Water Quality Division
Montana Pollutant Discharge Elimination System (MPDES) ▪ Fact Sheet

Permit Number:	MT0022535
Permittee:	City of Havre
Receiving Water:	Milk River
Facility Contact:	Drue Newfield City of Havre Wastewater Treatment Plant 1201 4th St N PO Box 231 Havre, MT 59501
Type of Facility:	Major Publicly Owned Treatment Works
Type of Treatment:	Biological nutrient removal system with ultraviolet (UV) disinfection and aerobic sludge digestion
Number of Outfalls:	1
Outfall Type:	001 – Major Publicly Owned Treatment Works (POTW) with 1 Major Industrial Discharger
Outfall Location:	latitude 48.5594 N, longitude -109.6625
Fact Sheet Date:	October 2020

I. Background

DEQ proposes to renew the Montana Pollutant Discharge Elimination System (MPDES) permit for City of Havre Wastewater Treatment Plant, MT0022535. This fact sheet documents the legal requirements and technical rationale that serve the decision-making process involved with developing effluent limits, monitoring and reporting requirements, and special conditions specific to Havre.

A. Summary of Proposed Changes

- The existing permit limits and monitoring requirements for *E. coli* are maintained in this renewal with the option to report organisms/100 mL instead of colony forming units/100 mL
- The renewed permit will have an effluent limit and monitoring requirements for oil and grease
- The effluent limit for total ammonia has been removed
- Ambient/upstream monitoring will be required in the permit
- WET testing requirements will be changed from acute to chronic
- Havre will be required to identify and report on potential copper and selenium sources and achievable reductions

C. Permit Status and Details Leading to Administrative Extension of the Permit

- May 1, 2011 — 2011-permit became effective
- January 26, 2016 — 2011-permit administratively extended

D. Exceptional Project Recognition

In 2019, Havre received an honorable mention for Exceptional Project Recognition by EPA's Performance and Innovation in the SRF Creating Environmental Success (PISCES) program for demonstrating sustainability, innovation, and benefits to water quality, public health and the economy. By adding brewery waste barley mash as an external source of carbon and volatile fatty acid supplement, Havre has made significant improvements in operability, reliability, and treatment capacity while consistently meeting permit limits.

E. Facility Description and Design Criteria Summary

Havre Wastewater Treatment Plant serves the residents and businesses of the City of Havre and North Havre. The activated sludge facility was constructed in 1974 and completed its most recent significant upgrades in June 2016. The facility was converted to a biological nutrient removal system, where new and rehabilitated basins create anaerobic, anoxic, and aerobic environments for nitrogen and phosphorus removal. The chlorination system was also replaced with ultraviolet disinfection.

- Continuous discharge to the Milk River
- Design flow rate of 1.8 mgd
- Average flow rate of 1.36 mgd
- Combined storm and sanitary system
- Headworks with screening and grit removal
- Biological nutrient removal trains with anaerobic, anoxic, and aeration basins in each
- Final clarification
- Ultraviolet disinfection
- Biosolids management:
  - EPA General Biosolids Permit MTG650007
  - Waste sludge treated through aerobic digestors and pumped to long-term sludge storage lagoons
- Influent monitoring:
  - Flow measured through Parshall flume
  - Samples collected after screening and grit removal
- Effluent monitoring:
  - Flow measured through an in-line MagMeter
  - Monitoring via an automatic composite sampler after disinfection

F. Significant Industrial User Discharge

Havre is not operating under the EPA Pretreatment Program. However, one non-categorical Significant Industrial User (SIU) discharges to the Havre wastewater collection system. Havre has a pretreatment agreement with Burlington Northern Santa Fe Railway Company (BNSF), renewed on an annual basis. Below is a description of BNSF's discharge and pretreatment agreement with Havre:

- Intermittent discharge of 50,000 gal/day allowed during certain times of the day
- Treated washwater and wastewater from servicing and maintaining locomotives
- Stormwater from petroleum (diesel fuel and lubricant) storage and fueling facilities
- Dissolved air floatation (DAF) treatment, oil removal, and pH adjustment
- Wastewater limits and required monitoring of total suspended solids, five-day biochemical oxygen demand, pH, and oil and grease

G. Existing Permit Requirements

The 2011-permit phased interim permit limits to allow for Havre to make facility upgrades. Final permit limits, presented in **Table 1**, became effective March 1, 2016.

Table 1: 2011 Final Permit Limits – Outfall 001

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	25	40	-
	lb/day	375	600	-
	% Removal		85 %	
Total Suspended Solids (TSS)	mg/L	30	45	-
	lb/day	450	676	-
	% Removal		85 %	
pH	s.u.	Within the range of 6.0 to 9.0 (instantaneous)		
E. coli Bacteria, Summer	cfu/100mL	126	252	-
E. coli Bacteria, Winter	cfu/100 mL	630	1260	-
Total Residual Chlorine	mg/L	0.01	-	0.02
Total Ammonia as N	mg/L	1.8	-	4.1

H. Effluent Quality

Period of Record: Effluent data from June 2016 through January 2020 were selected to represent the period of record (POR), and are representative of the facility's effluent quality after significant upgrades were deemed complete.

Conventional and Nonconventional Pollutants: Havre reported required effluent monitoring data on Discharge Monitoring Reports through NetDMR. The minimum, maximum, and average values in **Table 2** are the reported monthly minimum average, weekly or daily maximum, and average of the reported monthly average values, respectively.

