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

Date: **February 25, 2021**

Prepared by: **Suzan Tahir**
Standards and Technical Services

Facility: **Corinne City Corp.**
UPDES No. UT- 0020931

Receiving water: **Bear River (2B, 3B, 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: Bear River

The mean monthly design discharge is 0.07 MGD (0.11 cfs) for the facility.

Receiving Water

The receiving water for Outfall 001 is the Bear River.

Per UAC R317-2-13.3(a), the designated beneficial uses for the Bear River and tributaries, from Great Salt Lake to Utah-Idaho border are 2B, 3B, 3D and 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.*

- *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 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.*

Flow

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten-year return frequency (7Q10). The 7Q10 flow was calculated using USGS data from station 10126000 (BEAR RIVER NEAR CORINNE, UT) for the period 2010-2020. The calculated critical low flow values for each season are listed in Table 1.

Table 1. Seasonal 7Q10 Flow Values

Season	7Q10 Flow (cfs)
Summer	87.91
Fall	202.86
Winter	538.57
Spring	99.46
Overall	1271.01

The receiving water quality in the Bear River was characterized using DWQ monitoring site 4901100 (BEAR RIVER NEAR CORINNE AT U83 XING) for the period 2000-2020.

TMDL

According to the Utah's 2016 303(d) Water Quality Assessment Report, the receiving water for the discharge, Bear River from Reeder Overflow diversion to Cutler Reservoir UT16010204-008_00 (Bear River-2) is impaired for Bioassessment and Temperature.

In 2002, a TMDL was completed for the Lower Bear River. However, there were insufficient data to accurately allocate nutrient loads. In 2018, an Implementation Plan was developed by the Utah Division of Water Quality that included loading allocations for the point sources in the basin. The Implementation Plan allocates 2.5 lb/d of total phosphorus for this facility whereas the Corinne Lagoons current load is 2.0 lb/d of total phosphorus. The TMDL instream total phosphorus endpoint remains the same as in 2002.

Moreover, the 2018/2020 Integrated Report, divided the existing assessment unit into two and the receiving water for the discharge Bear River from Reeder Overflow Diversion to the confluence with the Malad River (UT16010204-008_02 Bear River-2-2) is impaired for Macroinvertebrates, Minimum Dissolved Oxygen and Total Dissolved Solids (TDS) (https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2020-021402.pdf).

Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and 2,500 feet for chronic conditions, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone.

The mixing zone analysis shows the discharge to be fully mixed by the end of the mixing zone. Acute limits were calculated using 50% of the seasonal critical low flow.

Parameters of Concern

The potential parameters of concerns identified for the discharge/receiving water were as determined in consultation with the UPDES Permit Writer are metals (as a function of hardness) due to the metal finisher in the area.

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_{50} (lethal concentration, 50%) percent effluent for acute toxicity and the IC_{25} (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test (see Table 2), needs to be below the WET limits, as determined by the WLA. The WET limit for LC_{50} is typically 100% effluent and does not need to be determined by the WLA.

Table 2.WET Limits for IC25

Outfall	Percent Effluent
Outfall 001	0.1%

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a simple mass balance mixing analysis (UDWQ 2012). 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. 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.

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.

Documents:

WLA Document*: Corinne_WLA_2-25-2021.docx*
Wasteload Analysis and Addendum: *Corinne_WLA_2-25-2021.xlsm*

References:

Utah Division of Water Quality. 2012. *Utah Wasteload Analysis Procedures Version 1.0*.

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
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

25-Feb-21
4:00 PM

Facilities: **Corinne Lagoons** **UPDES No: UT-0020931**
Discharging to: **Bear River**

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 interms 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

Bear River:	2B, 3B, 3D, 4
Antidegradation Review:	Antidegredation Level 2 not required. Simple renewal, no increase in permitted flow or concentration.

