

**Utah Division of Water Quality  
Statement of Basis  
ADDENDUM  
Preliminary Wasteload Analysis and Antidegradation Level I Review**

**Date:** May 18, 2023

**Prepared by:** Christopher L. Shope  
Standards and Technical Services

**Facility:** Moroni Wastewater Treatment Plant  
Moroni, Utah  
UPDES Permit No. UT-0020222

**Receiving water:** San Pitch River (2B,3C,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 (DWQ).

Discharge

Treated effluent is discharged to the San Pitch River via outfall number 001, which is an 18" underground pipe running southeast from the WWTP through a diffuser into the river.

Outfall 001 - The design flow for the system is 1.10 MGD. The annual average flow is 0.50 MGD. The maximum daily flow is 0.72 MGD.

Receiving Water

Moroni Wastewater Treatment Plant effluent of approximately 10 percent and Pitman Farms Moroni Turkey Processing facility effluent of approximately 90 percent discharge to the San Pitch River. The Publicly Operated Treatment Works (POTW) is operated by Pitman Farms.

Per UAC R317-2-13.3(a), the designated beneficial use of the assessment unit in the immediate downstream area is: *San Pitch River and tributaries, from confluence with Sevier River to Highway U-132 crossing except As listed below: 2B,3C,3D,4.*

- *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.*

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

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow averaged over seven consecutive days with a ten year return frequency (7Q10). The USGS 10210500 SAN PITCH RIVER NEAR MT PLEASANT, UTAH stream gauge located approximately 5.7 miles upgradient was used to evaluate ambient or background flow conditions. One year of continuous daily discharge data in 1988 to 1989 to statistically analyze flow conditions. This long-term daily flow record used to calculate the 7Q10 critical flow resulted in similar seasonal 20<sup>th</sup> percentile flow conditions to DWQ 4946960 San Pitch R Ab Moroni WWTP. Therefore, the USGS 10210500 results are used to estimate the seasonal critical flow (Table 1). The average annual critical low flow condition is 3.60 ft<sup>3</sup>/s.

**Table 1: Seasonal Critical Flow at USGS 10210500 San Pitch River Near Mt Pleasant, Utah.**

<b>Season</b>	<b>Critical flow (ft<sup>3</sup>/s)</b>
Summer	3.60
Fall	9.23
Winter	26.0
Spring	7.09
<b>Annual Overall</b>	<b>3.60</b>

Ambient, upstream, background receiving water quality was characterized using data from DWQ 4946960 San Pitch R Ab Moroni WWTP. The 20<sup>th</sup> percentile concentration value was calculated for each constituent with available monitoring and sampling data in the upstream receiving water. Seasonal average effluent discharge parameter concentrations were determined from the Discharge Monitoring Report (DMR) between 2000 and 2022. Additional parameter concentrations not provided in the DMR were determined from DWQ 4946970 Moroni WWTP.

Total Maximum Daily Load (TMDL)

According to the Utah’s 2021 303(d) [Water Quality Assessment Report](#) “Combined 2018/2020 Integrated Report Version 1.0”, the receiving water for the discharge is *San Pitch River and tributaries from Gunnison Reservoir to U132 crossing and below USFS boundary (San Pitch-3-1: UT16030004-005\_01)*. The reach was not supporting for total ammonia as N, E. Coli, pH, minimum dissolved oxygen (DO) with a low priority for a TMDL. There is an approved TMDL for total dissolved solids (TDS).

Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and for chronic conditions is 2500 ft, per UAC R317-2-5. Water

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quality standards must be met at the end of the mixing zone. . Individual mixing zones may be further limited or disallowed in consideration of the following factors in the area affected by the discharge: Zone of passage for migrating fish or other species (including access to tributaries).

The EPA Region 8 stream mixing zone analysis (STREAMIX1, 1994), was used to determine the plume width and mixed flow rate for both acute and chronic conditions.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total dissolved solids (TDS), biochemical oxygen demand (BOD), dissolved oxygen (DO), pH, ammonia, and E. coli, as determined in consultation with the UPDES Permit Writer and the Watershed Protection Specialist.

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 LC<sub>50</sub> (lethal concentration, 50%) percent effluent for acute toxicity and the IC<sub>25</sub> (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 LC<sub>50</sub> is typically 100% effluent and does not need to be determined by the WLA.

According to the permit application, WET testing has failed four quarters during the past five years. For two quarters, no sample results were provided.