Hardness, Total Recoverable Metals, and Organics: Major publicly owned treatment works are also required to provide results for at least three analyses of the parameters identified in EPA Form 2A. Havre completed this sampling on a semiannual basis and submitted results through NetDMR throughout the permit cycle. Values in **Table 2** reflect data summarized from actual sample results, and detection levels are incorporated into this summary.

- Cadmium, copper, lead, selenium, zinc, chloroform, and phenols were detected at values above the laboratory's stated reporting limits.
- Antimony, arsenic, beryllium, chromium, cyanide, mercury, nickel, silver, and thallium were below detection levels in all samples and not included in Table 2 or as a pollutant of concern.

Table 2. Havre Effluent [1] Characteristics June 2016 – January 2020

Parameter	Units	Minimum Value	Maximum Value	Average Value	Sample Size
Effluent Flow Rate [2]	mgd	1.36	2.72	1.76	42
Influent Flow Rate [2]	mgd	0.93	2.6	1.3	42
Temperature [2]	°C	7.8	20	13.9	42
Conventional Pollutants [2]					
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	1.4	9.9	2.8	42
	% removal	96	99	98	42
	lb/day	17.3	112	40.3	42
Influent $CBOD_5$	mg/L	85.7	396	146	42
Total Suspended Solids (TSS)	mg/L	1.3	40	4.3	42
	% removal	89	99	97	42
	lb/day	8.3	632	59.7	42
Influent TSS	mg/L	84	960	163	42
E. coli, April – October [3]	cfu/100mL	5.0	112	12	25
E. coli, November – March [3]	cfu/100 mL	5.4	182	14	17
Oil and Grease	mg/L	0.0	0.0	0.0	42
Oil Sheen	Visual	None Present		-	-
pH	s.u.	6.6	8.3	7.5	42
Nonconventional Pollutants [2]					
Total Ammonia as N	mg/L	0.16	1.4	0.25	42
	lb/day	0.5	8.0	3.5	42
Nitrate + Nitrite	mg/L	3.1	9.1	4.9	42
Total Kjeldahl Nitrogen	mg/L	0.95	6.6	1.4	42
Dissolved Oxygen	mg/L	5.8	11.8	7.3	42
Total Nitrogen, June – Sept	mg/L	4.53	10.7	6.60	15
	lb/day	72.0	213	98.6	15
Total Phosphorus, June – Sept	mg/L	0.37	4.2	1.2	15
	lb/day	6.0	68	18	15
Total Dissolved Solids (TDS)	mg/L	720	820	771	16
Hardness, Total Recoverable Metals, and Organics [4]					
Total Hardness, as CaCO3	mg/L	326	455	397	
Phenols	µg/L	10 [5]	30	16	8
Chloroform	µg/L	0.5 [5]	1.3	0.67	10
Cadmium	µg/L	0.08 [5]	0.14	0.09	8
Copper	µg/L	5.0 [5]	10	7.4	8
Lead	µg/L	0.5 [5]	1.0	0.65	8
Selenium	µg/L	1.0 [5]	6.0	2.3	8
Zinc	µg/L	40	50	44	8
Acute Whole Effluent Toxicity Tests					
Acute 48-hour *Ceriodaphnia*	Pass/Fail		Passed All		8
Acute 96- hour *P. promelas*	Pass/Fail		Passed All		6

[1] All data is for Outfall 001 effluent characteristics, unless indicated as influent
[2] Data sourced through NetDMR. The minimum, maximum, and average values are the reported minimum average monthly, maximum weekly or daily maximum, average of the reported monthly average values, respectively.
[3] Geometric mean
[4] Data sourced directly through biannual lab reports submitted by Havre
[5] Below detection. Value listed is the Reporting Limit.

II. Technology Based Effluent Limits

Technology-based effluent limitations (TBELs) represent the minimum level of control that must be implemented in MPDES permits. The limits are based on actual, available control technologies to treat pollutants, and must be met prior to dilution. The Montana Board of Environmental Review has adopted by reference 40 CFR 133, which defines minimum requirements for secondary treatment for publicly owned treatment works. Secondary treatment is defined in terms of effluent quality as measured by pH, carbonaceous 5-day biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), and percent removal of $CBOD_5$ and TSS.

A. Applicable Effluent Limits

Havre will be held to **National Secondary Standards** for $CBOD_5$, TSS, and pH:

- The monthly average shall not exceed 25 mg/L for $CBOD_5$ and 30 mg/L for TSS.
- The weekly average shall not exceed 40 mg/L for $CBOD_5$ and 45 mg/L for TSS.
- The monthly average percent removal for $CBOD_5$ 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.

B. Mass-Based Expression of Limits

Effluent limits must be expressed in terms of mass, identified as load (pounds/day), when suitable. Havre's mass-based load limits were calculated by multiplying the facility's average daily design flow and the national secondary treatment standards for each pollutant by a conversion factor:

- *$CBOD_5$ monthly average load* $= 1.8\ mgd \times 25 \frac{mg}{L} \times 8.34 \frac{lb \bullet L}{Mgal \bullet mg} = 375 \frac{lb}{day}$
- *$CBOD_5$ weekly average load* $= 1.8\ mgd \times 40 \frac{mg}{L} \times 8.34 \frac{lb \bullet L}{Mgal \bullet mg} = 600 \frac{lb}{day}$
- *TSS monthly average load* $= 1.8\ mgd \times 30 \frac{mg}{L} \times 8.34 \frac{lb \bullet L}{Mgal \bullet mg} = 450 \frac{lb}{day}$
- *TSS weekly average load* $= 1.8\ mgd \times 45 \frac{mg}{L} \times 8.34 \frac{lb \bullet L}{Mgal \bullet mg} = 676 \frac{lb}{day}$

Load limits for $CBOD_5$ and TSS will apply to the effluent and will be maintained at the more stringent of the mass-based limits shown above, or the nondegradation load allocations discussed next.

