

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

Date: August 10, 2021

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Standards and Technical Services

Facility: Moab Wastewater Treatment Facility
Moab, Utah
UPDES Permit No. UT-0020419

Receiving water: Colorado River, Assessment Unit: Colorado River and tributaries,
from Lake Powell to state line except as listed below (1C, 2A, 3B,
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

Outfall 001 is located at latitude 38°34'40" and longitude 109°34'47". The discharge is through a 2,000-lineal-foot, 18-inch diameter reinforced concrete pipeline from the wastewater treatment facility to the Colorado River.

The design flow for the treatment plant is 1.75 MGD, consistent with the wasteload analysis performed for the 2018 facility upgrade.

Receiving Water

The receiving water for Outfall 001 is the Colorado River

Per UAC R317-2-13.1(a), the designated beneficial uses of the assessment unit in the immediate area (Colorado River from Moab to HUC unit (14030005) boundary) is 1C, 2A, 3B, 4.

- *Class 1C -- Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water*

Utah Division of Water Quality

Wasteload Analysis

Moab Wastewater Treatment Facility, UPDES Permit No. UT-0020419

- *Class 2A -- Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.*
- *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.*

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 09180500 COLORADO RIVER NEAR CISCO, UT stream gauge approximately 41 miles upgradient was used to evaluate ambient or background flow conditions. The stream gauge has a daily average flow record from 1913 to 1917 and 1922 to present. Therefore, DWQ used the minimum of the 7Q10 over the entire period to estimate the seasonal critical flow in the receiving water (Table 1). The average annual critical low flow condition is 969.3 ft³/s.

Table 1: Seasonal Flow Data at USGS 09180500 COLORADO RIVER NEAR CISCO, UT.

Season	Minimum 7Q10 flow (ft³/s)
Summer	736.0
Fall	1265.7
Winter	1567.1
Spring	1350.0
Annual Overall	969.3

Ambient, upstream, background receiving water quality was characterized using combined data from UDWQ 4956560 COLORADO R BL ATLAS MILL TAILINGS PILE and UDWQ 4957000 COLORADO R AT US191 XING NEAR MOAB. The average seasonal value was calculated for each constituent with available data in the receiving water. Effluent discharge parameters, where available, were characterized using data supplied in the permit application, the discharge monitoring report, or monitoring site DWQ 4956550.

Data obtained from 2004-2014 for sampling site 4956550 Moab WWTP was used to characterize the temperature, pH and hardness of the effluent.

Total Maximum Daily Load (TMDL)

According to the Utah's 2016 303(d) [Water Quality Assessment Report](#) dated December 7, 2016, the receiving water for the discharge, Colorado River from Moab to HUC unit (14030005) boundary (UT14030005-004_00) was listed for dissolved selenium (Class 2B use) with an approved TMDL.

DWQ completed a TMDL for selenium in the Colorado River Watershed in 2014 (UDWQ, 2014). The TMDL allocated a selenium load to the Moab Wastewater Treatment Plant that was derived by applying the in-stream chronic selenium standard (4.6 ug/l) times the plant's design

**Utah Division of Water Quality
Wasteload Analysis
Moab Wastewater Treatment Facility, UPDES Permit No. UT-0020419**

flow rate. Using this approach for the facility (4.6 ug/l x 1.50 MGD x 3.79 conversion factor) would yield a selenium load of 26.1 g/d.

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 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).

Mill Creek confluence with the Colorado River is approximately 1,400 feet downstream of the Moab POTW outfall pipe. Therefore, in consideration of potential fish migration concerns between Mill Creek and Colorado River, the acute mixing zone is limited to 1,400 feet (calculated to be 10.2 minutes travel time).

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. A rectangular channel with a width of 300 feet, channel slope of 0.001 feet/foot, and roughness coefficient of 0.030 was assumed for channel geometry. Mannings equation was used to solve for the flow depth (1.8 feet) and velocity for the 7Q10 flow.

Table 2: Summary of plume characteristics at mixing zone boundary.

Criteria	Distance to End of Mixing Zone (feet)	Plume Width		Flow cfs	Dilution Factor
		feet	% of River		
Acute	1,400	39.2	12.8	113	62:1
Chronic	2,500	52.40	17.2	127	86:1

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total dissolved solids (TDS), total suspended solids (TSS), selenium, E. coli, and ammonia, as determined in consultation with the UPDES Permit Writer and the Watershed Protection Specialist. The imminently approved “Combined 2018/2020 Integrated Report” is scheduled to list this AU as impaired for E. coli.

