

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

**Date:** November 11, 2021

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Standards and Technical Services

**Facility:** Kamas City Wastewater Treatment Facility  
Kamas, Utah  
UPDES Permit No. UT-0020966

**Receiving water:** Beaver Creek

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 - The design flow for the treatment lagoons is 1.00 MGD. The annual average flow is 0.26 MGD. The maximum daily flow is 0.38 MGD.

Receiving Water

The receiving water for Outfall 001 is an un-named irrigation ditch flowing into Beaver Creek.

Per UAC R317-2-13.1(b), the designated beneficial use of the assessment unit in the immediate downstream area is: *Weber River and tributaries, from Stoddard diversion to headwaters, except as listed below: 1C,2B,3A,4.*

- *Class 1C -- Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water*
- *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 3A -- Protected for cold water species of game fish and other cold 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 DWQ 4928530-Beaver Creek Above Weber-Provo Canal stream gauge located approximately 0.5 miles upgradient was used to evaluate ambient or background flow conditions. Because there was not a long-term daily flow record to calculate the 7Q10 critical flow, the 20<sup>th</sup> percentile flow conditions are used to estimate the seasonal critical flow (Table 1). The average annual critical low flow condition is 2.02 ft<sup>3</sup>/s.

**Table 1: Seasonal Critical Flow at DWQ 4928530-Beaver Creek Above Weber-Provo Canal.**

Season	Critical flow (ft <sup>3</sup> /s)
Summer	1.20
Fall	1.30
Winter	2.00
Spring	10.0
<b>Annual Overall</b>	<b>2.02</b>

Ambient, upstream, background receiving water quality was characterized using data from DWQ 4928530-Beaver Creek Above Weber-Provo Canal. The average seasonal value was calculated for each constituent with available monitoring and sampling data in the upstream receiving water. Effluent discharge parameter concentrations were determined from the ECHO databased between 2001 and 2021. Additional parameter concentrations were determined from DWQ 4928500-Kamas Lagoons.

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, Beaver Creek and tributaries from confluence with Weber River to Kamas (Beaver Creek-1: UT16020101-029\_00) had insufficient data. However, the reach upstream of the discharge, Beaver Creek and tributaries from Kamas to headwaters (Beaver Creek-2: UT16020101-030\_00) was not supporting for aluminum.

Rockport Reservoir is listed as impaired due to violations of the cold-water fishery (3A) maximum temperature, pH, and dissolved oxygen (DO) standards. Rockport Reservoir was first listed 303(d) list in 2008. A TMDL was completed for Rockport Reservoir on September 16<sup>th</sup>, 2014 (UDWQ 2014). The TMDL identified the following load allocations applied to Kamas Lagoons for total nitrogen and total phosphorous:

**Table 2: TMDL Total Nitrogen and Phosphorous Load Allocations**

Load	Total Nitrogen (kg)	Total Phosphorous (kg)
Annual	5,542	554
Summer Season (Apr. 1st – Sept. 30 <sup>th</sup> )	2,771	277

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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).

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 5 feet, channel slope of 0.0139 feet/feet, and roughness coefficient of 0.049 was assumed for channel geometry. Mannings equation was used to solve for the average flow depth (1.0 feet) and velocity for the critical flow.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were suspended solids (TSS), biochemical oxygen demand (BOD), dissolved oxygen (DO), pH, ammonia, E. coli, and aluminum, 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.

**Table 3: WET Limits for IC<sub>25</sub>**

<b>Outfall</b>	<b>Percent Effluent</b>
Outfall 001	60.8%

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.

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**Table 4: Water Quality Based Effluent Limits Summary**

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)		1.00	1 day		1.00	30 days
Ammonia (mg/L)			1 hour			30 days
Summer (Jul-Sep)	2.9	6.5		1.1	3.2	
Fall (Oct-Dec)	1.3	20.6		1.2	12.8	
Winter (Jan-Mar)	3.0	12.5		1.7	5.4	
Spring (Apr-Jun)	2.5	6.5		1.7	3.2	
BOD <sub>5</sub> (mg/L)	N/A	30.0	7 days	N/A	30.0	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 facility has previously been permitted for discharge and no new construction activities are planned.