**Table 2: WET Limits for IC<sub>25</sub>**

<b>Season</b>	<b>IC<sub>25</sub> (%)</b>
Summer	32
Fall	16
Winter	6
Spring	19

Wasteload Allocation Methods

Effluent limits were determined for all constituents using the QUAL2Kw Model (UDWQ, 2021). The analysis is summarized in the Wasteload Addendum.

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. However, temperature, pH, and ammonia concentration of the effluent were not provided. Background temperature and pH values were used in the analysis. The analysis is summarized in the Wasteload Addendum.

Models and supporting documentation are available for review upon request.

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.

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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 the existing permit is being requested.

Documents:

WLA Document: *Q2Kw\_Pitman\_wla\_2023.docx*

Wasteload Analysis and Addendums: *Q2Kw\_Pitman\_wla\_2023.xlsm*

References:

Utah Division of Water Quality. 2014, *TMDL for Selenium in the Colorado River Watershed*

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.*

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**WASTELOAD ANALYSIS [WLA]**

Date: 5/18/2023

**Appendix A: QUAL2Kw Analysis Results**

DiscRarging Facility: Moroni Wastewater Treatment Plant  
 UPDES No: UT-0020222  
 Permit Flow [MGD]: 1.10 Maximum Daily Flow  
 1.10 Maximum Monthly Flow

Receiving Water: San Pitch River  
 Stream Classification: 2B,3C,3D,4  
 Stream Flows [cfs]: 3.60 Summer (July-Sept) Critical Low Flow  
 9.23 Fall (Oct-Dec)  
 26.00 Winter (Jan-Mar)  
 7.09 Spring (Apr-June)

Acute River Width: 50%  
 Chronic River Width: 100%

**Modeling Information**

A QUAL2Kw model was used to determine these effluent limits.

**Model Inputs**

The following is upstream and discharge information that was utilized as inputs for the analysis.

Headwater/Upstream Information	Summer	Fall	Winter	Spring
Flow (cfs)	3.6	9.2	26.0	7.1
Temperature (deg C)	18.2	6.5	4.1	12.7
Specific Conductance (µmhos)	1031	796	744	755
Inorganic Suspended Solids (mg/L)	12.3	27.6	103.5	114.4
Dissolved Oxygen (mg/L)	8.8	10.3	10.1	10.4
CBOD <sub>5</sub> (mg/L)	1.4	1.2	1.4	1.6
Organic Nitrogen (mg/L)	0.450	0.578	0.169	0.004
NH4-Nitrogen (mg/L)	0.024	0.027	0.026	0.022
NO3-Nitrogen (mg/L)	0.612	0.838	1.220	0.570
Organic Phosphorus (mg/L)	0.220	0.031	0.027	-0.062
Inorganic Ortho-Phosphorus (mg/L)	0.010	0.026	0.071	0.188
Phytoplankton (µg/L)	9.050	9.050	9.050	9.050
Detritus [POM] (mg/L)	0.6	1.5	5.4	6.0
Alkalinity (mg/L)	327	318	323	344
pH	8.0	8.2	8.2	8.3

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<b>Discharge Information - Chronic</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>
Flow (mgd)	1.1	1.1	1.1	1.1
Temperature (deg C)	20.9	15.7	10.4	17.3
Specific Conductance (µmhos)	1298	1172	1301	1240
Inorganic Suspended Solids (mg/L)	10.5	11.9	10.9	9.4
Dissolved Oxygen (mg/L)	5.5	5.5	5.5	5.5
CBOD <sub>5</sub> (mg/L)	35.0	35.0	35.0	35.0
Organic Nitrogen (mg/L)	39.444	0.119	10.344	43.632
NH <sub>4</sub> -Nitrogen (mg/L)	5.300	38.500	38.500	5.300
NO <sub>3</sub> -Nitrogen (mg/L)	60.458	34.887	15.700	42.033
Organic Phosphorus (mg/L)	-9.645	-5.679	-5.176	-8.680
Inorganic Ortho-Phosphorus (mg/L)	10.645	6.679	6.176	9.680
Phytoplankton (µg/L)	9.050	9.050	9.050	9.050
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	413	413	413	413
pH	7.5	7.4	7.4	7.5

