modification (other than hydromodification), and impacts from abandoned mine lands (inactive).

In August 2006, DEQ completed the *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area: Volume II – Final Report* (TMDL). The TMDL established wasteload allocations (WLA) for point sources and where applicable, incorporated a phased approach and adaptive management strategy for achieving those WLA. Specifics of the TMDL, with respect to the East Helena WWTF discharge, are provided in subsequent sections of this fact sheet.

PPC, in the area of discharge, historically experienced severely depleted stream flows in summer. The 2009-issued permit established the 7-day, 10-year low flow condition (7Q10) as zero (0) cfs for the purposes of discharge limit development. In 2008 a re-watering agreement was put into effect that reduced irrigation diversions during low flow periods in this portion of the stream. This agreement has continued to the present and the Lewis and Clark Water Quality Protection District has collected flow data at the Wylie Drive bridge crossing for over ten years. DEQ used this data and compared it to the upstream USGS gage 06061500 (Prickly Pear Creek near Clancy MT) to develop 7Q10 and 14Q5 flows at the location of the East Helena WWTF discharge. For development of permit limits in this renewal, the 7Q10 is 8.34 cfs and the 14Q5 is 12.7 cfs.

Fish species present in PPC include the longnose and white suckers, rainbow and brown trout, mottled sculpin and longnose dace. Early life stages of these species can be present year-round (*Spawning Times of Montana Fishes* D.Skaar, MFWP, March 2001).

The permittee conducted permit-required upstream monitoring in PPC at a road crossing in East Helena. Data were reported on the facility DMRs.

Ambient water quality data for nutrients in PPC upstream of the WWTP discharge are minimal. The few data available were collected either at the Highway 12 or Wylie Drive road crossings. TN and TP data were obtained between 2012 and 2014.

Instream monitoring data is summarized in Table 5 below.

Table 5. Prickly Pear Creek Upstream of Outfall 001

Parameter	Units	Number of Samples	Minimum	Maximum	75th Percentile
Total Nitrogen	mg/L	1	0.25	0.25	0.25
Total Phosphorus as P	mg/L	5	0.019	0.049	0.038
pH	s.u.	22	6.25	8.59	7.5
Temperature	°C	22	1	21	12
Total Ammonia as N	mg/L	22	<0.003	0.15	0.05
Total Hardness, as $CaCO_3$	mg/L	22	60	142	102 [1]
Aluminum, Dissolved	mg/L	22	0.03	0.25	0.05
Antimony, Total Recoverable	mg/L	22	0.001	0.003	0.003
Arsenic, Total Recoverable	mg/L	22	0.003	0.01	0.007
Cadmium, Total Recoverable	mg/L	22	0.00012	0.00083	0.0003
Copper, Total Recoverable	mg/L	22	0.001	0.011	0.0038
Lead, Total Recoverable	mg/L	22	0.001	0.03	0.0051
Zinc, Total Recoverable	mg/L	22	0.004	0.11	0.06

Footnotes:
(1) 25th Percentile

C. Applicable Water Quality Standards

Discharges to "I" class waters may not violate the specific water quality standards listed under ARM 17.30.628(2)(a through k). In addition, discharges are subject to ARM 17.30.635 through 637, 641, 645, and 646.

D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded. The Department must determine the applicability of currently granted or proposed mixing zones. Pollutant concentrations in the effluent must meet the applicable water quality standards at the end of pipe unless a mixing zone is recognized by the Department for that specific parameter in the permit.

Acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also be free from substances which will:

a. settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;

b. create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;

c. produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

d. create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and

e. create conditions which produce undesirable aquatic life.

Although certain standards may be exceeded in a mixing zone, an effluent in its 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 a designated mixing zone.

A standard mixing zone may be granted for facilities which discharge less than 1 mgd or when mixing is nearly instantaneous. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or when the permittee demonstrates through a DEQ approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) stream widths.

Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone and must be the smallest practicable size; have minimal effects on uses; and, have

definable boundaries. A person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for DEQ to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

The City of East Helena requested a mixing zone but did not specify whether the request was for a standard mixing zone or source specific. The request did not include the level of analysis DEQ typically requires for a source specific mixing zone, especially with respect to the aquatic life standards. The East Helena discharge is to a braided segment of Prickly Pear Creek. Based on observations during a site visit in autumn 2017, the immediate area of the discharge is to a channel that contains less than half of the flow of Prickly Pear Creek. This channel merges with the rest of the stream flow approximately 280 feet downstream of the discharge location.

DEQ proposes to grant a standard mixing zone for chronic aquatic life criteria and nutrients. DEQ finds that source specific mixing zones for acute aquatic life copper criteria and human health criteria are appropriate and will protect beneficial uses of Prickly Pear Creek.

Because the receiving water flow to discharge flow dilution ratio is less than 100:1 (approximately 16:1) a standard mixing zone allows dilution with 25% of the 7Q10 flow chronic aquatic life water quality criteria. A standard mixing zone for nutrients allows dilution with the entire 14Q5 flow of the receiving water. The standard mixing zone dilution flows used for reasonable potential assessment and limit development are:

25% of 7Q10 flow = 1.35 mgd (2.1 cfs); for chronic aquatic life criteria.
14Q5 flow = 8.2 mgd (12.7 cfs); for total nitrogen and total phosphorus.

A standard mixing zone does not provide a dilution allowance for acute aquatic life criteria. DEQ may allow minimal initial dilution for acute criteria only after determining that doing so will not threaten or impair beneficial uses. DEQ and EPA mixing zone guidance recommend that any mixing zone for acute criteria be no more than 10 percent of the mixing zone for chronic criteria. This 10 percent value is considered “minimal initial dilution.” Ten percent of the available chronic dilution flow at the East Helena discharge location is 0.54 mgd. Because the discharge from the East Helena WWTF is so small, and the minimal initial dilution is so slight, DEQ finds that granting a source specific mixing zone for acute aquatic life criteria is appropriate and will not threaten or impair beneficial uses.