C. Nondegradation

Montana's Nondegradation Policy prevents degradation of state waters and ensures that existing uses continue to be achieved. Dischargers that comply with the conditions of their permit and do not exceed the limits are not considered a new or increased source. The mass-based load limits and nondegradation limits are the same. Havre did not exceed the allocated load values for $CBOD_5$ and TSS during the period of record, as shown below. Therefore, Havre will continue to be held to the average monthly load limits calculated in section II.B.

Allocated Limits		Actual Average Monthly Load (lb/day)			
Parameter	Load (lb/day)	2016	2017	2018	2019
$CBOD_5$	375	45	39	34	46
TSS	450	67	49	55	72

III. Water Quality-Based Effluent Limits

Permits are required to include Water Quality-Based Effluent Limits (WQBELs) when TBELs are not adequate to protect state water quality standards. WQBELs are developed for each parameter demonstrating reasonable potential to cause or contribute to an excursion from any water quality standard.

A. Scope and Authority

The Montana Water Quality Act states that a permit may only be issued if DEQ finds that it will not result in pollution of state waters. 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. MPDES permit limits must control all pollutants which will cause, or have reasonable potential (RP) to cause or contribute to, an excursion from any state water quality standard, including narrative criteria.

B. Pollutants of Concern

Pollutants and parameters are identified as a pollutant of concern for the following reasons:

- Listed as TBELs
- Identified as needing WQBELs in the previously issued permit
- Identified as present in effluent monitoring or otherwise expected present in the discharge
- Associated with impairment which may or may not have a wasteload allocation (WLA) in a TMDL

Parameters typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include those found in **Table 3.** Identification of a pollutant of concern (POC) is not an indication that WQBELs are necessary, but an indication that further evaluation is required.

Table 3. Pollutants of Concern for Havre WWTP

Parameter	Basis for POC Identification
Conventional Pollutants:	
$CBOD_5$, TSS, and pH	TBEL, Previous Permit
E. coli, Oil and Grease	Previous Permit
Nonconventional Pollutants:	
Total Ammonia	Previous Permit
Total Phosphorus, Total Nitrogen, Nitrate Nitrite	Common wastewater pollutant
Toxic Pollutants:	
Cadmium, Copper, Lead, Selenium, Zinc, Phenols, Chloroform	Industrial sources

C. Receiving Water Summary: Milk River

The Havre Wastewater Treatment Plant discharges to the Milk River, which has been identified as impaired. A total maximum daily load (TMDL) has not been completed for this section of the Milk River. The following information is used to develop water quality-based effluent limits.

- Water Use Classification: B-3
- Watershed: Milk River
- Waterbody Name/Location Milk River, Fresno Dam to Thirtymile Creek
- Montana Stream Segment: MT40J001_011
- USGS Hydrologic Unit Code: 10050004
- USGS Gauging Stations: Milk River at Havre 06140500
- 7Q10: 10.5 mgd (16.3 cfs)
- 14Q5 24.9 mgd (38.5 cfs)
- Dilution Ratio 5.8:1
- Identified as Impaired: 2018 303(d) List
- Total Maximum Daily Load (TMDL): None
- Salmonids and early life stages Present

Water Use Classification: According to Montana Water Use Classifications, this section of the Milk River is classified as B-3. The goal of the state of Montana is to maintain B-3 class waters suitable for:

- drinking, culinary, and food processing purposes, after conventional treatment;
- bathing, swimming, and recreation;
- growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers;
- and agricultural and industrial water supply.

Impairments: The 2018 303(d) list shows this segment of the Milk River as not fully supporting drinking water. It has not been assessed for aquatic life or recreation. Mercury has been identified as a pollutant causing impairments, and probable sources are agriculture, dam or impoundment, natural sources. Because the impairment assessment does not indicate municipal sources as a probable cause of impairment, it is not treated as a pollutant of concern in this assessment.

D. Applicable Water Quality Standards and Ambient Stream Conditions

Each waterbody classification has numeric and narrative water quality standards designed to ensure that the beneficial uses are protected. Discharges to B-3 classified waters are subject to the specific water quality standards of:

- Administrative Rules of Montana 17.30 Subchapter 6
- Department Circular DEQ-7, Numeric Water Quality Standards

Water quality standards for ammonia and some metals are dependent on background conditions:

- The numeric water quality standards for ammonia account for the presence/absence of salmonids, the presence of fish early life stages, and ambient pH and temperature. DEQ uses the 75th percentile of ambient pH and temperature to characterize the receiving water for permit development.
- The aquatic life standards for cadmium, copper, lead, and zinc are expressed as a function of hardness (mg/L $CaCO_3$). DEQ uses the 25th percentile of hardness in permit development. The 2011-Fact Sheet used limited data for instream hardness to calculate the 25th percentile as 400 mg/L, and discussed the possibility of future water quality standards becoming more stringent. Further monitoring demonstrated lower instream hardness calculated at 140 mg/L for the POR, making criteria more stringent.

Ambient (instream) water quality data for relevant parameters in the Milk River are summarized in **Table 4.** The instream critical condition of the receiving water is the 75th percentile (25th percentile for hardness).