<b>Discharge Information - Acute</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>
Flow (mgd)	1.1	1.1	1.1	1.1
Temperature (deg C)	23.5	21.3	17.0	25.2
Specific Conductance (µmhos)	1762	1920	2085	1709
Inorganic Suspended Solids (mg/L)	40.6	25.0	30.2	31.4
Dissolved Oxygen (mg/L)	5.5	5.5	5.5	5.5
CBOD <sub>5</sub> (mg/L)	35.0	35.0	35.0	35.0
Organic Nitrogen (mg/L)	-16.180	3.300	-47.185	5.040
NH <sub>4</sub> -Nitrogen (mg/L)	21.400	24.100	49.500	13.700
NO <sub>3</sub> -Nitrogen (mg/L)	60.458	34.887	15.700	42.033
Organic Phosphorus (mg/L)	-9.645	-5.679	-5.176	-8.680
Inorganic Ortho-Phosphorus (mg/L)	10.645	6.679	6.176	9.680
Phytoplankton (µg/L)	9.050	9.050	9.050	9.050
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	413	413	413	413
pH	7.9	8.0	7.9	8.0

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 based upon Water Quality Standards for DO and Ammonia Toxicity**

In-stream criteria of downstream segments for Dissolved Oxygen and Ammonia will be met with an effluent limitation as follows:

	<b>Chronic</b>	<b>Standard</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>
Flow (MGD)		N/A	1.1	1.1	1.1	1.1
NH4-Nitrogen (mg/L)		Varies	5.3	38.5	38.5	5.3
CBOD <sub>5</sub> (mg/L)		N/A	35.0	35.0	35.0	35.0
Dissolved Oxygen [30-day Ave] (mg/L)		5.0	5.5	5.5	5.5	5.5
	<b>Acute</b>	<b>Standard</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>
Flow (cfs)		N/A	1.1	1.1	1.1	1.1
NH4-Nitrogen (mg/L)		Varies	21.4	24.1	49.5	13.7
CBOD <sub>5</sub> (mg/L)		N/A	35.0	35.0	35.0	35.0
Dissolved Oxygen [Minimum] (mg/L)		3.0	5.5	5.5	5.5	5.5

**Summary Comments**

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important downstream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

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**Coefficients and Other Model Information**

<i>Parameter</i>	<i>Value</i>	<i>Units</i>
<b><i>Stoichiometry:</i></b>		
Carbon	40	gC
Nitrogen	7.2	gN
Phosphorus	1	gP
Dry weight	100	gD
Chlorophyll	1	gA
<b><i>Inorganic suspended solids:</i></b>		
Settling velocity	1.5	m/d
<b><i>Oxygen:</i></b>		
Reaeration model	Tsvoglou-Neal	
Temp correction	1.024	
Reaeration wind effect	None	
O2 for carbon oxidation	2.69	gO2/gC
O2 for NH4 nitrification	4.57	gO2/gN
Oxygen inhib model CBOD oxidation	Exponential	
Oxygen inhib parameter CBOD oxidation	0.60	L/mgO2
Oxygen inhib model nitrification	Exponential	
Oxygen inhib parameter nitrification	0.60	L/mgO2
Oxygen enhance model denitrification	Exponential	
Oxygen enhance parameter denitrification	0.60	L/mgO2
Oxygen inhib model phyto resp	Exponential	
Oxygen inhib parameter phyto resp	0.60	L/mgO2
Oxygen enhance model bot alg resp	Exponential	
Oxygen enhance parameter bot alg resp	0.60	L/mgO2
<b><i>Slow CBOD:</i></b>		
Hydrolysis rate	0	/d
Temp correction	1.047	
Oxidation rate	0.103	/d
Temp correction	1.047	
<b><i>Fast CBOD:</i></b>		
Oxidation rate	5	/d
Temp correction	1.047	
<b><i>Organic N:</i></b>		
Hydrolysis	0.84504511	/d
Temp correction	1.07	
Settling velocity	0.055176	m/d
<b><i>Ammonium:</i></b>		
Nitrification	1.444564	/d
Temp correction	1.07	
<b><i>Nitrate:</i></b>		
Denitrification	1.6632371	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.38965	m/d
Temp correction	1.07	
<b><i>Organic P:</i></b>		
Hydrolysis	0.28013059	/d
Temp correction	1.07	
Settling velocity	0.043724	m/d
<b><i>Inorganic P:</i></b>		
Settling velocity	0.45041	m/d
Sed P oxygen attenuation half sat constant	0.71711	mgO2/L