The dilution flow for acute criteria is 0.14 mgd (0.22 cfs).

A source specific mixing zone for human health criteria is granted based on DEQ’s determination that there is not a drinking water intake on Prickly Pear Creek downstream of the East Helena discharge. Allowing dilution with 100% of the 7Q10 will not impair the drinking water beneficial use. The dilution flow for human health criteria is:

100% of the 7Q10 flow = 5.4 mgd (8.34 cfs)

The standard and source specific mixing zones described above result in the following dilution allowances for reasonable potential assessments and WQBEL development, where necessary:

25% of 7Q10 for chronic aquatic life standards for total recoverable copper, lead, zinc.

2.5% of 7Q10 for acute aquatic life standards for total recoverable copper, lead, and zinc.

100% of 14Q5 for total nitrogen and total phosphorus.

100% of 7Q10 for nitrate plus nitrite and total recoverable arsenic

E. Basis and Proposed WQBELs

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:

- they have listed TBELs;
- they were identified as needing limits in the previous permit;
- they are identified as present in the effluent through monitoring or otherwise expected present in the discharge; or
- they are pollutants associated with impairment which may or may not have a WLA in a TMDL.

For the East Helena WWTF, DEQ evaluated the POC in **Table 6**.

Table 6. Identification of POC and Need for RP Analysis

Parameter	Basis for POC Identification	RP Analysis
5-day biochemical oxygen demand	TBELs, previous permit	RP not required – no standard
Total Suspended Solids	TBELs, previous permit	RP not required – no standard
pH	TBELs, previous permit	RP not required – TBEL sufficient
Oil & Grease	Previous permit	Narrative RP – ARM 17.30.637(1)
E.coli bacteria	Previous permit, known present	ARM 17.30.623-629
Total Residual Chlorine	Previous permit	Circular DEQ-7
Ammonia, as N	Known present, impairments	Circular DEQ-7, TMDL
Nitrate+Nitrite, as N	Known present	Circular DEQ-7
Total Nitrogen, Total Phosphorus	Known present, impairments	Circular DEQ-12A, TMDL
Arsenic, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Cadmium, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Copper, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Lead, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL
Zinc, Total Recoverable	Known present, impairments	Circular DEQ-7, TMDL

WQBELs must be developed for any pollutant for which there is reasonable potential (RP) for discharges to cause or contribute to exceedances of instream numeric or narrative water quality standards. 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*).

$$C_{RP} = \frac{C_d Q_d + C_s Q_s}{Q_d + Q_s} \qquad \textit{Eq. 1}$$

Where:

C_{RP} = receiving water concentration (RWC) after mixing, mg/L
C_d = maximum projected effluent concentration, mg/L
C_r = RWC upstream of discharge, mg/L
Q_r = applicable receiving water flow, mgd
Q_d = facility design flow rate, mgd

1. Conventional Pollutants

TSS and BOD_5: The facility provides a significant reduction in biological material and solids through secondary treatment (Section III). No additional WQBELs will be required for these parameters.

Oil and Grease (O&G): The 2009-issued permit limit for O&G is an instantaneous maximum limit of 10 mg/L, with a once per month monitoring requirement. All effluent sample results over the POR were less than the laboratory detection limit of 1 mg/L. Therefore, there is no RP for this parameter. The limit is removed from the renewed permit, and monitoring is reduced to quarterly.

***Escherichia coli* Bacteria:** The 2009 permit incorporates limits based on the Montana state standards for *E. coli* bacteria at the end of the discharge pipe. The Department is not granting a mixing zone for *E. coli* based on the requirement that state waters must be free from substances that are harmful or toxic to humans. The existing permit limits and monitoring requirements are maintained in this renewal.

2. Nonconventional Pollutants

Total Ammonia as N: Total ammonia as N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. DEQ uses the 75th percentile of ambient pH and temperature data to establish the ammonia criteria for discharge permits.

Table 7, presents the total ammonia as N water quality standards for PPC using the ambient water quality data in Table 5.

Table 7. Total Ammonia as N Water Quality Standards for PPC						
Condition	Period	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard (mg/L)
				pH	Temperature °C	
Acute	Annual	Yes	NA	7.5	NA	13.3
Chronic	Annual	NA	Yes		12 (4)	4.36

The maximum reported total ammonia as N value is 1.32 mg/L. The projected maximum effluent concentration for total ammonia as N was found following the method recommended by the EPA *Technical Support Document for Water Quality-based Toxics Control* (TSD, 1991). A multiplier of 1.25 was determined using Table 3-2 in the TSD (given a coefficient of variation of 1.60 and a sample size of 39 at the 95% confidence interval.) The projected maximum effluent concentration, the multiplier times the maximum reported concentration (1.25 * 1.32 mg/L), is 1.65 mg/L. The projected effluent concentration does not exceed either the acute or chronic water quality standard. RP does not exist for this parameter. The ammonia limits in the 2009 permit are removed in this permit renewal. Because the permittee must continue to operate the treatment system to ensure that an acceptable level of treatment is maintained, monthly ammonia monitoring is continued. Instream monitoring of pH, temperature and ammonia is reduced to quarterly.

Nitrate plus Nitrite – The maximum reported nitrate plus nitrite value is 29.4 mg/L. The water quality standard for nitrate is 10 mg/L. RP calculations are shown in Attachment B. The resulting instream concentration for nitrate plus nitrite after available dilution is 2.4 mg/L, which is less than the water quality standard. WQBELs for nitrate plus nitrite are not necessary. Monthly monitoring is required.