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 3: WET Limits for IC₂₅

Outfall	Percent Effluent
Outfall 002	2.1%

**Utah Division of Water Quality
Wasteload Analysis
Moab Wastewater Treatment Facility, UPDES Permit No. UT-0020419**

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a simple mass balance mixing analysis (UDWQ, 2021). The mass balance 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. The AMMTOX Model developed by University of Colorado and adapted by Utah DWQ and EPA Region VIII was used to determine ammonia effluent limits (Lewis et al., 2002). The analysis is summarized in the Wasteload Addendum.

Due to the high dilution factor, secondary standards for BOD₅ were considered sufficiently protective to meet instream criteria for DO.

Table 4: Water Quality Based Effluent Limits Summary

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)		3.38	1 day		1.75	30 days
Ammonia (mg/L)			1 hour			30 days
Summer (Jul-Sep)	2.9	25.6		1.1	31.2	
Fall (Oct-Dec)	1.3	47.8		1.2	82.9	
Winter (Jan-Mar)	3.0	54.1		1.7	48.1	
Spring (Apr-Jun)	2.5	45.4		1.7	77.9	
BOD ₅ (mg/L)	N/A	35	7 days	N/A	25	30 days

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. 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 because the upgraded and expanded facility has previously been permitted.

Documents:

WLA Document: *Moab_WWTP_WLA_2021.docx*
Wasteload Analysis and Addendums: *Moab_WWTP_WLA_2021.xlsm*

References:

Lewis, B., J. Saunders, and M. Murphy. 2002. Ammonia Toxicity Model (AMMTOX, Version2): A Tool for Determining Effluent Ammonia Limits. University of Colorado, Center for Limnology.

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

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

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WASTELOAD ANALYSIS [WLA] [REDACTED] = not included in the WLA
Addendum: Statement of Basis

10-Aug-21
4:00 PM

Facilities: Moab WWTP
Discharging to: Colorado River

UPDES No: UT-0020419

I. Introduction

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 [R317-2-8, UAC]. Projected concentrations are compared to numeric water quality standards to determine acceptability. The anti-degradation policy and procedures are also considered. The primary in-stream parameters of concern may include metals (as a function of hardness), total dissolved solids (TDS), total residual chlorine (TRC), un-ionized ammonia (as a function of pH and temperature, measured and evaluated in terms of total ammonia), and dissolved oxygen.

Mathematical water quality modeling is employed to determine stream quality response to point source discharges. Models aid in the effort of anticipating stream quality at future effluent flows at critical environmental conditions (e.g., low stream flow, high temperature, high pH, etc).

The numeric criteria in this wasteload analysis may always be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

II. Receiving Water and Stream Classification

Colorado River:	1C,2A,3B,4
Antidegradation Review:	Level I review completed. Level II review is required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.0 mg/l (4 Day Average) 0.0 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	5.5 mg/l (30 Day Average) 4.0 mg/l (7Day Average) 3.0 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aluminum	87.00 ug/l**	1.525 lbs/day	750.00	ug/l	13.145 lbs/day
Arsenic	150.00 ug/l	2.629 lbs/day	340.00	ug/l	5.959 lbs/day
Cadmium	2.07 ug/l	0.036 lbs/day	6.19	ug/l	0.109 lbs/day
Chromium III	231.51 ug/l	4.058 lbs/day	4843.61	ug/l	84.894 lbs/day
ChromiumVI	11.00 ug/l	0.193 lbs/day	16.00	ug/l	0.280 lbs/day
Copper	26.16 ug/l	0.458 lbs/day	43.63	ug/l	0.765 lbs/day
Iron			1000.00	ug/l	17.527 lbs/day
Lead	14.78 ug/l	0.259 lbs/day	379.31	ug/l	6.648 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.042 lbs/day
Nickel	144.77 ug/l	2.537 lbs/day	1302.10	ug/l	22.822 lbs/day
Selenium	4.60 ug/l	0.081 lbs/day	20.00	ug/l	0.351 lbs/day
Silver	N/A ug/l	N/A lbs/day	30.15	ug/l	0.528 lbs/day
Zinc	333.05 ug/l	5.837 lbs/day	333.05	ug/l	5.837 lbs/day

* Allowed below discharge

**Chronic Aluminum standard applies only to waters with a pH < 7.0 and a Hardness < 50 mg/l as CaCO₃

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Metals Standards Based upon a Hardness of 334.2 mg/l as CaCO₃