Documents:

WLA Document: *Kamas\_City\_WLA\_2021.docx*  
Wasteload Analysis and Addendums: *Kamas\_City\_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. 2014. *TMDL for Selenium in the Colorado River Watershed*

Utah Division of Water Quality. 2021. *Combined 2018/2020 Integrated Report Version 1.0*

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

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

11-Nov-21
4:00 PM

**Facilities:** Kamas City Wastewater Treatment Facility  
**Discharging to:** Unnamed Ditch -> Beaver Creek

**UPDES No:** UT-0020966

**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**

Unnamed Ditch -> Beaver Creek: 1C,2B,3A,4  
 Antidegradation Review: Level I review completed. Level II review is not 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)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	6.5 mg/l (30 Day Average) 9.5 mg/l (7Day Average) 8.0 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**	0.871 lbs/day	750.00 ug/l	7.512 lbs/day
Arsenic	150.00 ug/l	1.502 lbs/day	340.00 ug/l	3.405 lbs/day
Cadmium	1.27 ug/l	0.013 lbs/day	3.41 ug/l	0.034 lbs/day
Chromium III	140.49 ug/l	1.407 lbs/day	2939.42 ug/l	29.439 lbs/day
ChromiumVI	11.00 ug/l	0.110 lbs/day	16.00 ug/l	0.160 lbs/day
Copper	15.53 ug/l	0.156 lbs/day	24.56 ug/l	0.246 lbs/day
Iron			1000.00 ug/l	10.015 lbs/day
Lead	6.80 ug/l	0.068 lbs/day	174.52 ug/l	1.748 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40 ug/l	0.024 lbs/day
Nickel	86.42 ug/l	0.866 lbs/day	777.30 ug/l	7.785 lbs/day
Selenium	4.60 ug/l	0.046 lbs/day	20.00 ug/l	0.200 lbs/day
Silver	N/A ug/l	N/A lbs/day	10.56 ug/l	0.106 lbs/day
Zinc	198.66 ug/l	1.990 lbs/day	198.66 ug/l	1.990 lbs/day

\* Allowed below discharge

\*\*Chronic Aluminum standard applies only to waters with a pH < 7.0 and a Hardness < 50 mg/l as CaCO<sub>3</sub>

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Metals Standards Based upon a Hardness of 181.62 mg/l as CaCO<sub>3</sub>

**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	3.76 lbs/day
Cadmium			10.0 ug/l	0.05 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	6.01 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	0.740 lbs/day
Barium			1000.0 ug/l	14.806 lbs/day
Cadmium			10.0 ug/l	0.148 lbs/day
Chromium			50.0 ug/l	0.740 lbs/day
Lead			50.0 ug/l	0.740 lbs/day
Mercury			2.0 ug/l	0.030 lbs/day
Selenium			10.0 ug/l	0.148 lbs/day
Silver			50.0 ug/l	0.740 lbs/day
Fluoride (3)			1.4 ug/l	0.021 lbs/day
to			2.4 ug/l	0.036 lbs/day
Nitrates as N			10.0 ug/l	0.148 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	0.21 lbs/day		
Arsenic	50.0 ug/l	0.74 lbs/day	4300.00 ug/l	63.67 lbs/day
Asbestos	7.00E+06 ug/l	1.04E+05 lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	1.30E+03 ug/l	19.25 lbs/day	2.2E+05 ug/l	3257.39 lbs/day
Lead	700.0 ug/l	10.36 lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	68.11 lbs/day
Selenium	0.1 ug/l	0.00 lbs/day		
Silver	610.0 ug/l	9.03 lbs/day		
Thallium			6.30 ug/l	0.09 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**

	<b>Stream</b>								
	<b>Critical Low</b>								
	<b>Flow</b>	<b>Temp.</b>	<b>pH</b>	<b>T-NH3</b>	<b>BOD5</b>	<b>DO</b>	<b>TRC</b>	<b>TDS</b>	
	<b>cfs</b>	<b>Deg. C</b>		<b>mg/l as N</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>
Summer (Irrig. Season)	1.2	14.2	8.3	0.03	1.00	7.24	0.00	150.4	
Fall	1.3	5.4	8.2	0.04	1.63	---	0.00	187.2	
Winter	2.0	4.0	8.2	0.04	1.50	---	0.00	187.2	
Spring	10.0	8.9	7.9	0.04	0.69	---	0.00	187.2	
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	34.84	1.20	0.42	1.99	2.65*	2.78	0.1	0.72	
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	0.53	0.51	11.37	10.0			* 1/2 MDL