Nutrients (TN and TP): The 2009 permit incorporated nutrient limitations required by Phase I of the 2006 *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area* (TMDL). The limits, shown in Table 2, are expressed as average monthly and average weekly loads based on plant performance at that time.

In 2014 DEQ adopted numeric nutrient criteria (circular DEQ-12A) and a nutrient variance process (circular DEQ-12B) for wadeable streams in Montana. DEQ-12B was updated in 2017. In this permit renewal DEQ evaluated the East Helena discharge's reasonable potential to exceed the numeric nutrient criteria, developed WQBELs, and followed the process for a general variance described in DEQ-12B. The effluent limitations and conditions developed following these new regulations were compared to the current TMDL-based effluent limits and requirements as discussed below.

Reasonable Potential and WQBEL Analysis

The East Helena WWTF is located in the Middle Rockies (17) ecoregion. The numeric criteria for total nitrogen and total phosphorus are 0.3 mg/L and 0.03 mg/L respectively. Ambient concentrations of TN and TP upstream of the discharge, shown in Table 5, are 0.25 mg/L and 0.038 mg/L respectively. The facility seasonal DMR data (June, July, August) includes maximum reported

effluent concentrations of 24.8 mg/L TN and 2.82 mg/L TP. Applying the TSD yields critical effluent concentrations of 31 mg/L TN (CV = 0.38; n = 18), and 4.4 mg/L TP (CV = 0.81; n = 18).

Using *Equation 1,* the 14Q5, facility design flow, and the above values, the resulting instream concentration for TN is 1.82 mg/L. This value is greater than the water quality criteria. The facility exhibits reasonable potential to exceed the water quality criteria and WQBELs for TN are necessary. RP calculations are shown in Attachment B.

For TP, the average, median, and 75th percentile concentrations in PPC are all greater than or equal to the water quality criteria, so there is no assimilative capacity or available dilution instream. Reasonable potential for an exceedance of the TP criteria exists because the critical effluent concentration is greater than the water quality criteria. WQBELs for TP are necessary. RP calculations are shown in Attachment B.

DEQ uses *Equation 1*, rearranged to solve for the maximum effluent concentration (C_d), also called the wasteload allocation (WLA), the facility may discharge without exceeding the instream water quality criteria.

$$C_d = WLA = \frac{Q_r C_r - Q_s C_s}{Q_d} \qquad \textit{Equation 2}$$

Where:

WLA = Maximum effluent concentration; mg/L
C_r = Water quality criteria; 0.30 mg/L TN, 0.030 mg/L TP
Q_r = Receiving water flow downstream of the discharge; 8.6 mgd
Q_s = Critical upstream receiving water flow; 8.2 mgd
C_s = Receiving water concentration upstream of discharge; 0.25 mg/L TN, 0.038 mg/L TP
Q_d = WWTF design flow; 0.44 mgd

The resulting WLA for TN is 1.23 mg/L. The stream concentration for TP is greater than the water quality criteria, so the WLA for TP is set equal to the criteria, 0.030 mg/L.

From the WLA, long term average concentrations and WQBELs are calculated using the methods described in DEQ-12A and Chapter 5 of the TSD. For nutrients, DEQ calculates an average monthly limit (AML) only. The AML (concentration) is multiplied by the facility design flow and a conversion factor to develop an average monthly load limit. WQBELs for nutrients are expressed as both concentration and load limits. The WQBELs in Table 8 are applicable June, July, and August, each year.

Table 8. Nutrient WQBELs

Parameter	Average Monthly Limit, mg/L	Average Monthly Limit, lb/day
Total Nitrogen (1)	1.2	4.4
Total Phosphorus as P	0.03	0.1

Footnotes:
(1) Calculated from the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

General Nutrient Standards Variance

In 2014 DEQ adopted a general variance for nutrients that permittees may request if required to comply with the base numeric nutrient standards. The variances are effective for up to 20 years from the date of adoption, at which time the effluent limits based on the water quality standard are effective.

As can be seen from the WWTF's TN and TP effluent concentrations shown in Table 2, the East Helena WWTF is unable to comply with the limits above. On February 26, 2018, the city requested a general variance for both nitrogen and phosphorus. The appropriate general variances that may apply to a facility are determined by the facility average design flow rate and are described in Department Circular DEQ-12B (2017). The East Helena WWTF is a mechanical treatment plant and the design flow is less than 1.0 mgd, which means the facility may be considered for the 10 mg/L TN and 1.0 mg/L TP variances.

The first step in determining the appropriate permit conditions based on DEQ-12B is to calculate the 95th percentile of the facility's representative effluent data prior to July 1, 2017. In 2014 East Helena completed a significant upgrade to add a metals removal treatment process to the WWTF. This process also significantly improved the removal of total phosphorus from the wastewater. Therefore, to evaluate the WWTF's nutrient treatment, DEQ calculated the 95th percentile of TN and TP concentrations between June 2014 and July 2017. Those values are 21 mg/L TN and 1.5 mg/L TP. DEQ also evaluated the facility's seasonal data (July - September) over the same timeframe; which results in 95th percentile concentrations of 12 mg/L TN and 1.4 mg/L TP. Since the 95th percentile in all cases is above the highest attainable condition treatment requirements (HAC) in DEQ-12B, effluent limits are based on the DEQ-12B, Table 12B-1 values of 10 mg/L TN and 1 mg/L TP.

Effluent limits are developed from the HAC values above, which are treated as long term average (LTA) concentrations (DEQ, *First Triennial Review of Base Numeric Nutrient Standards and Variances, April 2017*). DEQ uses the TSD to develop concentration-based effluent limits from the HAC values (LTA concentrations) using a default coefficient of variation (CV) of 0.6 and the appropriate LTA multiplier from TSD Table 5-2. This yields concentrations of 15.5 mg/L TN and 1.5 mg/L TP as average monthly values. DEQ-12B requires variance limits be expressed as loads only. So, the average monthly concentration values are multiplied by the facility design flow and a conversion factor to arrive at the average monthly load limits for the permit. The calculations are represented in the following equation:

(Table 12B-1 value)*(TSD Table 5-2 multiplier)*(Design flow)*(8.34 conversion) = load (lb/day)

The resulting load limits are 56.9 lb/day TN and 5.5 lb/day TP.