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)	5.50 mg/l (30 Day Average) 4.00 mg/l (7Day Average) 3.00 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 Concentration		Load*		1 Hour Average (Acute) Standard Concentration		Load*	
Aluminum	87.00	ug/l**	0.051	lbs/day	750.00	ug/l	0.438	lbs/day
Arsenic	190.00	ug/l	0.111	lbs/day	340.00	ug/l	0.198	lbs/day
Cadmium	0.64	ug/l	0.000	lbs/day	6.96	ug/l	0.004	lbs/day
Chromium III	223.33	ug/l	0.130	lbs/day	4672.43	ug/l	2.727	lbs/day
ChromiumVI	11.00	ug/l	0.006	lbs/day	16.00	ug/l	0.009	lbs/day
Copper	25.19	ug/l	0.015	lbs/day	41.86	ug/l	0.024	lbs/day
Iron					1000.00	ug/l	0.584	lbs/day
Lead	13.98	ug/l	0.008	lbs/day	358.68	ug/l	0.209	lbs/day
Mercury	0.0120	ug/l	0.000	lbs/day	2.40	ug/l	0.001	lbs/day
Nickel	139.49	ug/l	0.081	lbs/day	1254.59	ug/l	0.732	lbs/day
Selenium	4.60	ug/l	0.003	lbs/day	20.00	ug/l	0.012	lbs/day
Silver	N/A	ug/l	N/A	lbs/day	27.96	ug/l	0.016	lbs/day
Zinc	320.88	ug/l	0.187	lbs/day	320.88	ug/l	0.187	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

Metals Standards Based upon a Hardness of 319.84 mg/l as CaCO3

Organics [Pesticides]

Parameter	4 Day Average (Chronic) Standard Concentration		Load*		1 Hour Average (Acute) Standard Concentration		Load*	
Aldrin					1.500	ug/l	0.001	lbs/day
Chlordane	0.004	ug/l	2.040	lbs/day	1.200	ug/l	0.001	lbs/day
DDT, DDE	0.001	ug/l	0.474	lbs/day	0.550	ug/l	0.000	lbs/day
Dieldrin	0.002	ug/l	0.901	lbs/day	1.250	ug/l	0.001	lbs/day
Endosulfan	0.056	ug/l	26.567	lbs/day	0.110	ug/l	0.000	lbs/day
Endrin	0.002	ug/l	1.091	lbs/day	0.090	ug/l	0.000	lbs/day
Guthion					0.010	ug/l	0.000	lbs/day
Heptachlor	0.004	ug/l	1.803	lbs/day	0.260	ug/l	0.000	lbs/day
Lindane	0.080	ug/l	37.953	lbs/day	1.000	ug/l	0.001	lbs/day
Methoxychlor					0.030	ug/l	0.000	lbs/day
Mirex					0.010	ug/l	0.000	lbs/day
Parathion					0.040	ug/l	0.000	lbs/day
PCB's	0.014	ug/l	6.642	lbs/day	2.000	ug/l	0.001	lbs/day
Pentachlorophenol	13.00	ug/l	6167.442	lbs/day	20.000	ug/l	0.012	lbs/day
Toxephene	0.0002	ug/l	0.095	lbs/day	0.7300	ug/l	0.000	lbs/day

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	lbs/day
Cadmium			10.0 ug/l	0.00 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	0.35 tons/day

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

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Metals	**Concentration**	**Load***	**Concentration**	**Load***
Arsenic			ug/l	lbs/day
Barium			ug/l	lbs/day
Cadmium			ug/l	lbs/day
Chromium			ug/l	lbs/day
Lead			ug/l	lbs/day
Mercury			ug/l	lbs/day
Selenium			ug/l	lbs/day
Silver			ug/l	lbs/day
Fluoride (3)			ug/l	lbs/day
to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day
Chlorophenoxy Herbicides				
2,4-D			ug/l	lbs/day
2,4,5-TP			ug/l	lbs/day
Endrin			ug/l	lbs/day
ocyclohexane (Lindane)			ug/l	lbs/day
Methoxychlor			ug/l	lbs/day
Toxaphene			ug/l	lbs/day

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

	Maximum Conc., ug/l - Acute Standards				
	Class 1C		**Class 3A, 3B**		
Toxic Organics	[2 Liters/Day for 70 Kg Person over 70 Yr.]		[6.5 g for 70 Kg Person over 70 Yr.]		
Acenaphthene	ug/l	lbs/day	2700.0 ug/l	1280.93	lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	370.05	lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	0.31	lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	33.68	lbs/day
Benzidine	ug/l	lbs/day	0.0 ug/l	0.00	lbs/day
Carbon tetrachloride	ug/l	lbs/day	4.4 ug/l	2.09	lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	9962.79	lbs/day
1,2,4-Trichlorobenzene					
Hexachlorobenzene	ug/l	lbs/day	0.0 ug/l	0.00	lbs/day
1,2-Dichloroethane	ug/l	lbs/day	99.0 ug/l	46.97	lbs/day
1,1,1-Trichloroethane					
Hexachloroethane	ug/l	lbs/day	8.9 ug/l	4.22	lbs/day
1,1-Dichloroethane					
1,1,2-Trichloroethane	ug/l	lbs/day	42.0 ug/l	19.93	lbs/day
1,1,2,2-Tetrachloroetha	ug/l	lbs/day	11.0 ug/l	5.22	lbs/day
Chloroethane			0.0 ug/l	0.00	lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4 ug/l	0.66	lbs/day
2-Chloroethyl vinyl ethe	ug/l	lbs/day	0.0 ug/l	0.00	lbs/day
2-Chloronaphthalene	ug/l	lbs/day	4300.0 ug/l	2040.00	lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5 ug/l	3.08	lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00	lbs/day