IV. Numeric Stream Standards for Protection of Agriculture

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			100.0 ug/l	lbs/day
Boron			750.0 ug/l	6.57 lbs/day
Cadmium			10.0 ug/l	0.09 lbs/day
Chromium			100.0 ug/l	lbs/day
Copper			200.0 ug/l	lbs/day
Lead			100.0 ug/l	lbs/day
Selenium			50.0 ug/l	lbs/day
TDS, Summer			1200.0 mg/l	10.52 tons/day

V. Numeric Stream Standards for Protection of Human Health (Class 1C Waters)

Metals	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			50.0 ug/l	16.746 lbs/day
Barium			1000.0 ug/l	334.926 lbs/day
Cadmium			10.0 ug/l	3.349 lbs/day
Chromium			50.0 ug/l	16.746 lbs/day
Lead			50.0 ug/l	16.746 lbs/day
Mercury			2.0 ug/l	0.670 lbs/day
Selenium			10.0 ug/l	3.349 lbs/day
Silver			50.0 ug/l	16.746 lbs/day
Fluoride (3)			1.4 ug/l	0.469 lbs/day
to			2.4 ug/l	0.804 lbs/day
Nitrates as N			10.0 ug/l	3.349 lbs/day

VI. Numeric Stream Standards the Protection of Human Health from Water & Fish Consumption [Toxics]

Metals	Maximum Conc., ug/l - Acute Standards			
	Class 1C		Class 3A, 3B	
Antimony	14.0 ug/l	4.69 lbs/day		
Arsenic	50.0 ug/l	16.75 lbs/day	4300.00 ug/l	1440.18 lbs/day
Asbestos	7.00E+06 ug/l	2.34E+06 lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	1.30E+03 ug/l	435.40 lbs/day	2.2E+05 ug/l	73683.79 lbs/day
Lead	700.0 ug/l	234.45 lbs/day		
Mercury			0.15 ug/l	0.05 lbs/day
Nickel			4600.00 ug/l	1540.66 lbs/day
Selenium	0.1 ug/l	0.05 lbs/day		
Silver	610.0 ug/l	204.31 lbs/day		
Thallium			6.30 ug/l	2.11 lbs/day
Zinc				

There are additional standards that apply to this receiving water, but were not considered in this modeling/waste load allocation analysis.

VII. Mathematical Modeling of Stream Quality

Model configuration was accomplished utilizing standard modeling procedures. Data points were plotted and coefficients adjusted as required to match observed data as closely as possible.

The modeling approach used in this analysis included one or a combination of the following models.

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(1) The Utah River Model, Utah Division of Water Quality, 1992. Based upon STREAMDO IV (Region VIII) and Supplemental Ammonia Toxicity Models; EPA Region VIII, Sept. 1990 and QUAL2E (EPA, Athens, GA).

(2) Utah Ammonia/Chlorine Model, Utah Division of Water Quality, 1992.

(3) AMMTOX Model, University of Colorado, Center of Limnology, and EPA Region 8

(4) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

Coefficients used in the model were based, in part, upon the following references:

(1) Rates, Constants, and Kinetics Formulations in Surface Water Quality Modeling. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens Georgia. EPA/600/3-85/040 June 1985.

(2) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

VIII. Modeling Information

The required information for the model may include the following information for both the upstream conditions at low flow and the effluent conditions:

Flow, Q, (cfs or MGD)	D.O. mg/l
Temperature, Deg. C.	Total Residual Chlorine (TRC), mg/l
pH	Total NH3-N, mg/l
BOD5, mg/l	Total Dissolved Solids (TDS), mg/l
Metals, ug/l	Toxic Organics of Concern, ug/l

Other Conditions

In addition to the upstream and effluent conditions, the models require a variety of physical and biological coefficients and other technical information. In the process of actually establishing the permit limits for an effluent, values are used based upon the available data, model calibration, literature values, site visits and best professional judgement.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Current Upstream Information

	Stream								
	Critical Low								
	Flow	Temp.	pH	T-NH3	BOD5	DO	TRC	TDS	
	cfs	Deg. C		mg/l as N	mg/l	mg/l	mg/l	mg/l	mg/l
Summer (Irrig. Season)	736.0	8.5	8.3	0.09	1.55	9.15	0.00	848.0	
Fall	1265.7	14.4	8.1	0.07	2.28	---	0.00	439.5	
Winter	1567.1	20.5	8.2	0.22	2.10	---	0.00	439.5	
Spring	1350.0	4.5	8.3	0.15	1.71	---	0.00	439.5	
Dissolved Metals	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb	
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	14.87	1.12	0.05	1.19	2.65*	2.31	0.0	0.11	
Dissolved Metals	Hg	Ni	Se	Ag	Zn	Boron			
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l			
All Seasons	0.0000	2.50	1.47	0.25	12.39	10.0			* 1/2 MDL

Projected Discharge Information

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Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	1.75000	NA	276.90	2.02027
Fall	1.75000	NA		
Winter	1.75000	NA		
Spring	1.75000	NA		

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

IX. 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 coincide with the environmental conditions expected at low stream flows.