Table 4. Milk River Upstream Water Quality and Comparison to Water Quality Standards

Parameter	Receiving Water Quality [1]		Water Quality Standards [2]		
	Sample Size	75th Percentile	Aquatic Life Acute	Aquatic Life Chronic	Human Health
Total Ammonia (mg/L)	35	0.33	2.91	1.12	-
Dissolved Oxygen (mg/L)	35	11.6 [3]	Weekly Mean: 6.0	1-Day Minimum: 5.0	
Hardness, as $CaCO_3$ (mg/L)	11	140 [3]	No Standard		
Nitrate + Nitrite (mg/L)	4	0.14	-	-	10
Total Nitrogen (mg/L)	data unavailable		Narrative Standard[5]		
Total Phosphorus (mg/L)	data unavailable		Narrative Standard[5]		
pH (s.u.)	31	8.34	6.0 – 9.0		
Temperature (ºC)	31	18.3	Varies		
Cadmium (µg/L)	4	0.1 [4]	2.6	1	5
Copper (µg/L)	10	4.5	19.2	12.4	1300
Lead (µg/L)	8	1.5	125	4.9	15
Selenium (µg/L)	4	1 [4]	20	5	50
Zinc (µg/L)	10	10	159	159	7400

[1] Monitoring Stations: Havre WWTP Upstream, Montana DEQ M42MILKR09, M42MILKR10, M42MILKR11
[2] Circular DEQ-7
[3] 25th percentile
[4] No detection reported on all samples, reporting level (RL) represents the 75th percentile
[5] Recent litigation may result in numeric criteria of 1300 µg/L TN and 110 µg/L TP

E. 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 sets the available dilution flow on a parameter-by-parameter basis to assess RP and achieve acute, chronic, and human health standards.

Mixing Zone Requirements:

- 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.
- 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.
- DEQ may require information from the permittee before determining appropriate mixing and the conditions which should be applied.

Havre's Mixing Zone Eligibility:

- Havre did not request a mixing zone.
- A standard mixing zone may apply to facilities which discharge less than 1 mgd or can demonstrate nearly instantaneous mixing. Throughout the period of record, Havre had an average flow of 1.8 mgd and has not demonstrated instantaneous mixing, so a standard mixing zone will not be granted.
- A source-specific mixing zone may be available to facilities which have completed a mixing zone study based on use of an approved water quality model. Havre has not completed a mixing zone study, so is not eligible. The renewed permit will require Havre to conduct a mixing zone study for future permit development as a special condition.
- Publicly-owned treatment works are eligible for an alternative mixing zone for total ammonia, which applies to Havre.

Alternative Mixing Zone: For this permit renewal, DEQ will allow dilution for total ammonia as follows:

- Up to 1% of the 7Q10 for acute aquatic life, and up to 10% of the 7Q10 for chronic.

Havre's Mixing Zone Boundaries: Mixing zones must have the smallest practicable size, a minimum practicable effect on water uses, and definable boundaries. The mixing zone boundaries established in the 2011-Permit will be continued:

- *Acute:* A segment of the Milk River extending downstream 10 feet long x 7 feet wide
- *Chronic:* A segment of the Milk River extending downstream 100 feet long x 35 feet wide

Applying a Mixing Zone: When a mixing zone is granted, the steady-state mass balance model *(Equation 1)* is used to determine the projected receiving water concentration (C_r) for each parameter to which the mixing zone applies. If this value exceeds the water quality standard (C_r > WQS), reasonable potential exists and WQBELs must be established.

Equation 1: $Q_s C_s + Q_d C_d = Q_r C_r$ and $C_r = (C_s Q_s + C_d Q_d)/(Q_r)$

Where:	Determined by:
Q_s = upstream flow	Q_s = allowed dilution flow
Q_d = discharge flow	Q_d = average daily design flow
Q_r = receiving flow after discharge	$Q_r = Q_s + Q_d$
C_s = upstream pollutant conc.	C_s = 75th percentile critical instream conc.
C_d = discharge pollutant conc.	C_d = max effluent concentration • TSD 3-2 mult. from *equation 2*

F. Determining Reasonable Potential

DEQ uses a statistical approach outlined in Chapter 3 of EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD, 1991) to determine reasonable potential for individual pollutants to exceed water quality standards:

Critical Effluent Concentration (C_d) Calculation: The facility's maximum reported effluent concentration (C_{max}) is converted into the projected critical effluent concentration (C_d) by applying a statistical multiplier (TSD 3-2 multiplier). This accounts for variation in effluent concentration. The TSD 3-2 multiplier is determined by the data set, coefficient of variation (CV), and sample size at the 95th percentile confidence interval. A default CV of 0.6 is used if there are less than 10 samples. See *Equation 2.*

Equation 2: $C_d = C_{max}$ **.** TSD 3-2 multiplier

Where:

C_d = critical effluent concentration

C_{max} = maximum measured and quantified effluent pollutant concentration

$$\text{TSD 3-2 multiplier} = \frac{EXP\left[z_{0.95}\cdot\left(ln(1+CV^2)\right)^{0.5} - 0.5\cdot ln(1+CV^2)\right]}{EXP\left[z_{(1-0.95)}\cdot\left(ln(1+CV^2)\right)^{0.5} - 0.5\cdot ln(1+CV^2)\right]}$$

CV = coefficient of variation

n = number of effluent pollutant concentration measurements in the data set

z_x = the z-statistic for the x percentile

Comparison of C_d to the Water Quality Standards: The calculated C_d values for each parameter and their comparison to applicable water quality standards are demonstrated in **Tables 5 and 6.** If the projected critical effluent concentration is greater than the water quality standard (C_d > WQS), further analysis is needed on a pollutant by pollutant basis.