Chloroform (HM)	ug/l	lbs/day	470.0	ug/l	222.98	lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0	ug/l	189.77	lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0	ug/l	8065.12	lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	1233.49	lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	1233.49	lbs/day
3,3'-Dichlorobenzidine	ug/l	lbs/day	0.1	ug/l	0.04	lbs/day
1,1-Dichloroethylene	ug/l	lbs/day	3.2	ug/l	1.52	lbs/day
1,2-trans-Dichloroethyle	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
2,4-Dichlorophenol	ug/l	lbs/day	790.0	ug/l	374.79	lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0	ug/l	18.50	lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0	ug/l	806.51	lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0	ug/l	1091.16	lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1	ug/l	4.32	lbs/day
2,6-Dinitrotoluene	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
1,2-Diphenylhydrazine	ug/l	lbs/day	0.5	ug/l	0.26	lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0	ug/l	13758.14	lbs/day
Fluoranthene	ug/l	lbs/day	370.0	ug/l	175.53	lbs/day
4-Chlorophenyl phenyl ether						
4-Bromophenyl phenyl ether						
Bis(2-chloroisopropyl) e	ug/l	lbs/day	170000.0	ug/l	80651.16	lbs/day
Bis(2-chloroethoxy) met	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
Methylene chloride (HM	ug/l	lbs/day	1600.0	ug/l	759.07	lbs/day
Methyl chloride (HM)	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
Methyl bromide (HM)	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
Bromoform (HM)	ug/l	lbs/day	360.0	ug/l	170.79	lbs/day
Dichlorobromomethane	ug/l	lbs/day	22.0	ug/l	10.44	lbs/day
Chlorodibromomethane	ug/l	lbs/day	34.0	ug/l	16.13	lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0	ug/l	23.72	lbs/day
Hexachlorocyclopentadi	ug/l	lbs/day	17000.0	ug/l	8065.12	lbs/day
Isophorone	ug/l	lbs/day	600.0	ug/l	284.65	lbs/day
Naphthalene						
Nitrobenzene	ug/l	lbs/day	1900.0	ug/l	901.40	lbs/day
2-Nitrophenol	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
4-Nitrophenol	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
2,4-Dinitrophenol	ug/l	lbs/day	14000.0	ug/l	6641.86	lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0	ug/l	362.93	lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1	ug/l	3.84	lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0	ug/l	7.59	lbs/day
N-Nitrosodi-n-propylami	ug/l	lbs/day	1.4	ug/l	0.66	lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2	ug/l	3.89	lbs/day
Phenol	ug/l	lbs/day	4.6E+06	ug/l	2.18E+06	lbs/day
Bis(2-ethylhexyl)phthala	ug/l	lbs/day	5.9	ug/l	2.80	lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0	ug/l	2466.98	lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0	ug/l	5693.02	lbs/day
Di-n-octyl phthlate						
Diethyl phthalate	ug/l	lbs/day	120000.0	ug/l	56930.23	lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06	ug/l	1.38E+06	lbs/day
Benzo(a)anthracene (P/	ug/l	lbs/day	0.0	ug/l	0.01	lbs/day
Benzo(a)pyrene (PAH)	ug/l	lbs/day	0.0	ug/l	0.01	lbs/day
Benzo(b)fluoranthene (F	ug/l	lbs/day	0.0	ug/l	0.01	lbs/day
Benzo(k)fluoranthene (F	ug/l	lbs/day	0.0	ug/l	0.01	lbs/day
Chrysene (PAH)	ug/l	lbs/day	0.0	ug/l	0.01	lbs/day
Acenaphthylene (PAH)						
Anthracene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day