Effluent Limitation for Flow based upon Water Quality Standards

In-stream criteria of downstream segments will be met with an effluent flow maximum value as follows:

Season	Daily Average	
Summer	1.750 MGD	2.707 cfs
Fall	1.750 MGD	2.707 cfs
Winter	1.750 MGD	2.707 cfs
Spring	1.750 MGD	2.707 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 1.75 MGD. If the discharger is allowed to have a flow greater than 1.75 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occurring, the permit writers must include the discharge flow limitation as indicated above; or, include loading effluent limits in the permit.

Effluent Limitation for Whole Effluent Toxicity (WET) based upon WET Policy

Effluent Toxicity will not occur in downstream segments if the values below are met.

WET Requirements	LC50 >	7.8% Effluent	[Acute]
	IC25 >	2.1% Effluent	[Chronic]

Effluent Limitation for Biological Oxygen Demand (BOD) based upon Water Quality Standards or Regulations

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

Season	Concentration	
Summer	25.0 mg/l as BOD5	364.8 lbs/day
Fall	25.0 mg/l as BOD5	364.8 lbs/day
Winter	25.0 mg/l as BOD5	364.8 lbs/day
Spring	25.0 mg/l as BOD5	364.8 lbs/day

Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent

**Utah Division of Water Quality
Salt Lake City, Utah**

D.O. limitation as follows:

Season	Concentration
Summer	5.00
Fall	5.00
Winter	5.00
Spring	5.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

Season		Concentration	Load
Summer	4 Day Avg. - Chronic	31.2 mg/l as N	455.9 lbs/day
	1 Hour Avg. - Acute	25.6 mg/l as N	373.8 lbs/day
Fall	4 Day Avg. - Chronic	82.9 mg/l as N	1,210.0 lbs/day
	1 Hour Avg. - Acute	47.8 mg/l as N	697.6 lbs/day
Winter	4 Day Avg. - Chronic	48.1 mg/l as N	701.5 lbs/day
	1 Hour Avg. - Acute	54.1 mg/l as N	788.8 lbs/day
Spring	4 Day Avg. - Chronic	77.9 mg/l as N	1,136.6 lbs/day
	1 Hour Avg. - Acute	45.4 mg/l as N	663.1 lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 2.0%.

Effluent Limitation for Total Residual Chlorine based upon Water Quality Standards

In-stream criteria of downstream segments for Total Residual Chlorine will be met with an effluent limitation as follows:

Season		Concentration	Load
Summer	4 Day Avg. - Chronic	0.351 mg/l	5.12 lbs/day
	1 Hour Avg. - Acute	0.167 mg/l	2.44 lbs/day
Fall	4 Day Avg. - Chronic	0.595 mg/l	8.68 lbs/day
	1 Hour Avg. - Acute	0.274 mg/l	3.99 lbs/day
Winter	4 Day Avg. - Chronic	0.734 mg/l	10.71 lbs/day
	1 Hour Avg. - Acute	0.334 mg/l	4.88 lbs/day
Spring	4 Day Avg. - Chronic	0.634 mg/l	0.00 lbs/day
	1 Hour Avg. - Acute	0.291 mg/l	0.00 lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration	Load
Summer	Maximum, Acute	96891.0 mg/l	706.92 tons/day
Fall	Maximum, Acute	207959.7 mg/l	1,517.28 tons/day
Winter	Maximum, Acute	109012.9 mg/l	795.36 tons/day
Spring	4 Day Avg. - Chronic	122438.7 mg/l	893.32 tons/day

Colorado Salinity Forum Limits Determined by Permitting Section

Effluent Limitations for Total Recoverable Metals based upon Water Quality Standards

In-stream criteria of downstream segments for Dissolved Metals will be met with an effluent

**Utah Division of Water Quality
Salt Lake City, Utah**

limitation as follows (based upon a hardness of 334.2 mg/l):