Parameters with Allowed Dilution: The steady-state mass balance model *(Equation 1)* is used to determine the projected receiving water concentration (C_r). If this value exceeds the water quality standard (C_r > WQS), reasonable potential exists and WQBELs must be established.

G. Conventional Pollutants Analysis

$CBOD_5$, 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 and solids through secondary treatment. No additional limits are necessary because TBELs adequately control these pollutants and protect the beneficial uses of the receiving water body.

***Escherichia coli* (*E. coli*) Bacteria:** Pathogens are known municipal wastewater contaminants. *E. coli* standards protect beneficial uses of receiving waters for pathogens. State waters must be free from substances that are harmful or toxic to humans. The standards for B-3 classified waters, as expressed by the number of organisms in a 100-mL sample, are:

- Summer: April 1 through October 31 of each year
  - The geometric mean number must not exceed 126 organisms per 100 milliliters (org/100 mL)
  - 10% of the total samples may not exceed 252 org/100 mL during any 30-day period
- Winter: November 1 through March 31 of each year
  - The geometric mean number of *E. coli* must not exceed 630 org/100 mL
  - 10% of the total samples may not exceed 1,260 org/100 mL during any 30-day period

The existing permit limits and monitoring requirements for *E. coli* are maintained in this renewal, and Havre has the option to report most probable number (mpn) per 100 mL, instead of colony forming units (cfu) per 100mL. Most probable number is a statistical representation of org/100 mL.

Oil and Grease: 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. Because Havre accepts discharge from a significant industrial user, the permit will include this limit, but monitoring will be reduced from monthly to quarterly, as all samples during the POR were below detection. Havre will also be required to observe the discharge each day for an oil and grease sheen and to collect and analyze an oil and grease sample if a sheen is observed.

H. Nonconventional Pollutants Analysis:

The 2011-permit included effluent monitoring for all parameters discussed in this section, but total residual chlorine and total ammonia were the only nonconventional pollutants with effluent limits.

The TSD 3-2 multiplier was applied to ammonia and nitrate + nitrite **(Table 5).**

Table 5. Projected Critical Effluent Concentration Compared to Water Quality Standard

	Projected Critical Effluent Concentration (C_d)					Water Quality Standard		
	CV	n →	3-2 TSD Mult.	• C_{max} =	C_d	Aquatic Life Acute	Aquatic Life Chronic	Human Health
			-	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Ammonia [(1)]	0.55	42	1.09	1.4	1.5	2.91	1.12	-
Nitrate + Nitrite	0.21	42	1.03	9.1	9.4	-	-	10

(1) C_d > WQS, further analysis needed.

Total Residual Chlorine: The facility uses ultraviolet disinfection, so chlorine limits and monitoring requirements will be removed from the permit.

Total Ammonia: DEQ calculated water quality standards (based on Circular DEQ-7) that account for a combination of receiving water characteristics, such as the 75th percentile pH of 8.4, and the 75th percentile temperature of 18.3ºC. Both salmonids and non-salmonids are assumed to be present in the receiving water year-round and also present in early life stages year-round.

Using ***Equation 2,*** the maximum reported effluent concentration for the period of record (C_{max} = 1.4 mg/L) and the projected critical effluent concentration (C_d = 1.5 mg/L) both exceed the chronic water quality criteria. Because Havre qualifies for an alternative mixing zone for total ammonia, *Equation 1* applies. With allowed dilution, the projected receiving water concentrations (C_r) for both the acute and chronic are below water quality standards. Effluent limits are not needed.

1% acute dilution: $C_{r-acute} = \frac{(0.33\ mg/L \cdot 0.105\ mgd + 1.5\ mg/L \cdot 1.8\ mgd)}{1.9\ mgd} = 1.44\ mg/L$

10% chronic dilution: $C_{r-chronic} = \frac{(0.33\ mg/L \cdot 1.05\ mgd + 1.5\ mg/L \cdot 1.8\ mgd)}{2.8\ mgd} = 1.07\ mg/L$

Anti-backsliding Concerns for Total Ammonia: Through anti-backsliding rules, a permit must contain limits at least as stringent than those established in the previous permit. Anti-backsliding regulations allow for exceptions including permit renewals in which substantial alterations or additions to the permitted facility occurred after permit issuance, which is the case for Havre (**Section II.A**). The projected maximum effluent concentration (C_d) calculated in the 2011-fact sheet was significant and demonstrated reasonable potential to exceed water quality standards. Since that time, Havre has upgraded the facility, significantly reducing the ammonia concentrations from a 2011-permit C_{max} of 22.2 mg/L to a 2020-permit C_{max} of 1.4 mg/L.

Removing the ammonia effluent limits will not cause degradation of the Milk River, so this permit renewal will not include an ammonia limit. The monitoring requirement will be reduced to monthly. Semi-annual upstream monitoring of ammonia, pH and temperature will be required to provide a data set for determining reasonable potential in the next permit cycle.

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. The applied TSD 3-2 multiplier (1.03) from ***Equation 2*** was determined from a CV of 0.21 and a sample size of 42. Neither the maximum effluent concentration (9.1 mg/L) or the projected critical effluent concentration (9.4 mg/L) exceed the water quality standard. This permit renewal will not include a limit, but monthly effluent monitoring will be continued.

Total Nitrogen (TN) and Total Phosphorus (TP): Montana regulations require state waters be free from substances attributable to municipal discharges that will create conditions which produce undesirable aquatic life. Havre invested in significant upgrades, committed to optimization of the wastewater treatment thereby significantly reducing nutrient loads to the Milk River. Below is a comparison of the average summer monthly concentrations and loads before and after significant upgrades were completed in 2016.