Dibenzo(a,h)anthracene	ug/l	lbs/day	0.0	ug/l	0.01 lbs/day
Indeno(1,2,3-cd)pyrene	ug/l	lbs/day	0.0	ug/l	0.01 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0	ug/l	5218.60 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9	ug/l	4.22 lbs/day
Toluene	ug/l	lbs/day	200000	ug/l	94883.72 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0	ug/l	38.43 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0	ug/l	249.07 lbs/day
					lbs/day
Pesticides					lbs/day
Aldrin	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Dieldrin	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Chlordane	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
4,4'-DDT	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
4,4'-DDE	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
4,4'-DDD	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
alpha-Endosulfan	ug/l	lbs/day	2.0	ug/l	0.95 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0	ug/l	0.95 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0	ug/l	0.95 lbs/day
Endrin	ug/l	lbs/day	0.8	ug/l	0.38 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8	ug/l	0.38 lbs/day
Heptachlor	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Heptachlor epoxide					
PCB's					
PCB 1242 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1254 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1221 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1232 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1248 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1260 (Arochlor 12	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1016 (Arochlor 10	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Pesticide					
Toxaphene	ug/l		0.0	ug/l	0.00 lbs/day
Dioxin					
Dioxin (2,3,7,8-TCDD)	ug/l	lbs/day			
Metals					
Antimony	ug/l	lbs/day			
Arsenic	ug/l	lbs/day	4300.00	ug/l	2040.00 lbs/day
Asbestos	ug/l	lbs/day			
Beryllium					
Cadmium					
Chromium (III)					
Chromium (VI)					
Copper					
Cyanide	ug/l	lbs/day	2.2E+05	ug/l	104372.09 lbs/day
Lead	ug/l	lbs/day			
Mercury			0.15	ug/l	0.07 lbs/day
Nickel			4600.00	ug/l	2182.33 lbs/day
Selenium	ug/l	lbs/day			
Silver	ug/l	lbs/day			
Thallium			6.30	ug/l	2.99 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.

(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 cfs	Temp. Deg. C	pH	T-NH3 mg/l as N	BOD5 mg/l	DO mg/l	TRC mg/l	TDS mg/l
Summer (Irrig. Season)	87.9	23.1	8.4	0.08	0.10	6.57	0.00	2333.7
Fall	202.9	7.6	8.4	0.04	0.10	---	0.00	840.3
Winter	538.6	3.1	8.2	0.16	0.10	---	0.00	840.3
Spring	99.5	16.3	8.3	0.07	0.10	---	0.00	840.3

Dissolved Metals	Al ug/l	As ug/l	Cd ug/l	CrIII ug/l	CrVI ug/l	Copper ug/l	Fe ug/l	Pb ug/l
All Seasons	1.59*	0.53*	0.053*	0.53*	2.65*	0.53*	0.83*	0.53*

Dissolved Metals	Hg ug/l	Ni ug/l	Se ug/l	Ag ug/l	Zn ug/l	Boron ug/l		
All Seasons	0.0000	0.53*	1.06*	0.1*	0.053*	10.0		* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.07000	21.4	1204.00	0.35138
Fall	0.07000	7.5		
Winter	0.07000	2.5		
Spring	0.07000	16.3		

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	0.070 MGD	0.108 cfs
Fall	0.070 MGD	0.108 cfs
Winter	0.070 MGD	0.108 cfs
Spring	0.070 MGD	0.108 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.07 MGD. If the discharger is allowed to have a flow greater than 0.07 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occuring, the permit writers must include the discharge flow limititation 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 segements if the values below are met.

WET Requirements	LC50 >	0.8%	Effluent	[Acute]
	IC25 >	0.1%	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	14.6 lbs/day
Fall	25.0 mg/l as BOD5	14.6 lbs/day
Winter	25.0 mg/l as BOD5	14.6 lbs/day
Spring	25.0 mg/l as BOD5	14.6 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 D.O. limitation as follows:

Season	**Concentration**
Summer	4.00
Fall	4.00
Winter	4.00
Spring	4.00

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	559.7	mg/l as N	326.7	lbs/day
	1 Hour Avg. - Acute	1120.0	mg/l as N	653.7	lbs/day
Fall	4 Day Avg. - Chronic	986.6	mg/l as N	575.9	lbs/day
	1 Hour Avg. - Acute	1162.0	mg/l as N	678.3	lbs/day
Winter	4 Day Avg. - Chronic	7129.2	mg/l as N	4,161.2	lbs/day
	1 Hour Avg. - Acute	9434.2	mg/l as N	5,506.6	lbs/day
Spring	4 Day Avg. - Chronic	2005.0	mg/l as N	0.0	lbs/day
	1 Hour Avg. - Acute	2364.8	mg/l as N	0.0	lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 50.%.