	4 Day Average		1 Hour Average		
	Concentration	Load	Concentration		Load
Aluminum	N/A	N/A	100,677.2	ug/l	1764.6 lbs/day
Arsenic	3,436.11 ug/l	32.4 lbs/day	46,404.4	ug/l	813.3 lbs/day
Cadmium	46.63 ug/l	0.4 lbs/day	841.0	ug/l	14.7 lbs/day
Chromium III	5,315.15 ug/l	50.1 lbs/day	663,080.5	ug/l	11621.8 lbs/day
Chromium VI	166.06 ug/l	1.6 lbs/day	1,650.6	ug/l	28.9 lbs/day
Copper	552.52 ug/l	5.2 lbs/day	5,660.8	ug/l	99.2 lbs/day
Iron	N/A	N/A	136,928.4	ug/l	2399.9 lbs/day
Lead	338.52 ug/l	3.2 lbs/day	51,923.8	ug/l	910.1 lbs/day
Mercury	0.28 ug/l	0.0 lbs/day	328.6	ug/l	5.8 lbs/day
Nickel	3,284.94 ug/l	31.0 lbs/day	177,958.5	ug/l	3119.1 lbs/day
Selenium	73.69 ug/l	0.7 lbs/day	2,538.8	ug/l	44.5 lbs/day
Silver	N/A ug/l	N/A lbs/day	4,094.6	ug/l	71.8 lbs/day
Zinc	7,410.70 ug/l	69.9 lbs/day	43,920.7	ug/l	769.8 lbs/day
Cyanide	119.98 ug/l	1.1 lbs/day	3,012.5	ug/l	52.8 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	20.5 Deg. C.	68.9 Deg. F
Fall	33.6 Deg. C.	92.5 Deg. F
Winter	43.8 Deg. C.	110.8 Deg. F
Spring	24.8 Deg. C.	76.7 Deg. F

Effluent Targets for Pollution Indicators Based upon Water Quality Standards

In-stream criteria of downstream segments for Pollution Indicators will be met with an effluent limit as follows:

	1 Hour Average	
	Concentration	Loading
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	87.6 lbs/day
Nitrates as N	4.0 mg/l	70.1 lbs/day
Total Phosphorus as P	0.05 mg/l	0.9 lbs/day
Total Suspended Solids	90.0 mg/l	1577.4 lbs/day

Note: Pollution indicator targets are for information purposes only.

Effluent Limitations for Protection of Human Health [Toxics Rule] Based upon Water Quality Standards (Most stringent of 1C or 3A & 3B as appropriate.)

In-stream criteria of downstream segments for Protection of Human Health [Toxics] will be met with an effluent limit as follows:

	Maximum Concentration	
	Concentration	Load
Metals		
Antimony	3820.08 ug/l	55.74 lbs/day
Arsenic	13338.64 ug/l	194.64 lbs/day
Asbestos	1.91E+09 ug/l	2.79E+07 lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	354721.37 ug/l	5176.12 lbs/day

**Utah Division of Water Quality
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Cyanide	191003.81 ug/l	2787.14 lbs/day
Lead	0.00	0.00
Mercury	38.20 ug/l	0.56 lbs/day
Nickel	166446.18 ug/l	2428.80 lbs/day
Selenium	0.00	0.00
Silver	0.00	0.00
Thallium	463.87 ug/l	6.77 lbs/day
Zinc		

**Metals Effluent Limitations for Protection of All Beneficial Uses
Based upon Water Quality Standards and Toxics Rule**

	Class 4 Acute Agricultural ug/l	Class 3 Acute Aquatic Wildlife ug/l	Acute Toxics Drinking Water Source ug/l	Acute Toxics Wildlife ug/l	1C Acute Health Criteria ug/l	Acute Most Stringent ug/l	Class 3 Chronic Aquatic Wildlife ug/l
Aluminum		100677.2				100677.2	N/A
Antimony			3820.1	1173309.1		3820.1	
Arsenic	27286.3	46404.4	13338.6		0.0	13338.6	3436.1
Asbestos			1.91E+09			1.91E+09	
Barium					272862.6	272862.6	
Beryllium						0.0	
Cadmium	2715.0	841.0			0.0	841.0	46.6
Chromium (III)		663080.5			0.0	663080.5	5315.1
Chromium (VI)	26962.7	1650.6			0.0	1650.57	166.06
Copper	53944.5	5660.8	354721.4			5660.8	552.5
Cyanide		3012.5	60029770.1			3012.5	120.0
Iron		136928.4				136928.4	
Lead	27255.3	51923.8			0.0	27255.3	338.5
Mercury		328.63	38.2	40.93	0.0	38.20	0.277
Nickel		177958.5	166446.2	1255167.9		166446.2	3284.9
Selenium	13243.5	2538.8			0.0	2538.8	73.7
Silver		4094.6			0.0	4094.6	
Thallium			463.9	1719.0		463.9	
Zinc		43920.7				43920.7	7410.7
Boron	204627.1					204627.1	

Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]

[If Acute is more stringent than Chronic, then the Chronic takes on the Acute value.]