	TN (mg/L)	TN (lbs/day)	TP (mg/L)	TP (lbs/day)
2011 - 2015	15.2	211	1.95	26.7
2016 - 2019	6.7	100.5	1.17	17.7

Recent litigation on nutrients may result in numeric nutrient criteria on the Milk River, but also grant a mixing zone with the 14Q5 flow of the river, which is larger than the 7Q10 flow. Under that scenario, the Milk River sufficiently dilutes Havre's improving discharge to prevent an impairment of the Milk River, but there is a need for instream nutrient monitoring to confirm the impact. Based on currently available information, DEQ finds Havre's effluent does not have reasonable potential to cause or contribute to undesirable aquatic life in the Milk River. Seasonal (June 1 to September 30) effluent and upstream monthly monitoring will be required in the renewed permit.

Total Dissolved Solids: The 2011-permit required monitoring for total dissolved solids. This permit renewal will not require monitoring because there is no numeric water quality standard or concern for this parameter in this part of the Milk River.

I. Toxic Pollutants Analysis

Cadmium, copper, lead, selenium, zinc, chloroform, and phenols were found in the wastewater, raising concerns of industrial inputs to the wastewater. All metals discussions below refer to the metals in their "total recoverable" fraction. Water quality standards for these pollutants are specified in Circular DEQ-7. Total recoverable cadmium, copper, lead, and zinc water quality standards are based on waterbody hardness using the 25th percentile (140 mg/L $CaCO_3$) to be protective of the receiving water year-round. The applied TSD 3-2 multiplier (1.9) from *Equation 2* was determined for all toxic pollutants of concern, as semiannual monitoring yielded a CV of 0.6 and sample size of 8 ($C_d = C_{max} \cdot 1.9$).

Table 6. Projected Critical Effluent Concentration Compared with Water Quality Standard

	C_d Calculation			Water Quality Standard		
	3-2 TSD Mult.	• C_{max} =	C_d	Aquatic Life Acute	Aquatic Life Chronic	Human Health
	-	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Cadmium	1.90	0.14	0.27	2.6	1.0	5
Copper (1)	1.90	10	19.0	19.2	12.4	1300
Lead	1.90	1.0	1.9	125	4.9	15
Selenium (1)	1.90	6.0	11.4	20	5	50
Zinc	1.90	50	94.9	159	159	7400
Phenols	1.90	30	57	-	-	4000
Chloroform	1.90	1.3	2.5	-	-	60

Cadmium: The maximum reported effluent concentration and the projected critical effluent concentration are below water quality standards. Effluent limits are not needed.

Copper: The maximum reported effluent concentration is less than all applicable water quality standards, but the projected critical effluent concentration exceeds the chronic aquatic life criteria. Considering Havre's recent significant upgrades, the limited data set for effluent characterization, and the potential to consider future dilution; an effluent limit will not be implemented in this permit cycle. Instead, the permit will include special conditions requiring Havre to complete a mixing zone study and identify and report on potential copper sources and achievable reductions. Effluent monitoring will be required monthly, and upstream monitoring will be required quarterly.

Lead: The maximum reported effluent concentration and the projected critical effluent concentration are below the water quality standards. Effluent limits are not needed.

Selenium: The maximum reported effluent concentration is less than all applicable water quality standards, but the projected critical effluent concentration exceeds the chronic aquatic life criteria. Considering Havre's recent investment in significant upgrades, the small data set, and the potential to consider future dilution, an effluent limit will not be implemented in this permit cycle. Instead, the permit will include special conditions requiring Havre to complete a mixing zone study and identify and report on potential selenium sources and achievable reductions. Effluent monitoring will be required monthly, and upstream monitoring will be required quarterly.

Zinc: The maximum reported effluent concentration and the projected critical effluent concentration are below the water quality standards. Effluent limits are not needed.

Phenols: The maximum reported effluent concentration and the projected critical effluent concentration are below the human health quality standard, which is the only standard that applies to this parameter. Effluent limits are not needed.

Chloroform: The maximum reported effluent concentration and the projected critical effluent concentration are below the human health water quality standard, which is the only standard that applies to this parameter. Effluent limits are not needed.

Hardness, Total Recoverable Metals, Volatile Organic Compounds, Acid-Extractable Compounds, and Base Neutral Compounds: Major publicly owned treatment works are also required to provide results for at least three analyses of the parameters identified in EPA Form 2A when submitting a complete renewal application. This requirement will be reflected in the permit effluent monitoring requirements, but the results will not be reported in NetDMR. Instead, Havre will be required to submit a copy of each analytic laboratory report.

J. Whole Effluent Toxicity Testing

Water quality standards require that state waters 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. DEQ's procedures for determining the type of WET testing required (acute or chronic) are based on the EPA's recommendations in the *Technical Support Document for Water Quality-based Toxics Control, 1991.*

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., $LC_{50} < 100\%$ effluent)
- During a chronic WET test, chronic toxicity occurs when the 25% inhibition concentration (IC_{25}) 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.

Chronic WET Testing Required: The previous permit required quarterly acute WET testing on two species, and Havre passed all WET tests performed during the period of record and will not have a WET limit for acute toxicity. However, because Havre is a major discharger with a dilution ratio less than 100:1, the WET testing requirement will be changed to chronic. If DEQ determines there is reasonable potential for a discharge to cause acute and/or chronic toxicity during this permit cycle, the MPDES permit may be updated to included limits for WET based on one, or both, of the endpoints above.