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	8.860	mg/l	5.17	lbs/day
	1 Hour Avg. - Acute	7.691	mg/l	4.49	lbs/day
Fall	4 Day Avg. - Chronic	20.430	mg/l	11.92	lbs/day
	1 Hour Avg. - Acute	17.722	mg/l	10.34	lbs/day
Winter	4 Day Avg. - Chronic	54.221	mg/l	31.65	lbs/day
	1 Hour Avg. - Acute	47.018	mg/l	27.44	lbs/day
Spring	4 Day Avg. - Chronic	10.022	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	8.698	mg/l	0.00	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	1200.0	mg/l	0.35	tons/day
Fall	Maximum, Acute	1200.0	mg/l	0.35	tons/day
Winter	Maximum, Acute	1200.0	mg/l	0.35	tons/day
Spring	4 Day Avg. - Chronic	1200.0	mg/l	0.35	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 limitation as follows (based upon a hardness of 319.84 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum	N/A		N/A		304,207.5	ug/l	177.6	lbs/day
Arsenic	1.54E+05	ug/l	58.0	lbs/day	138,023.6	ug/l	80.6	lbs/day
Cadmium	456.00	ug/l	0.2	lbs/day	2,798.0	ug/l	1.6	lbs/day
Chromium III	1.81E+05	ug/l	68.2	lbs/day	1.90E+06	ug/l	1109.5	lbs/day
Chromium VI	5,713.91	ug/l	2.2	lbs/day	4,897.0	ug/l	2.9	lbs/day
Copper	1.98E+04	ug/l	7.5	lbs/day	16,711.9	ug/l	9.8	lbs/day
Iron	N/A		N/A		406,393.4	ug/l	237.2	lbs/day
Lead	1.07E+04	ug/l	4.0	lbs/day	145,623.4	ug/l	85.0	lbs/day
Mercury	9.75	ug/l	0.0	lbs/day	976.6	ug/l	0.6	lbs/day
Nickel	1.13E+05	ug/l	42.5	lbs/day	510,171.9	ug/l	297.8	lbs/day
Selenium	2,448.12	ug/l	0.9	lbs/day	7,492.6	ug/l	4.4	lbs/day
Silver	N/A	ug/l	N/A	lbs/day	11,375.4	ug/l	6.6	lbs/day
Zinc	2.61E+05	ug/l	98.4	lbs/day	130,533.8	ug/l	76.2	lbs/day
Cyanide	4,226.57	ug/l	1.6	lbs/day	8,951.8	ug/l	5.2	lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	100.0	Deg. C.	212.0	Deg. F
Fall	100.0	Deg. C.	212.0	Deg. F
Winter	100.0	Deg. C.	212.0	Deg. F

Spring	100.0	Deg. C.	212.0	Deg. F

Effluent Limitations for Organics [Pesticides]
Based upon Water Quality Standards

In-stream criteria of downstream segments for Organics [Pesticides] will be met with an effluent limit as follows:

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aldrin					1.5E+00	ug/l	1.35E-03	lbs/day
Chlordane	4.30E-03	ug/l	2.51E-03	lbs/day	1.2E+00	ug/l	1.08E-03	lbs/day
DDT, DDE	1.00E-03	ug/l	5.84E-04	lbs/day	5.5E-01	ug/l	4.97E-04	lbs/day
Dieldrin	1.90E-03	ug/l	1.11E-03	lbs/day	1.3E+00	ug/l	1.13E-03	lbs/day
Endosulfan	5.60E-02	ug/l	3.27E-02	lbs/day	1.1E-01	ug/l	9.93E-05	lbs/day
Endrin	2.30E-03	ug/l	1.34E-03	lbs/day	9.0E-02	ug/l	8.13E-05	lbs/day
Guthion	0.00E+00	ug/l	0.00E+00	lbs/day	1.0E-02	ug/l	9.03E-06	lbs/day
Heptachlor	3.80E-03	ug/l	2.22E-03	lbs/day	2.6E-01	ug/l	2.35E-04	lbs/day
Lindane	8.00E-02	ug/l	4.67E-02	lbs/day	1.0E+00	ug/l	9.03E-04	lbs/day
Methoxychlor	0.00E+00	ug/l	0.00E+00	lbs/day	3.0E-02	ug/l	2.71E-05	lbs/day
Mirex	0.00E+00	ug/l	0.00E+00	lbs/day	1.0E-02	ug/l	9.03E-06	lbs/day
Parathion	0.00E+00	ug/l	0.00E+00	lbs/day	4.0E-02	ug/l	3.61E-05	lbs/day
PCB's	1.40E-02	ug/l	8.17E-03	lbs/day	2.0E+00	ug/l	1.81E-03	lbs/day
Pentachlorophenol	1.30E+01	ug/l	7.59E+00	lbs/day	2.0E+01	ug/l	1.81E-02	lbs/day
Toxephene	2.00E-04	ug/l	1.17E-04	lbs/day	7.3E-01	ug/l	6.59E-04	lbs/day

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	2.9	lbs/day
Nitrates as N	4.0	mg/l	2.3	lbs/day
Total Phosphorus as P	0.05	mg/l	0.0	lbs/day
Total Suspended Solids	90.0	mg/l	52.5	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	
Toxic Organics				
Acenaphthene	2.19E+06	ug/l	1.28E+03	lbs/day
Acrolein	6.34E+05	ug/l	3.70E+02	lbs/day
Acrylonitrile	5.36E+02	ug/l	3.13E-01	lbs/day
Benzene	5.77E+04	ug/l	3.37E+01	lbs/day
Benzidine		ug/l		lbs/day
Carbon tetrachloride	3.58E+03	ug/l	2.09E+00	lbs/day
Chlorobenzene	1.71E+07	ug/l	9.96E+03	lbs/day
1,2,4-Trichlorobenzene				
Hexachlorobenzene	6.26E-01	ug/l	3.65E-04	lbs/day
1,2-Dichloroethane	8.05E+04	ug/l	4.70E+01	lbs/day
1,1,1-Trichloroethane				
Hexachloroethane	7.23E+03	ug/l	4.22E+00	lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	3.41E+04	ug/l	1.99E+01	lbs/day
1,1,2,2-Tetrachloroethane	8.94E+03	ug/l	5.22E+00	lbs/day
Chloroethane				
Bis(2-chloroethyl) ether	1.14E+03	ug/l	6.64E-01	lbs/day
2-Chloroethyl vinyl ether				
2-Chloronaphthalene	3.50E+06	ug/l	2.04E+03	lbs/day
2,4,6-Trichlorophenol	5.28E+03	ug/l	3.08E+00	lbs/day
p-Chloro-m-cresol				
Chloroform (HM)	3.82E+05	ug/l	2.23E+02	lbs/day
2-Chlorophenol	3.25E+05	ug/l	1.90E+02	lbs/day
1,2-Dichlorobenzene	1.38E+07	ug/l	8.07E+03	lbs/day
1,3-Dichlorobenzene	2.11E+06	ug/l	1.23E+03	lbs/day
1,4-Dichlorobenzene	2.11E+06	ug/l	1.23E+03	lbs/day
3,3'-Dichlorobenzidine	6.26E+01	ug/l	3.65E-02	lbs/day
1,1-Dichloroethylene	2.60E+03	ug/l	1.52E+00	lbs/day
1,2-trans-Dichloroethylene1				
2,4-Dichlorophenol	6.42E+05	ug/l	3.75E+02	lbs/day
1,2-Dichloropropane	3.17E+04	ug/l	1.85E+01	lbs/day
1,3-Dichloropropylene	1.38E+06	ug/l	8.07E+02	lbs/day
2,4-Dimethylphenol	1.87E+06	ug/l	1.09E+03	lbs/day
2,4-Dinitrotoluene	7.40E+03	ug/l	4.32E+00	lbs/day
2,6-Dinitrotoluene				
1,2-Diphenylhydrazine	4.39E+02	ug/l	2.56E-01	lbs/day