**Projected Discharge Information**

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Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	1.00000	17.2	355.17	1.48075
Fall	1.00000	5.7		
Winter	1.00000	3.6		
Spring	1.00000	13.7		

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	1.000 MGD	1.547 cfs
Fall	1.000 MGD	1.547 cfs
Winter	1.000 MGD	1.547 cfs
Spring	1.000 MGD	1.547 cfs

**Flow Requirement or Loading Requirement**

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 1 MGD. If the discharger is allowed to have a flow greater than 1 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 >	EOP Effluent	[Acute]
	IC25 >	60.8% 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	30.0 mg/l as BOD5	250.1 lbs/day
Fall	30.0 mg/l as BOD5	250.1 lbs/day
Winter	30.0 mg/l as BOD5	250.1 lbs/day
Spring	30.0 mg/l as BOD5	250.1 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



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D.O. limitation as follows:

Season	Concentration
Summer	5.50
Fall	5.50
Winter	5.50
Spring	5.50

**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	3.2 mg/l as N	26.3 lbs/day
	1 Hour Avg. - Acute	6.5 mg/l as N	54.4 lbs/day
Fall	4 Day Avg. - Chronic	12.8 mg/l as N	106.3 lbs/day
	1 Hour Avg. - Acute	20.6 mg/l as N	171.5 lbs/day
Winter	4 Day Avg. - Chronic	5.4 mg/l as N	44.7 lbs/day
	1 Hour Avg. - Acute	12.5 mg/l as N	104.5 lbs/day
Spring	4 Day Avg. - Chronic	3.2 mg/l as N	27.1 lbs/day
	1 Hour Avg. - Acute	6.5 mg/l as N	53.9 lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100.%.

**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	0.017 mg/l	0.15 lbs/day
	1 Hour Avg. - Acute	0.031 mg/l	0.26 lbs/day
Fall	4 Day Avg. - Chronic	0.018 mg/l	0.15 lbs/day
	1 Hour Avg. - Acute	0.032 mg/l	0.26 lbs/day
Winter	4 Day Avg. - Chronic	0.022 mg/l	0.18 lbs/day
	1 Hour Avg. - Acute	0.038 mg/l	0.32 lbs/day
Spring	4 Day Avg. - Chronic	0.065 mg/l	0.00 lbs/day
	1 Hour Avg. - Acute	0.116 mg/l	0.00 lbs/day

**Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards**

Season		Concentration	Load
Summer	Maximum, Acute	2014.1 mg/l	8.40 tons/day
Fall	Maximum, Acute	1985.6 mg/l	8.28 tons/day
Winter	Maximum, Acute	1977.6 mg/l	8.24 tons/day
Spring	4 Day Avg. - Chronic	2051.7 mg/l	8.55 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

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limitation as follows (based upon a hardness of 181.62 mg/l):

	4 Day Average		1 Hour Average		Load
	Concentration	Load	Concentration	Load	
Aluminum	N/A	N/A	1,027.4	ug/l	10.3 lbs/day
Arsenic	265.42 ug/l	1.4 lbs/day	471.4	ug/l	4.7 lbs/day
Cadmium	1.94 ug/l	0.0 lbs/day	4.6	ug/l	0.0 lbs/day
Chromium III	247.93 ug/l	1.3 lbs/day	4,078.7	ug/l	40.8 lbs/day
Chromium VI	16.45 ug/l	0.1 lbs/day	20.7	ug/l	0.2 lbs/day
Copper	25.43 ug/l	0.1 lbs/day	33.0	ug/l	0.3 lbs/day
Iron	N/A	N/A	1,387.8	ug/l	13.9 lbs/day
Lead	11.52 ug/l	0.1 lbs/day	241.9	ug/l	2.4 lbs/day
Mercury	0.02 ug/l	0.0 lbs/day	3.3	ug/l	0.0 lbs/day
Nickel	151.52 ug/l	0.8 lbs/day	1,077.8	ug/l	10.8 lbs/day
Selenium	7.76 ug/l	0.0 lbs/day	27.6	ug/l	0.3 lbs/day
Silver	N/A ug/l	N/A lbs/day	14.5	ug/l	0.1 lbs/day
Zinc	343.94 ug/l	1.9 lbs/day	271.3	ug/l	2.7 lbs/day
Cyanide (free)	9.23 ug/l	0.0 lbs/day	30.5	ug/l	0.3 lbs/day

