

Utah Division of Water Quality

Statement of Basis

ADDENDUM

Wasteload Analysis and Antidegradation Level I Review

Date: **January 9, 2023**

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Standards and Technical Services

Facility: **Mona City Wastewater Treatment Facility**
UPDES No. UT-0025950

Receiving water: **Wetlands Adjacent to Mona Reservoir (2B, 3D, 4)**

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge

Outfall 001: Mona Reservoir

The design flow for the facility is 0.5 MGD (0.77 cfs), as estimated by the permittee.

Receiving Water

The receiving water for Outfall 001 is a wetland adjacent to Mona Reservoir. Per UAC R317-2-13.13, the presumptive beneficial uses for the unclassified wetlands are 2B and 3D.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*
- *Class 3D - Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.*

Per UAC R317-2-8, all actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses. Therefore, downstream uses in Mona Reservoir need to be protected. Per UAC R317-2-13.12.k, the designated beneficial uses for Mona Reservoir are 2B, 3B, and 4.

- *Class 3B - Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

The outfall pipe discharges to wetlands adjacent to Currant Creek and Mona Reservoir. The outfall is located above the ordinary high water mark of the reservoir. The critical water surface elevation for the wasteload analysis was considered the lowest elevation for seven consecutive days with a ten year return frequency (7Q10). The 7Q10 water surface elevation was assumed to be below the discharge pipe based on aerial photography and site reconnaissance. No water surface elevation data was available for this analysis.

Mixing Zone

Per UAC R317-2-5, the allowable mixing zone in lakes and reservoirs shall not exceed 200 feet for chronic conditions and shall not exceed 35 feet for acute conditions. Water quality standards must be met at the end of the mixing zone. Since no water is anticipated at the discharge location during critical conditions, a mixing zone was not granted and no dilution factor was applied.

Parameters of Concern

The potential parameters of concern identified for the discharge were total suspended solids (TSS), dissolved oxygen (DO), BOD₅, total phosphorus (TP), total nitrogen (TN), total ammonia (TAN), dissolved metals, and pH, as determined in consultation with the UPDES Permit Writer.

TMDL

The receiving water for the discharge is Mona Reservoir UT-L-16020201-001_00 supports all assessed uses based on *Utah's 2022 Integrated Report* (UDWQ 2022). Currant Creek downstream of Mona Reservoir is listed impaired for temperature.

WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC₅₀ (lethal concentration, 50%) percent effluent for acute toxicity and the IC₂₅ (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC₅₀ is typically 100% effluent and does not need to be determined by the WLA.

Table 1: WET Limits for IC₂₅

Season	Percent Effluent
Annual	100%

Effluent Limits

Effluent limits for this discharge are water quality standards for the receiving water, which are summarized in Appendix A. The water quality standards for dissolved metals are dependent on hardness (total as CaCO_3). Water Quality data was obtained for the drinking water sources for Mona. The membrane wastewater treatment plant is not anticipated to alter the hardness of the influent. Therefore, an average hardness of 189 mg/L based on the drinking water source was used for determining the dissolved metals effluent limits.

The water quality standard for chronic ammonia toxicity is dependent on temperature and pH, and the water quality standard for acute ammonia toxicity is dependent on pH. The water quality standards for ammonia are summarized in Appendix B.

For parameters without a WQBEL, permit limits should be set according to rules found in R317-1-3 and categorical UPDES discharge requirements.

Table 2: Water Quality Based Effluent Limits

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)					0.50	30 days
Dissolved Oxygen (mg/L)	3.0	3.0	Instant	5.0	5.0	30 days
BOD ₅ (mg/L)	None	35	7 days	None	25	30 days
Ammonia (mg/l)	Varies	6.95	1 hour	Varies		30 days
Summer (Jul-Sep)					3.12	
Fall (Oct-Dec)					3.61	
Winter (Jan-Mar)					3.98	
Spring (Apr-Jun)					3.72	

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is not required for this facility. The proposed permit is a simple renewal of an existing UPDES permit. No increase in flow or concentration of pollutants over those authorized in the existing permit is being requested.

Utah Division of Water Quality

Wasteload Analysis

Mona WWTP

UPDES No. UT-0025950

Documents

WLA Document: *mona_wwtp_wla_2022.docx*

Analysis: *mona_wwtp_wla_2022.xlsx*

References:

Utah Division of Water Quality. 2022. *Final 2022 Integrated Report on Water Quality*.

Utah Division of Water Quality. 2021. *Utah Wasteload Analysis Procedures Version 2.0*.