Comparing the HAC load limits to the existing permit limits shows that the existing load limit for TN (53.3 lb/day) is less than the HAC load limit above. East Helena has not exceeded this permit

limit since January 2012. The existing TN limit is maintained in this permit renewal. This limit will continue to apply year-round to maintain protection of Lake Helena.

The HAC limit for TP is less than half the existing load limit. However, given that the maximum reported TP load since June 2014 is 4.3 lb/day, it is apparent the facility is achieving the HAC load limit. DEQ proposes applying the 5.5 lb/day limit for TP during the growing season (July – September). To maintain protection of Lake Helena, the existing load limit of 11.2 lb/day will apply the rest of the year (October – June).

The City of East Helena WWTF discharge is achieving the HAC limits for both TN and TP. DEQ 12-B requires facilities achieving HAC-based effluent limits, but not achieving WQBELs, to develop a Pollutant Minimization Program (PMP), which must be incorporated into the permit. PMP requirements are discussed in Part VII of this Fact Sheet.

Lake Helena TMDL

The 2009 permit implemented Phase I of the TMDL, which required "no increase" in nutrient concentrations. Phase II of the TMDL requires optimization of the facility infrastructure as it currently exists. The goal of Phase III is to implement the necessary actions to reach the level of treatment to meet the TP and TN targets for Prickly Pear Creek (numeric criteria).

With this renewal, DEQ is incorporating the approved general variance for both TN and TP. The interim limits provided for under the variance apply, even if such limits differ from those that might otherwise apply based on a wasteload allocation derived in a TMDL (DEQ-12B, 2017).

Even though the variance requirements differ from Phase II of the TMDL, the overall approach and outcomes are similar. The variance establishes a reduced seasonal limit for TP and maintains the existing limit for TN, which is more stringent than the variance limit. These limits represent the "best attainable concentrations", as required by the TMDL. The variance also requires the Pollutant Minimization Plan, which aligns with the TMDL Phase II "Optimization" requirements.

Phase III of the TMDL is intended to implement WQBELs based on the numeric water quality criteria. These WQBELs are shown above in Table 7 and represent the target limits that would apply to the facility at the end of the variance term.

The approach taken above is consistent with the TMDL's Phase II requirements. The variance differs from the limits that would apply under the TMDL Phase III. However, the DEQ-12B HAC values are subject to review every three years. The HAC review process, together with the PMP requirement, provides a path toward establishing adaptive management strategies for implementing TMDL Phase III at the end of the variance term.

Total Residual Chlorine (TRC): The permittee utilizes UV disinfection rather than chlorination. The 2009-issued permit included WQBEL for TRC, in the event chlorination is employed at the facility. The facility has not used chlorine for disinfection during the current permit cycle and has no plans to do so. Chlorine is not stored on the site. The TRC limitations and monitoring are removed in this permit renewal.

pH: Pursuant to ARM 17.30.628(2)(c), the induced variation of hydrogen ion concentration within the range of 6.5 to 9.5 must be less than 0.5 pH units. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0. The 2009 permit limit for pH requires effluent pH to be maintained between 6.5 and 9.0 s.u. This limit and the daily monitoring requirement are maintained in this renewal.

3. Toxic Pollutants

Concentrations of carcinogenic, bio-concentrating, toxic, or harmful parameters which would remain in the water after conventional treatment may not exceed the applicable standards specified in Circular DEQ-7.

Metals - All metals discussions refer to the metals in their "total recoverable" fraction with the exception of aluminum which is regulated and monitored in the dissolved form.

For metals, the 2009 permit includes WQBELs and required monitoring for copper, lead, and zinc. Additional effluent monitoring is required for aluminum, antimony, arsenic, and cadmium. The permit also requires monitoring in PPC for aluminum, antimony, arsenic, cadmium, copper, lead, zinc, and hardness. These monitoring results are summarized in Tables 2 and 5.

Applicable surface water standards for aquatic life and human health for the above-mentioned metals are summarized in Table 9 for PPC. These standards are calculated using the 25th percentile value for the upstream total hardness data set obtained from the permittee's DMR forms. The 25th percentile, low hardness condition is used to be protective of the receiving water year-round.

Table 9. PPC Metals Surface Water Standards (Circular DEQ-7)

Parameter	Units	Required Reporting Value (RRV)	Human Health Standard	Aquatic Life Standard (1)	
				Acute	Chronic
Aluminum (Dissolved)	µg/L	30	--	750	87
Antimony, Total Recoverable	µg/L	3	5.6	--	--
Arsenic, Total Recoverable	µg/L	3	10	340	150
Cadmium, Total Recoverable	µg/L	0.08	5	2	0.3
Copper, Total Recoverable	µg/L	1	1,300	14.3	9.5
Lead, Total Recoverable	µg/L	0.5	15	84	3.3
Zinc, Total Recoverable	µg/L	10	2,000	120	120

Footnotes:
(1) Applicable metals standards calculated using the 25th percentile upstream total hardness value of 102.25 mg/L as $CaCO_3$

Aluminum – All analytical results for aluminum were below detection at the required reporting value (RRV). RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Antimony – All analytical results were below detection at the RRV. RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Cadmium – All analytical results were below detection. The RRV was achieved in 6 of the 13 samples. RP does not exist for this parameter. No limit is proposed and monitoring is not required in the renewed permit.