**Effluent Limitations for Heat/Temperature based upon Water Quality Standards**

Summer	17.5 Deg. C.	63.5 Deg. F
Fall	8.8 Deg. C.	47.8 Deg. F
Winter	8.1 Deg. C.	46.6 Deg. F
Spring	21.7 Deg. C.	71.1 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:

	Concentration	1 Hour Average
		Loading
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	50.1 lbs/day
Nitrates as N	4.0 mg/l	40.1 lbs/day
Total Phosphorus as P	0.05 mg/l	0.5 lbs/day
Total Suspended Solids	90.0 mg/l	901.4 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:

Metals	Maximum Concentration	
	Concentration	Load
Antimony	24.86 ug/l	0.21 lbs/day
Arsenic	87.85 ug/l	0.73 lbs/day
Asbestos	1.24E+07 ug/l	1.04E+05 lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		

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Copper	2308.40 ug/l	19.25 lbs/day
Cyanide	1242.99 ug/l	10.36 lbs/day
Lead	0.00	0.00
Mercury	0.25 ug/l	0.00 lbs/day
Nickel	1083.17 ug/l	9.03 lbs/day
Selenium	0.00	0.00
Silver	0.00	0.00
Thallium	3.02 ug/l	0.03 lbs/day
Zinc		

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

	<b>Class 4 Acute Agricultural ug/l</b>	<b>Class 3 Acute Aquatic Wildlife ug/l</b>	<b>Acute Toxics Drinking Water Source ug/l</b>	<b>Acute Toxics Wildlife ug/l</b>	<b>1C Acute Health Criteria ug/l</b>	<b>Acute Most Stringent ug/l</b>	<b>Class 3 Chronic Aquatic Wildlife ug/l</b>
Aluminum		1027.4				1027.4	N/A
Antimony			24.9	7635.5		24.9	
Arsenic	177.6	471.4	87.9		0.0	87.9	265.4
Asbestos			1.24E+07			1.24E+07	
Barium					1775.7	1775.7	
Beryllium						0.0	
Cadmium	17.4	4.6			0.0	4.6	1.9
Chromium (III)		4078.7			0.0	4078.7	247.9
Chromium (VI)	176.0	20.7			0.0	20.66	16.45
Copper	353.0	33.0	2308.4			33.0	25.4
Cyanide		30.5	390652.9			30.5	9.2
Iron		1387.8				1387.8	
Lead	177.0	241.9			0.0	177.0	11.5
Mercury		3.33	0.2	0.27	0.0	0.25	0.021
Nickel		1077.8	1083.2	8168.2		1077.8	151.5
Selenium	88.4	27.6			0.0	27.6	7.8
Silver		14.5			0.0	14.5	
Thallium			3.0	11.2		3.0	
Zinc		271.3				271.3	343.9
Boron	1331.8					1331.8	

**Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]**

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

	<b>WLA Acute ug/l</b>	<b>WLA Chronic ug/l</b>	
Aluminum	1027.4	N/A	
Antimony	24.86		
Arsenic	87.9	265.4	Acute Controls
Asbestos	1.24E+07		
Barium			
Beryllium			
Cadmium	4.6	1.9	
Chromium (III)	4078.7	248	
Chromium (VI)	20.7	16.4	
Copper	33.0	25.4	
Cyanide	30.5	9.2	
Iron	1387.8		
Lead	177.0	11.5	
Mercury	0.249	0.021	
Nickel	1077.8	152	
Selenium	27.6	7.8	
Silver	14.5	N/A	
Thallium	3.0		

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Zinc	271.3	343.9	Acute Controls
Boron	1331.76		

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

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2.000	0.000	1.534	158.034	0.000	137.827	0.250	0.160
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 3.069	NO2+NO3 LOSS (K6)20 1/day 0.000	NO2+NO3 (K6)T 1/day 0.000	TRC Decay K(CI)20 1/day 32.000	TRC K(CI)(T) 1/day 22.865
BENTHIC DEMAND (SOD)20 gm/m2/day 1.000	BENTHIC DEMAND (SOD)T gm/m2/day 0.695						
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(CI) 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.