- Quarterly chronic WET testing using two species will be required of the facility starting the first full quarter after the permit effective date.
- Confirmation of chronic toxicity in the effluent will trigger the standard toxicity identification/toxicity reduction (TIE/TRE) requirements of the permit, but will not be a violation.
- If the results for four consecutive quarters of testing indicate no chronic toxicity, Havre may request for DEQ to reduce WET monitoring to semi-annual (twice yearly) two-species chronic toxicity testing. DEQ may approve or deny the request based on the results and other available information without an additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

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.

The 25% Inhibition Concentration (IC_{25}) is 44%: The IC_{25} is the concentration of pollutant that would cause a 25% reduction in reproduction. For the Havre WWTP, chronic toxicity occurs when the 25% inhibition concentration (IC_{25}) for any test species is less than or equal to 44% effluent after 25% dilution is granted:

- Dilution ratio after 25% dilution = 25% 7Q10:design flow = 1.3:1
- Effluent concentration in the receiving water after dilution = 1.3 + 1 = 2.3
- Percent effluent concentration in receiving water = RWC = (1 / 2.3) x 100 = 44%

The Two-species Chronic Tests Concentrations: With an IC_{25} of 44%, the two-species chronic tests must consist of the following concentrations: control, 11, 22, 44, 72, and 100% effluent

- The test concentrations were determined by: 1) 100% effluent, (2) (RWC + 100)/2, (3) RWC, (4) RWC/2, and (5) RWC/4

IV. Final Effluent Limits

The final effluent limits are a combination of the more stringent of the technology-based and water quality-based effluent limits developed. The final effluent limits in **Table 7** will be applied to the discharge at Outfall 001 beginning on the permit effective date and lasting through the term of the permit.

- There shall be no discharge of floating solids or visible foam other than in trace amounts.
- There shall be no discharge which causes visible oil sheen in the receiving stream.
- There shall be no discharge that settles to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines.

Table 7. Final Effluent Limits – Outfall 001

Parameter	Units	Average Monthly Limit [1]	Average Weekly Limit [1]	Maximum Daily Limit [1]
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	25	40	-
	lb/day	375	600	-
	Percent Removal	85	-	-
Total Suspended Solids (TSS)	mg/L	30	45	-
	lb/day	450	676	-
	Percent Removal	85	-	-
E. coli, April - October	org/100 mL	126 [2]	252 [2]	-
E. coli, November - March	org/100 mL	630 [2]	1,260 [2]	-
Oil and Grease	mg/L	-	-	10.0
pH	s.u.	6.0-9.0 instantaneous minimum and maximum		

[1] See Definitions section at the end of the permit for explanation of terms.
[2] Geometric Mean

V. Monitoring and Reporting Requirements

A. Requirement to Monitor and Report

Havre must monitor the effluent. The samples collected and analyzed must be representative of the volume and nature of the facility's discharge. The Required Reporting Value is DEQ's best determination of a level of analysis that can be achieved by the majority of commercial, university, or governmental laboratories using EPA-approved methods or methods approved by DEQ, unless another reporting level is specified by DEQ, in writing.

- Monitoring will start with the effective date of the permit and last for the duration of the permit cycle.
- All analytical procedures must comply with the specifications of 40 CFR Part 136.
- Havre must submit NetDMR results for each month by the 28th of the following month.

B. Monitoring Locations, Frequency, Sample Type, and Calculations

The monitored parameters, their respective monitoring locations, and the reporting requirements are presented in **Tables 8 and 9.** All requirements in **Table 8** are for effluent unless otherwise noted.

Effluent and Influent Monitoring

Effluent Monitoring will be conducted through an in-line MagMeter with an automatic composite sampler after ultraviolet disinfection. Influent flow will be measured through a Parshall flume and samples collected after screening and grit removal.

Upstream/Ambient Monitoring

Monitoring must take place at a consistent location upstream and outside the influence of Outfall 001 with the sample type, frequency, and required reporting values (RRVS) as identified in **Table 9.** The value will be reported on the facility's discharge monitoring reports. Havre may choose to collect ambient data for additional parameters during the permit term if they plan to request a mixing zone for that parameter.