Arsenic – Arsenic was detected in all samples. Results ranged from 4 µg/L to 19 µg/L. DEQ used the TSD approach, as described previously, and *Equation 1* to assess RP to exceed the human health standard, where:

C_d = maximum projected effluent concentration; 27.7 µg/L (19 µg/L * TSD multiplier)
C_r = RWC upstream of discharge; 7 µg/L (75th percentile)
Q_r = applicable receiving water flow; 5.4 mgd (100% of 7Q10)
Q_d = facility design flow rate; 0.44 mgd

RP calculations are shown in Attachment B. The resulting concentration in PPC after available dilution is 9 µg/L, which is less than the human health standard for arsenic. RP does not exist and WQBELs are not necessary. Due to the presence of arsenic in the discharge, monthly monitoring is required.

Copper – Copper was detected in all but one sample over the POR. The results above detection ranged from 5 µg/L to 17 µg/L. As with arsenic, DEQ used *Equation 1* to assess RP to exceed the water quality standards, where:

C_d = maximum projected effluent concentration; 18.5 µg/L (17 µg/L * TSD multiplier)
C_r = RWC upstream of discharge; 4 µg/L (75th percentile)
Q_{rc} = receiving water flow for chronic; 1.35 mgd (25% of 7Q10)
Q_{ra} = receiving water flow for acute; 0.14 mgd (2.5% of 7Q10)
Q_d = facility design flow rate; 0.44 mgd

RP calculations are shown in Attachment B. The resulting concentrations in PPC are 7 µg/L for chronic copper, and 15 µg/L for acute. The acute concentration exceeds the 14.3 µg/L acute standard. RP exists for copper and WQBELs are necessary.

DEQ used *Equation 2* to establish a WLA for copper, where:

WLA = maximum concentration that may be discharged without exceeding the standard; µg/L
C_r = Aquatic life water quality criteria; 9.5 µg/L chronic, 14.3 µg/L acute
Q_r = Receiving water flow downstream of the discharge; 1.79 mgd chronic, 0.58 mgd acute
Q_s = Critical upstream receiving water flow; 1.35 mgd chronic, 0.14 mgd acute
C_s = Receiving water concentration upstream of discharge; 4 µg/L
Q_d = facility design flow; 0.44 mgd

Where there are both acute and chronic water quality standards, two WLA are calculated. The resulting WLA are 17.5 µg/L for acute and 27 µg/L for chronic. Long term average (LTA) concentrations that the facility should meet to ensure compliance with each WLA are calculated following the TSD. The minimum LTA is selected to calculate the WQBELs. In this case the chronic LTA is 19.3 µg/L and the acute is 9.2 µg/L. Limits are calculated from the acute LTA by applying

the TSD Table 5-2 multiplier. The average monthly limit is 11.7 µg/L and the maximum daily limit is 17.5 µg/L. All calculations are summarized in Attachment C.

The limits above are less stringent than the limits in the 2009 permit. Relaxation (or "backsliding") of existing limits is only allowed under certain conditions, as described in the anti-backsliding provisions in the federal Clean Water Act and the Code of Federal Regulations. In this case, the new limits reflect changing conditions in the receiving water (available dilution) and significant new wastewater treatment technology installed by the permittee, both of which were not available at the time the 2009 permit was issued. These new conditions meet the requirements to allow the relaxation of effluent limits.

Lead – During the POR 31 lead analyses of the effluent were less than the detection limit of 0.5 µg/L. Lead was detected in four samples. Those four samples ranged from 0.8 µg/L to 3 µg/L, none of which are above the chronic aquatic life standard. The 75th percentile concentration of lead in PPC is 5 µg/L, which is above the chronic standard. After assessing RP, DEQ determined that the lead concentrations in the effluent, being lower than that in the receiving water, actually improve lead concentrations in PPC at critical conditions. Since the discharge is neither causing nor contributing to an exceedance of water quality standards, RP does not exist for lead. However, this outcome could change if lead concentrations in PPC improve. DEQ proposes to remove the WQBELs for lead from the permit, but continue to require quarterly monitoring.

Zinc – Zinc concentrations ranged from less than the detection limit of 10 µg/L up to 40 µg/L. The acute and chronic aquatic life standards for zinc are both 120 µg/L. RP to exceed the standard does not exist. The zinc limit is removed from the permit. Quarterly monitoring is required.

Table 10. Outfall 001 Final Effluent Metals Limitations

Parameter	Units	RRV	Limitations	
			Maximum Daily (1)	Average Monthly (1)
Copper, Total Recoverable	µg/L	1	17.5	11.7

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

Monitoring of PPC upstream of Outfall 001 for arsenic, copper, lead, and zinc, will continue.

Monitoring of PPC for dissolved aluminum, antimony, and cadmium is discontinued.

Whole Effluent Toxicity (WET) Testing – The 2009 permit requires WET monitoring of the effluent by means of quarterly acute WET testing on two species. DMR data indicates the permittee reported two failed WET tests over the POR. A review of the WET laboratory reports indicates these two reported failures were the result of data entry errors. The facility has not failed any WET tests over the POR.

The East Helena WWTF does not have significant industrial contributors and no EPA required pretreatment program. WET monitoring was required in the past to screen for potential metals toxicity in the effluent. The facility passed all quarterly WET tests over the POR, and installed significant metals treatment. RP for metals and appropriate limits are incorporated into the permit. The requirement to conduct WET tests is no longer necessary, and is removed in this renewal.

V. Effluent Limitations

The proposed final effluent limits are a combination of the more stringent of the technology-based and water quality-based effluent limits as developed in Sections III and IV.

Final Limitations

The following final effluent limitations will be applied to the discharge at Outfall 001 beginning on the permit effective date and will remain in effect through the duration of the permit.