WASTELOAD ANALYSIS [WLA]
Appendix A: Mass Balance Mixing Analysis

Date: 12/15/2022

Discharging Facility: Mona City WWTP
 UPDES No: UT-0025950
 Permit Flow [MGD]: 0.50 Max. Monthly

Receiving Water: Wetlands
 Beneficial Uses: 2B, 3D
 Downstream Receiving Water: Mona Reservoir
 Beneficial Uses: 2B, 3B, 4
 Stream Flows [cfs]: 0.0 All Seasons Critical Low Flow

Fully Mixed: YES
 Acute River Width: 100%
 Chronic River Width: 100%

Modeling Information

A mass balance mixing analysis was used to determine the effluent limits.

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations for Protection of Recreation (Class 2B Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0

Bacteriological

E. coli (30 Day Geometric Mean)	206 (#/100 mL)
E. coli (Maximum)	668 (#/100 mL)

Effluent Limitations for Protection of Aquatic Wildlife (Class 3D Waters)

Physical Parameter	Concentration		
	Minimum	Maximum	
pH	6.5	9.0	
Dissolved Oxygen (mg/L)	Minimum Concentration		
Instantaneous	3.0		
30-day Average	5.0		
Inorganics			Acute Standard (1 Hour Average) Standard
	Parameter		
	Phenol (mg/L)		0.010
	Hydrogen Sulfide (Undissociated) [mg/L]		0.002
Ammonia-Total (mg/L)			
		Chronic (30-day ave)	
	Season	Standard	Background
	Summer	3.1	3.1
	Fall	3.6	3.6
	Winter	4.0	4.0
	Spring	3.7	3.7
		Limit	
			Acute (1-hour ave)
		Standard	Background
			Limit
			6.9
			6.9
			6.9
			6.9
Metals-Total Recoverable		Chronic (4-day ave)	
	Parameter	Standard¹	Background
	Aluminum (µg/L)	N/A ²	N/A ²
	Arsenic (µg/L)	150	150
	Cadmium (µg/L)	0.5	0.5
	Chromium VI (µg/L)	11.0	11.0
	Chromium III (µg/L)	152	152
	Copper (µg/L)	16.9	16.9
	Cyanide (µg/L) ²	5.2	5.2
	Iron (µg/L)		
	Lead (µg/L)	7.7	7.7
	Mercury (µg/L) ²	0.012	0.012
	Nickel (µg/L)	93.8	93.8
	Selenium (µg/L)	4.6	4.6
	Silver (µg/L)		
	Tributyltin (µg/L) ²	0.072	0.072
	Zinc (µg/L)	216	216
		Limit	
			750
			340
			4.3
			16.0
			3,181
			26.9
			22.0
			1,000
			197
			2.4
			843
			18.4
			12.5
			0.46
			216
			12.5
			0.46
			216

1: Based upon a Hardness of 200 mg/l as CaCO₃

2: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO₃ in the receiving water after mixing, the 87 µg/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 µg/L acute aluminum criterion (expressed as total recoverable).

Organics [Pesticides]

Parameter	Chronic (4-day ave)		Acute (1-hour ave)	
	Standard	Limit	Standard	Limit
Aldrin (µg/L)			1.5	1.5
Chlordane (µg/L)	0.0043	0.0043	1.2	1.2
DDT, DDE (µg/L)	0.001	0.001	0.55	0.55
Diazinon (µg/L)	0.17	0.17	0.17	0.17
Dieldrin (µg/L)	0.0056	0.0056	0.24	0.24
Endosulfan, a & b (µg/L)	0.056	0.056	0.11	0.11
Endrin (µg/L)	0.036	0.036	0.086	0.086
Heptachlor & H. epoxide (µg/L)	0.0038	0.0038	0.26	0.26
Lindane (µg/L)	0.08	0.08	1.0	1.0
Methoxychlor (µg/L)			0.03	0.03
Mirex (µg/L)			0.001	0.001
Nonylphenol (µg/L)	6.6	6.6	28.0	28.0
Parathion (µg/L)	0.0130	0.0130	0.066	0.066
PCB's (µg/L)	0.014	0.014		
Pentachlorophenol (µg/L)	15.0	15.0	19.0	19.0
Toxephene (µg/L)	0.0002	0.0002	0.73	0.73

Radiological Maximum Concentration

Parameter	Standard
Gross Alpha (pCi/L)	15

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	Maximum Concentration		
	Standard	Background	Limit
Total Dissolved Solids (mg/L)	1,200		1,200
Boron (mg/L)	0.75		0.75
Arsenic, Dissolved (µg/L)	100		100
Cadmium, Dissolved (µg/L)	10		10
Chromium, Dissolved (µg/L)	100		100
Copper, Dissolved (µg/L)	200		200
Lead, Dissolved (µg/L)	100		100
Selenium, Dissolved (µg/L)	50		50
Gross Alpha (pCi/L)	15		15