Table 8. Self-Monitoring Requirements for Influent and Outfall 001

Parameter	Unit [1]	Sample Frequency	Sample Type [2]	Reporting Requirement	Required Reporting Value [3]
Effluent Flow	mgd	Continuous	Continuous	Daily Average Daily Maximum	0.01
Influent Flow	mgd	Continuous	Continuous	Daily Average Daily Maximum	0.01
Carbonaceous Biochemical Oxygen Demand, ($CBOD_5$)	mg/L	2/Week	Composite	Monthly Average Weekly Average	5
	% Removal	1/Month	Calculated	Monthly Average	0.1
	lbs/day	1/Month	Calculated	Monthly Average	0.1
Influent $CBOD_5$	mg/L	2/Week	Composite	Monthly Average	5
Total Suspended Solids (TSS)	mg/L	2/Week	Composite	Monthly Average Weekly Average	10
	%	1/Month	Calculated	Monthly Average	0.1
	lbs/day	1/Month	Calculated	Monthly Average	0.1
Influent TSS	mg/L	2/Week	Composite	Monthly Average	10
pH	s.u.	1/Day	Instantaneous	Daily Minimum Daily Maximum	0.1
Temperature	°C	1/Day	Instantaneous	Monthly Average Daily Maximum	0.1
E. coli	org/100 mL	2/Week	Grab	Monthly Average Weekly Average	1/100 mL
Oil and Grease	Presence	5/Week	Observation	Present/Absent	NA
	mg/L	1/Quarter [4]	Grab	Monthly	1
Total Ammonia, as N	mg/L	1/Month	Composite	Monthly Average	0.07
Nitrate + Nitrite, as N	mg/L	1/Month	Composite	Monthly Average	0.02
Kjeldahl Nitrogen, as N [5]	mg/L	1/Month	Composite	Monthly Average	0.225
Total Nitrogen, as N [5][6]	mg/L	1/Month	Calculated	Monthly Average	0.245
	lbs/day	1/Month	Calculated		NA
Total Phosphorus, as P [5]	mg/L	1/Month	Composite	Monthly Average	0.003
	lbs/day	1/Month	Calculated		NA
Copper, Total Recoverable	µg/L	1/Month	Composite	Monthly Average	2
Selenium, Total Recoverable	µg/L	1/Month	Composite	Monthly Average	1
WET Chronic	% Effluent	1/Quarter	Composite	Pass/Fail	NA
Expanded Effluent Testing Data – Required for EPA Application 2A Part D					
Metals, Total Recoverable	µg/L	2/Year [7]	Composite	Single Sample	[3]
Hardness, Total (as $CaCO_3$)	mg/L	2/Year [7]	Grab	Single Sample	10
Volatile Organic Compounds	µg/L	2/Year [7]	Composite	Single Sample	[3]
Acid-Extractable Compounds	µg/L	2/Year [7]	Composite	Single Sample	[3]
Base Neutral Compounds	µg/L	2/Year [7]	Composite	Single Sample	[3]

[1] See narrative discussion in this section of permit for additional details on calculating load and percent removal.
[2] See Definition section at end of permit for explanation of terms.
[3] See Circular DEQ-7 for minimum RRVs. If permittee is reporting non-detects, the analysis must meet these RRVs or lower.
[4] Oil and grease analysis must be conducted once per quarter, at a minimum. Additionally, if visual monitoring indicates the presence of oil and grease, an additional grab sample must be submitted for analysis.
[5] Required June 1 - September 30.
[6] Calculated as the sum of nitrate + nitrite (as N) and total Kjeldahl nitrogen concentrations.
[7] Samples must be analyzed two times per year during the years of 2024 and 2025, at least four months apart. Havre must submit a copy of the analytic laboratory report (results will not be entered into NetDMR).

Table 9. Upstream/Ambient Monitoring and Reporting Requirements

Parameter	Unit	Sample Frequency	Sample Type [1]	Reporting Requirement	Required Reporting Value [2]
pH	s.u.	1/Quarter	Instantaneous	Min, Max	0.1
Temperature	°C	1/Quarter	Instantaneous	Min, Max	0.1
Total Ammonia, as N	mg/L	1/Quarter	Grab	Single Sample	0.07
Hardness, as $CaCO_3$	µg/L	1/Quarter	Grab	Single Sample	0.1
Nitrate + Nitrite, as N	mg/L	1/Quarter	Grab	Single Sample	0.02
Kjeldahl Nitrogen, as N [3]	mg/L	1/Month	Grab	Single Sample	0.225
Total Nitrogen, as N [3][4]	mg/L	1/Month	Calculated	Single Sample	0.245
Total Phosphorus, as P [4]	mg/L	1/Month	Grab	Single Sample	0.003
Copper, Total Recoverable	µg/L	1/Quarter	Grab	Single Sample	2
Selenium, Total Recoverable	µg/L	1/Quarter	Grab	Single Sample	1

[1] See Definition section at end of permit for explanation of terms.
[2] See Circular DEQ-7 for minimum RRVs. If permittee is reporting non-detects, the analysis must meet these RRVs or lower.
[3] May be determined by persulfate digestion (grab sampling) or calculated as the sum of nitrate + nitrite (as N) and total Kjeldahl nitrogen concentrations. If persulfate digestion is used, then it is not required to sample total Kjeldahl nitrogen.
[4] Required June 1 – Sept 30.

VI. Special Conditions

A. Pollutant Source Evaluation and Reduction

Havre will be required to identify and report on potential copper and selenium sources and achievable reductions. Havre must submit a report for each of the following requirements:

1. **Within 18 months of the effective date of the permit –** Investigate the source(s) of total recoverable copper and selenium and evaluate the feasibility of controls for these sources.
2. **Within 36 months of the effective date of the permit -** Implement control(s) for identified pollutant source(s).

B. Mixing Zone Investigation

Within **3 years of the effective date of the permit,** Havre will be required to implement either one or both of the following options and include details sufficient for DEQ to grant an appropriate amount of acute and chronic dilution in the next permit cycle:

1. Conduct a Source Specific Mixing Zone Study and submit a mixing zone report adhering to the requirements in ARM 17.30.518.

   or

2. Design a diffuser and provide engineering drawings and a schedule for installation.

VII. Public Participation

DEQ issued Public Notice No. MT-20-17 dated November 16, 2020. 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 December 17,2020. 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).

A. 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.

B. 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.

C. 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

D. Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at 406-444-5546.

VIII. 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.

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. *Montana 2018 Integrated Report and 303(d) List. A Compilation of Impaired and Threatened Water bodies in Need of Water Quality Restoration. Part A. Water Quality Assessment Results*.

Montana Pollutant Discharge Elimination System Permit Number MT0022535:
- Administrative Record
- Renewal Application EPA Form 1 and 2A, January 2016

US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, 136 and 442.

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

US EPA. *EPA Region VIII Mixing Zones and Dilution Policy*. December 1994 (Updated September 1995)

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

US Geological Survey. *The StreamStats Program*. Online at http://streamstats.usgs.gov/.