Table 11. Outfall 001 Final Limitations

Parameter	Units	Average Monthly Limit (1)	Average Weekly Limit (1)	Maximum Daily Limit (1)
BOD_5	mg/L	30	45	--
	lb/day	109	163	--
TSS	mg/L	30	45	--
	lb/day	109	163	--
pH	S.U.	In the range of 6.0 – 9.0		
E. coli Bacteria (2)	Number of organisms/100 mL	126	252	--
E. coli Bacteria (3)	Number of organisms/100 mL	630	1,260	--
Total Nitrogen Load (4, 5)	lb/day	53.3	--	--
Total Phosphorus as P Load (6)	lb/day	11.2	--	--
Total Phosphorus as P Load (7)	lb/day	5.5	--	--
Copper, Total Recoverable	µg/L	11.7	--	17.5

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) This limit applies during the period April 1 through October 31.
(3) This limit applies during the period November 1 through March 31.
(4) Calculated as the sum of Total Kjeldahl Nitrogen (TKN) and nitrate plus nitrite as N concentrations.
(5) This limit applies year round
(6) This limit applies October – June
(7) This limit applies July - September

85 Percent (%) Removal Requirement for TSS and BOD_5: The arithmetic mean of the BOD_5 and TSS and for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85% removal). This is in addition to the concentration limitations on BOD_5 and TSS.

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. Self-Monitoring Requirements

A. Effluent Monitoring

The permittee shall monitor the discharge from Outfall 001 at the last point of control following treatment (post metals treatment).

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. In order to be representative of the nature and volume of the flow being monitored, influent sample collection and flow monitoring must occur prior to the equalization basin or any recycle flow returns. Effluent flow measuring must account for all draw-off and return flows. Metals shall be analyzed as total recoverable, use EPA Method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent.

The RRV is the detection level that must be achieved in reporting surface water monitoring or compliance data to the Department (Circular DEQ-7). The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of the commercial, university, or governmental laboratories using EPA-approved methods or methods approved by the Department.

Table 14. Outfall 001 Self-Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type [1]	Reporting Requirements	Reporting Frequency	RRV
Flow	mgd	Effluent	Continuous	[2]	Average Monthly/Daily Maximum	Monthly	--
5-Day Biological Oxygen Demand (BOD_5)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly		2
	mg/L	Effluent	3/Week	Composite			2
	lb/day	Effluent	1/Month	Calculated			--
	% Removal [3]	Effluent	1/Month	Calculated	Average Monthly		--
Total Suspended Solids (TSS)	mg/L	Influent	3/Week	Composite	Average Monthly/ Maximum Weekly		10
	mg/L	Effluent	3/Week	Composite			10
	lb/day	Effluent	1/Month	Calculated			--
	% Removal [3]	Effluent	1/Month	Calculated	Average Monthly		--
pH	s.u.	Effluent	Daily	Instantaneous	Minimum and Maximum		0.1
E. coli Bacteria [4]	Number of organisms/100 mL	Effluent	3/Week	Grab	Monthly/ Weekly Geo Mean		1
Total Ammonia as N	mg/L	Effluent	1/Month	Composite	Report		0.1
Nitrate + Nitrite as N	mg/L	Effluent	1/Week	Composite	Average Monthly		0.05
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Week	Composite			0.1
Total Nitrogen [5]	mg/L	Effluent	1/Month	Calculated			--
	lb/day	Effluent	1/Month	Calculated			--
Total Phosphorus as P	mg/L	Effluent	1/Week	Composite			--
	lb/day	Effluent	1/Month	Calculated			--
Oil and Grease	mg/L	Effluent	1/Quarter	Grab	Report	Quarterly	1
Arsenic, Total Recoverable [2]	µg/L	Effluent	1/Month	Composite	Average Monthly / Daily Maximum	Monthly	3
Copper, Total	µg/L	Effluent	1/Month	Composite			1
Lead, Total Recoverable	µg/L	Effluent	1/Quarter	Composite	Report	Quarterly	0.5
Zinc, Total Recoverable	µg/L	Effluent	1/Quarter	Composite			10

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Requires recording device or totalizer; permittee shall report daily maximum and daily average flow on DMR.
(3) Percent (%) Removal shall be calculated using the monthly average values.
(4) Report Geometric Mean if more than one sample is collected during reporting period.
(5) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen (TKN) concentrations.

B. Instream Monitoring

The permittee is required to continue monitoring PPC upstream of the outfall at the previously established CRK-A sample point for the parameters listed in Table 16, below.

Table 16. Ambient Water Quality PPC Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type (1)	RRV
pH	s.u.	Instream	1/Quarter	Instantaneous	0.1
Temperature	°C	Instream	1/Quarter	Instantaneous	--
Total Ammonia as N	mg/L	Instream	1/Quarter	Grab	0.1
Total Hardness as $CaCO_3$	mg/L	Instream	1/Quarter	Grab	10
Arsenic, Total Recoverable	µg/L	Instream	1/Quarter	Grab	3
Copper, Total Recoverable	µg/L	Instream	1/Quarter	Grab	1
Lead, Total Recoverable	µg/L	Instream	1/Quarter	Grab	0.5
Zinc, Total Recoverable	µg/L	Instream	1/Quarter	Grab	10

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

VII. Special Conditions

A. East Helena's Pollutant Minimization Program (PMP)

A pollutant minimization program (PMP) is a structured set of activities designed to improve processes and pollutant controls that will prevent and reduce pollutant loadings. East Helena has met highest attainable condition for total nitrogen and total phosphorus and will adopt and implement a PMP reflecting the greatest pollutant reduction achievable. East Helena needs and is eligible for a General Variance from the Montana Base Numeric Nutrient Standards found in DEQ-12B.