	WLA Acute ug/l	WLA Chronic ug/l
Aluminum	100677.2	N/A
Antimony	3820.08	
Arsenic	13338.6	3436.1
Asbestos	1.91E+09	
Barium		
Beryllium		
Cadmium	841.0	46.6
Chromium (III)	663080.5	5315
Chromium (VI)	1650.6	166.1
Copper	5660.8	552.5
Cyanide	3012.5	120.0
Iron	136928.4	
Lead	27255.3	338.5
Mercury	38.199	0.277
Nickel	166446.2	3285
Selenium	2538.8	73.7
Silver	4094.6	N/A
Thallium	463.9	
Zinc	43920.7	7410.7

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Boron 204627.10

Other Effluent Limitations are based upon R317-1.
E. coli 126.0 organisms per 100 ml

X. Antidegradation Considerations

The Utah Antidegradation Policy allows for degradation of existing quality where it is determined that such lowering of water quality is necessary to accommodate important economic or social development in the area in which the waters are protected [R317-2-3]. It has been determined that certain chemical parameters introduced by this discharge will cause an increase of the concentration of said parameters in the receiving waters. Under no conditions will the increase in concentration be allowed to interfere with existing instream water uses.

The antidegradation rules and procedures allow for modification of effluent limits less than those based strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

An Antidegradation Level I Review was conducted on this discharge and its effect on the receiving water. Based upon that review, it has been determined that an Antidegradation Level II Review is not required.

XI. Colorado River Salinity Forum Considerations

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value. This doesn't apply to facilities that do not discharge to the Colorado River Basin.

XII. 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.

XIII. Notice of UPDES Requirement

This Addendum to the Statement of Basis does not authorize any entity or party to discharge to the waters of the State of Utah. That authority is granted through a UPDES permit issued by the Utah Division of Water Quality. The numbers presented here may be changed as a function of other factors. Dischargers are strongly urged to contact the Permits Section for further information. Permit writers may utilize other information to adjust these limits and/or to determine other limits based upon best available technology and other considerations provided that the values in this wasteload analysis [TMDL] are not compromised. See special provisions in Utah Water Quality Standards for adjustments in the Total Dissolved Solids values based upon background concentration.

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APPENDIX - Coefficients and Other Model Information

CBOD	CBOD	CBOD	REAER.	REAER.	REAER.	NBOD	NBOD
Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
(Kd)20	FORCED	(Ka)T	(Ka)20	FORCED	(Ka)T	(Kn)20	(Kn)T
1/day	(Kd)/day	1/day	(Ka)/day	1/day	1/day	1/day	1/day
2.000	0.000	1.180	86.006	0.000	65.483	0.400	0.165

**Utah Division of Water Quality
Salt Lake City, Utah**

Open Coeff. (K4)20 1/day 0.000	Open Coeff. (K4)T 1/day 0.000	NH3 LOSS (K5)20 1/day 4.000	NH3 (K5)T 1/day 2.359	NO2+NO3 LOSS (K6)20 1/day 0.000	NO2+NO3 (K6)T 1/day 0.000	TRC Decay K(Cl)20 1/day 32.000	TRC K(Cl)(T) 1/day 16.378
BENTHIC DEMAND (SOD)20 gm/m2/day 1.000	BENTHIC DEMAND (SOD)T gm/m2/day 0.485						
K1 CBOD {theta} 1.0	K2 Reaer. {theta} 1.0	K3 NH3 {theta} 1.1	K4 Open {theta} 1.0	K5 NH3 Loss {theta} 1.0	K6 NO2+3 {theta} 1.0	K(Cl) TRC {theta} 1.1	S Benthic {theta} 1.1

Antidegradation Review

An antidegradation review (ADR) was conducted to determine whether the proposed activity complies with the applicable antidegradation requirements for receiving waters that may be affected. The Level I ADR evaluated the criteria of R317-2-3.5(b) and determined that a Level II antidegradation Review is not required.