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<b>Phytoplankton:</b>			
Max Growth rate	2.8862	/d	
Temp correction	1.07		
Respiration rate	0.1045676	/d	
Temp correction	1.07		
Death rate	0.325185	/d	
Temp correction	1		
Nitrogen half sat constant	15	ugN/L	
Phosphorus half sat constant	11	ugP/L	
Inorganic carbon half sat constant	1.30E-05	moles/L	
Phytoplankton use HCO3- as substrate	Yes		
Light model	Smith		
Light constant	57.6	langleys/d	
Ammonia preference	7.35575	ugN/L	
Settling velocity	0.11142	m/d	
<b>Bottom Plants:</b>			
Growth model	Zero-order		
Max Growth rate	22.21241	gD/m2/d or /d	
Temp correction	1.07		
First-order model carrying capacity	100	gD/m2	
Basal respiration rate	0.6899654	/d	
Photo-respiration rate parameter	0.01	unitless	
Temp correction	1.07		
Excretion rate	0.11302	/d	
Temp correction	1.07		
Death rate	0.021304	/d	
Temp correction	1.07		
External nitrogen half sat constant	694.537	ugN/L	
External phosphorus half sat constant	122.1963	ugP/L	
Inorganic carbon half sat constant	3.31E-05	moles/L	
Bottom algae use HCO3- as substrate	Yes		
Light model	Smith		
Light constant	66.948	mgO <sup>2</sup> /L	
Ammonia preference	21.34475	ugN/L	
Subsistence quota for nitrogen	35.4263	mgN/gD	
Subsistence quota for phosphorus	3.569585	mgP/gD	
Maximum uptake rate for nitrogen	886	mgN/gD/d	
Maximum uptake rate for phosphorus	29.3088	mgP/gD/d	
Internal nitrogen half sat ratio	3.404516		
Internal phosphorus half sat ratio	1.081363		
Nitrogen uptake water column fraction	1		
Phosphorus uptake water column fraction	1		
<b>Detritus (POM):</b>			
Dissolution rate	1.5255605	/d	
Temp correction	1.07		
Settling velocity	0.89958	m/d	
<b>pH:</b>			
Partial pressure of carbon dioxide	380	ppm	

Atmospheric Inputs:	Spring	Fall	Winter	Spring
Max. Air Temperature, F	89.2	66.4	51.7	81.8
Min. Air Temperature, F	41.0	13.7	11.7	29.8
Dew Point, Temp., F	52.7	30.4	26.7	43.4
Wind, ft./sec. @ 21 ft.	6.8	5.9	6.3	8.4
Cloud Cover, %	0.0	0.0	0.0	0.0

Other Inputs:	
Bottom Algae Coverage	100.0%
Bottom SOD Coverage	100.0%
Prescribed SOD (mg O <sub>2</sub> /m <sup>2</sup> /day)	0.0

**WASTELOAD ANALYSIS [WLA]**

Date: 5/18/2023

**Appendix B: Mass Balance Mixing Analysis Results**

Discharging Facility: Moroni Wastewater Treatment Plant  
 UPDES No: UT-0020222  
 Permit Flow [MGD]: 1.10 Maximum Daily Flow  
 1.10 Maximum Monthly Flow

Receiving Water: San Pitch River  
 Stream Classification: 2B,3C,3D,4  
 Stream Flows [cfs]: 3.60 Annual Critical Low Flow

Acute River Width: 50%  
 Acute Combined Flow [cfs] 3.50  
 Chronic River Width: 100%  
 Chronic Combined Flow [cfs] 5.30

**Modeling Information**

A simple mixing analysis was used to determine these 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)**

Parameter	Limit
pH	
Minimum	6.5
Maximum	9.0

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

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

Parameter	Limit
Temperature (deg C)	
Maximum	27.0
Maximum Change	4.0

pH	Limit
Minimum	6.5
Maximum	9.0

Inorganics	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
	Standard	Limit	Unit	Standard	Limit	Unit
Phenol				0.010	0.014 mg/L	
Hydrogen Sulfide (Undissociated)				0.002	0.003 mg/L	

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**Dissolved Metals [µg/L]**

Parameter	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
	Standard <sup>1</sup>	Background	Limit	Standard	Background	Limit
Aluminum	NA <sup>3</sup>	NA	NONE	750	13.0	1,530
Arsenic	150	1.1	465	340	1.1	699
Cadmium	0.6	0.06	1.9	7.7	0.06	15.9
Chromium VI	11.0	2.7	28.6	16.0	2.7	30.1
Chromium III	231	2.7	713	1,773	2.7	3,646
Copper	29.3	3.0	84.9	49.6	3.0	99.0
Cyanide <sup>2</sup>	5.2	3.5	8.9	22.0	3.5	41.6
Iron				1,000	28.65	2,027
Lead	10.9	0.19	33.7	281	0.19	578
Mercury <sup>2</sup>	0.012	0.008	0.020	2.4	0.008	4.9
Nickel	168	4.7	514	1,513	4.7	3,108
Selenium	4.6	2.0	10.1	18.4	2.0	35.7
Silver				34.9	0.25	71.6
Tributyltin <sup>2</sup>	0.072	0.048	0.123	0.46	0.048	0.90
Zinc	382	14.1	1,162	379	14.1	766