East Helena is required to conduct the following PMP activities:

Action Item 1: Continue Current Advanced Operational Strategies throughout the Term of the Permit

1. Continue cycling aeration on and off in the bioreactor to create periodic anoxic conditions for denitrification.

2. Continue to operate and maintain the tertiary filtration process.

3. Throughout the permit term and in the operation and maintenance manual, continue to maintain in progress documentation of following operational strategies effective toward reducing nutrients, as applicable:
   - identification of aerators and mixers used or taken offline
   - aeration cycle times
   - oxygen reduction potential (ORP) target points
   - variable frequency drive set points
   - target mixed liquor suspended solids (MLSS) concentration for summer and winter

- return and wasting strategies
- seasonal adjustments

Action Item 2: Evaluate Nutrient Reduction Measures

a. Submit a brief (no more than one-page) annual report addressing the following:
    - Identify nutrient reduction measures implemented that year.
    - Evaluate the effectiveness of each implemented nutrient reduction measure.
    - Propose nutrient reduction measures for the upcoming year.

    The annual reports will be due January 28th of each year, beginning January 28, 2020.

VIII. Information Sources

1. Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
   a. Sub-Chapter 2 - *Water Quality Permit and Application Fees*, 2014.
   b. Sub-Chapter 5 - *Mixing Zones in Surface and Ground Water*, 2014.
   c. Sub-Chapter 6 - *Montana Surface Water Quality Standards and Procedures*, 2014.
   d. Sub-Chapter 7- *Nondegradation of Water Quality*, 2014.
   e. Sub-Chapter 10 - *Montana Ground Water Pollution Control System,* 2014.
   f. Sub-Chapter 12 - *Montana Pollutant Discharge Elimination System (MPDES) Standards*, 2012.
   g. Sub-Chapter 13 - *Montana Pollutant Discharge Elimination System (MPDES) Permits*, 2013.

2. Clean Water Act § 303(d), 33 USC 1313(d) *Montana List of Waterbodies in Need of Total Maximum Daily Load Development*, 2016.

3. 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.

4. Montana Code Annotated Title 75 - Environmental Protection Chapter 5 - Water Quality, October 2011.

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

6. Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0022560
   a. Administrative Record.
   b. Renewal Application EPA Form 2A, June 2014.

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

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

9. USEPA Region VIII *Mixing Zones and Dilution Policy*, September 1995.

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

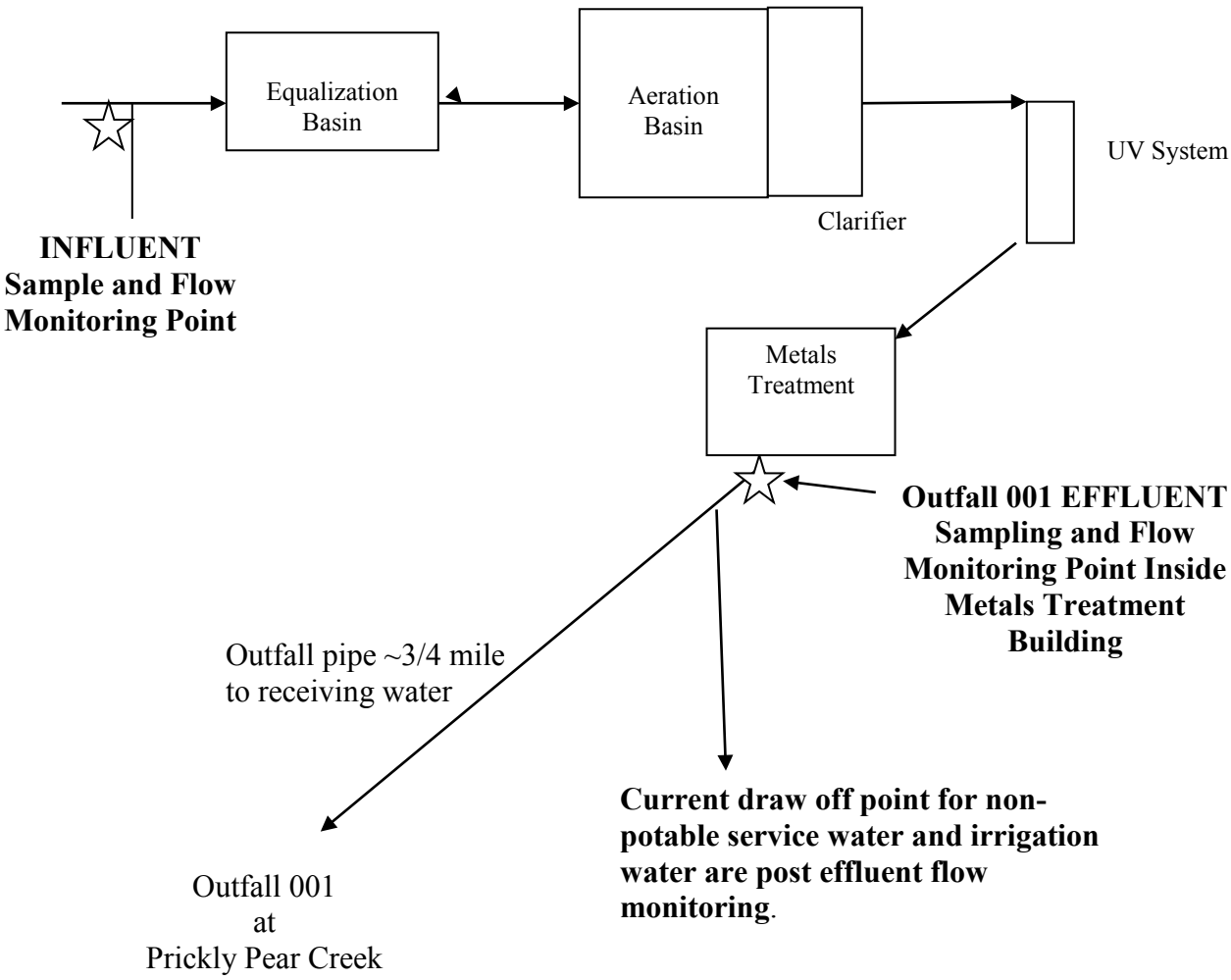
11. US EPA Region VIII NPDES *Whole Effluent Toxics Control Program*, August 1997.

12. US EPA for Montana Department of Environmental Quality *Framework Water Quality Restoration Plan and Total Maximum Daily Loads (TMDLs) for the Lake Helena Watershed Planning Area:*
    a. Volume I – Appendices, December 2004.
    b. Volume II – Final Report, August 2006.

13. US EPA Ref. 8-MO, TMDL Approvals, *Lake Helena Total Maximum Daily Load Planning Area* and Enclosures, September 27, 2006.

Attachment A

Schematic of Helena WWTP with Sample and Flow Monitoring Points



Attachment B: East Helena WWTP Reasonable Potential Analysis (October 2017)

			Ammonia Acute	Ammonia Chronic	N+N	TN	TP	Arsenic HH	Copper Acute	Copper Chronic	Lead Acute	Lead Chronic	Zinc Acute	Zinc Chronic
Flow														
	critical stream flow (7Q10 or seasonal 14Q5)	mgd	5.4	5.4	5.4	8.2	8.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4
	% of 7Q10 being provided (as decimal, e.g. - .10 for 10%)	%	0.0%	25.0%	100.0%	100.0%	100.0%	100.0%	2.5%	25.0%	2.5%	25.0%	2.5%	25.0%
Qs	**resulting critical stream flow (7Q10 * % dilution granted)**	**mgd**	**0.00**	**1.35**	**5.40**	**8.20**	**8.20**	**5.40**	**0.14**	**1.35**	**0.14**	**1.35**	**0.14**	**1.35**
Qd	**critical effluent flow (ave daily design flow)**	**mgd**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**	**0.44**
Qr	downstream flow (Qs + Qd)	mgd	0.44	1.79	5.84	8.64	8.64	5.84	0.58	1.79	0.58	1.79	0.58	1.79
Concentrations														
Cmax	maximum effluent concentration for POR (from application or DMR data)	mg/L	**1.32**	**1.32**	**29.4**	**24.8**	**1.7**	**0.0190**	**0.017**	**0.017**	**0.003**	**0.003**	**0.04**	**0.04**
n	number of samples in effluent data set		39	39	68	11	11	13	35	35	35	35	64	64
CV	coefficient of variation for effluent data (if n<10, use 0.6)		1.60	1.60	0.31	0.50	0.60	0.48	0.34	0.34	0.68	0.68	0.38	0.38
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		1.250	1.250	0.979	1.554	1.678	1.455	1.087	1.087	1.170	1.170	0.984	0.984
Cd	**critical effluent concentration - 95%tile (max. effluent concentration * TSD multiplier)**	**mg/L**	**1.650**	**1.650**	**28.8**	**39**	**2.9**	**0.0277**	**0.0185**	**0.0185**	**0.0035**	**0.0035**	**0.04**	**0.04**
Cs	**critical instream concentration (75%tile if n<=30, 95% UCL if n>30)**	**mg/L**	**0.050**	**0.050**	**0.220**	**0.250**	**0.038**	**0.0070**	**0.004**	**0.004**	**0.005**	**0.005**	**0.060**	**0.060**
Cr	resulting or downstream pollutant concentration (term to solve for)	mg/L	**1.6**	**0.4**	**2.4**	**2.20**	**0.184**	**0.009**	**0.015**	**0.007**	**0.0039**	**0.0047**	**0.0442**	**0.0549**
WQS	**water quality standard (from DEQ-7 or rule)**	**mg/L**	**13.3**	**4.36**	**10**	**0.30**	**0.030**	**0.010**	**0.0143**	**0.0095**	**0.084**	**0.0033**	**0.1221**	**0.1221**
	RP?		**no**	**no**	**no**	**yes**	**yes**	**no**	**yes**	**no**	**no**	**No**	**no**	**no**

Attachment C: WQBEL Development

			TN		TP			Copper		
								acute	chronic	
	7Q10 (= 491 mgd)	mgd	**8.2**		**8.2**		mgd	**5.4**		mgd
	% of 7Q10 to use for dilution		100		100			2.5	25	%
Qs	instream flow available for dilution	mgd	8.2		8.2		mgd	0.135	1.35	mgd
Qd	design flow (POTW)	mgd	**0.44**		**0.44**		mgd	0.44		mgd
Qr	downstream flow (Qs + Qd)	mgd	8.6		8.6		mgd	0.6	1.8	mgd
Cr	**water quality standard**	mg/L	0.30		0.03		µg/L	14.3	9.5	µg/L
Cs	instream concentration (75th percentile)	mg/L	**0.25**		**0.038**		µg/L	3.8		µg/L
Cd or WLA	effluent concentration or waste load allocation ((Qr*Cr) - (Qs*Cs))/Qd)	mg/L	1.2318		0.030		µg/L	17.5	27.0	µg/L
	* If background > standard, than WLA = standard									
	number of samples per month ***(if = 1, enter 4)***		4		4			4		
	CV ***(if sample set >= 10, then SD/mean, else 0.6)***		0.6		0.6			0.3		
LTA_a LTA_c	acute and chronic long term average (99 %tile); (95 %tile for nutrients)		0.7935		0.0193			9.2	19.3	
MIN (LTA_a, LTA_c)	most conservative LTA		0.7935		0.0193			9.2		
	maximum daily limit (99 %tile)	mg/L	**2.4713**		**0.0602**		µg/L	**17.5**		**µg/L**
	average monthly limit (95 %tile)	mg/L		**1.2318**		**0.0300**	µg/L		**11.7**	**µg/L**