1: Based upon a Hardness of 400 mg/l as CaCO<sub>3</sub>

2: Ambient concentration assumed 2/3 of water quality standard

3: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO<sub>3</sub> in the receiving water after mixing, the 87 ug/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/L acute aluminum criterion (expressed as total recoverable).

**Organics [Pesticides] [µg/L]**

Parameter	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
	Standard	Background <sup>1</sup>	Limit	Standard	Background	Limit
Aldrin				1.5	1.0	2.0
Chlordane	0.0043	0.0029	0.0073	1.2	0.0029	2.5
DDT, DDE	0.001	0.0007	0.0017	0.55	0.0007	1.13
Diazinon	0.17	0.11	0.29	0.17	0.11	0.23
Dieldrin	0.0056	0.0037	0.0095	0.24	0.0037	0.49
Endosulfan, a & b	0.056	0.037	0.095	0.11	0.037	0.19
Endrin	0.036	0.024	0.061	0.086	0.024	0.152
Heptachlor & H. epoxide	0.0038	0.0025	0.0065	0.26	0.0025	0.53
Lindane	0.08	0.05	0.14	1.0	0.05	2.0
Methoxychlor				0.03	0.02	0.04
Mirex				0.001	0.0007	0.001
Nonylphenol	6.6	4.4	11.3	28.0	4.4	53.0
Parathion	0.013	0.009	0.022	0.066	0.009	0.127
PCB's	0.014	0.009	0.024			
Pentachlorophenol	15.0	10.0	25.6	19.0	10.0	28.5
Toxephene	0.0002	0.0001	0.0003	0.73	0.0001	1.50

1: Ambient concentration assumed 2/3 of water quality standard

**Radiological**

Parameter	Maximum Concentration
Gross Alpha	15 pCi/L

**Effluent Limitation for Protection of Agriculture (Class 4 Waters)**

Parameter	Maximum Concentration		
	Standard	Background	Limit
Total Dissolved Solids (mg/L)	1,700		1,700 Site specific standard
Arsenic (µg/L)	100	1.1	309
Boron (µg/L)	750	201	1,912
Cadmium (µg/L)	10	0.06	31
Chromium (µg/L)	100	2.7	306
Copper (µg/L)	200	3.0	617
Lead (µg/L)	100	0.19	311
Selenium (µg/L)	50	2.0	152
Gross Alpha (pCi/L)	15		15

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**WASTELOAD ANALYSIS [WLA]**  
**Appendix C: Total Residual Chlorine**

Date: 5/18/2023

Discharging Facility: Moroni Wastewater Treatment Plant  
 UPDES No: UT-0020222

**CHRONIC**

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day)		Travel Time (min)	Decay Coefficient	Effluent Limit
								@ 20 deg C	@ T deg C			
Discharge (cfs)	Summer	3.6		1.7	5.3							
	Fall	9.2		1.7	10.9							
	Winter	26.0		1.7	27.7							
	Spring	7.1		1.7	8.8							
TRC (mg/L)	Summer	0.000	0.011			0.034	20.9	20	20.8	10	0.8653	0.040
	Fall	0.000	0.011			0.071	15.7	20	16.4	10	0.8925	0.079
	Winter	0.000	0.011			0.179	10.4	20	12.8	10	0.9146	0.196
	Spring	0.000	0.011			0.057	17.3	20	17.7	10	0.8844	0.064

**ACUTE**

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day)		Travel Time (min)	Decay Coefficient	Effluent Limit
								@ 20 °C	@ T °C			
Discharge (cfs)	Summer	1.8		1.7	3.5							
	Fall	4.6		1.7	6.3							
	Winter	13.0		1.7	14.7							
	Spring	3.5		1.7	5.2							
TRC (mg/L)	Summer	0.000	0.019			0.039	23.5	20	23.5	10	0.8494	0.046
	Fall	0.000	0.019			0.071	21.3	20	21.2	10	0.8630	0.082
	Winter	0.000	0.019			0.164	17.0	20	17.4	10	0.8859	0.185
	Spring	0.000	0.019			0.059	25.2	20	25.4	10	0.8383	0.070