Ethylbenzene	2.36E+07	ug/l	1.38E+04	lbs/day
Fluoranthene	3.01E+05	ug/l	1.76E+02	lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopropyl) ether	1.38E+08	ug/l	8.07E+04	lbs/day
Bis(2-chloroethoxy) methane				
Methylene chloride (HM)	1.30E+06	ug/l	7.59E+02	lbs/day
Methyl chloride (HM)				
Methyl bromide (HM)				
Bromoform (HM)	2.93E+05	ug/l	1.71E+02	lbs/day
Dichlorobromomethane(HM)	1.79E+04	ug/l	1.04E+01	lbs/day
Chlorodibromomethane (HM)	2.76E+04	ug/l	1.61E+01	lbs/day
Hexachlorocyclopentadiene	1.38E+07	ug/l	8.07E+03	lbs/day
Isophorone	4.88E+05	ug/l	2.85E+02	lbs/day
Naphthalene				
Nitrobenzene	1.54E+06	ug/l	9.01E+02	lbs/day
2-Nitrophenol				
4-Nitrophenol				
2,4-Dinitrophenol	1.14E+07	ug/l	6.64E+03	lbs/day
4,6-Dinitro-o-cresol	6.22E+05	ug/l	3.63E+02	lbs/day
N-Nitrosodimethylamine	6.58E+03	ug/l	3.84E+00	lbs/day
N-Nitrosodiphenylamine	1.30E+04	ug/l	7.59E+00	lbs/day
N-Nitrosodi-n-propylamine	1.14E+03	ug/l	6.64E-01	lbs/day
Pentachlorophenol	6.66E+03	ug/l	3.89E+00	lbs/day
Phenol	3.74E+09	ug/l	2.18E+06	lbs/day
Bis(2-ethylhexyl)phthalate	4.80E+03	ug/l	2.80E+00	lbs/day
Butyl benzyl phthalate	4.23E+06	ug/l	2.47E+03	lbs/day
Di-n-butyl phthalate	9.75E+06	ug/l	5.69E+03	lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	9.75E+07	ug/l	5.69E+04	lbs/day
Dimethyl phthlate	2.36E+09	ug/l	1.38E+06	lbs/day
Benzo(a)anthracene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Benzo(a)pyrene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Benzo(b)fluoranthene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Benzo(k)fluoranthene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Chrysene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)				
Dibenzo(a,h)anthracene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	2.52E+01	ug/l	1.47E-02	lbs/day
Pyrene (PAH)	8.94E+06	ug/l	5.22E+03	lbs/day
Tetrachloroethylene	7.23E+03	ug/l	4.22E+00	lbs/day
Toluene	1.63E+08	ug/l	9.49E+04	lbs/day
Trichloroethylene	6.58E+04	ug/l	3.84E+01	lbs/day
Vinyl chloride	4.27E+05	ug/l	2.49E+02	lbs/day

Pesticides				
Aldrin	1.14E-01	ug/l	6.64E-05	lbs/day
Dieldrin	1.14E-01	ug/l	6.64E-05	lbs/day
Chlordane	4.80E-01	ug/l	2.80E-04	lbs/day
4,4'-DDT	4.80E-01	ug/l	2.80E-04	lbs/day
4,4'-DDE	4.80E-01	ug/l	2.80E-04	lbs/day
4,4'-DDD	6.83E-01	ug/l	3.99E-04	lbs/day
alpha-Endosulfan	1.63E+03	ug/l	9.49E-01	lbs/day
beta-Endosulfan	1.63E+03	ug/l	9.49E-01	lbs/day
Endosulfan sulfate	1.63E+03	ug/l	9.49E-01	lbs/day
Endrin	6.58E+02	ug/l	3.84E-01	lbs/day
Endrin aldehyde	6.58E+02	ug/l	3.84E-01	lbs/day
Heptachlor	1.71E-01	ug/l	9.96E-05	lbs/day
Heptachlor epoxide				
PCB's				
PCB 1242 (Arochlor 1242)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1254 (Arochlor 1254)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1221 (Arochlor 1221)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1232 (Arochlor 1232)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1248 (Arochlor 1248)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1260 (Arochlor 1260)	3.66E-02	ug/l	2.13E-05	lbs/day
PCB-1016 (Arochlor 1016)	3.66E-02	ug/l	2.13E-05	lbs/day
Pesticide				
Toxaphene	6.10E-01	ug/l	3.56E-04	lbs/day
Metals				
Antimony		ug/l		lbs/day
Arsenic		ug/l		lbs/day
Asbestos		ug/l		lbs/day
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper		ug/l		lbs/day
Cyanide		ug/l		lbs/day
Lead				
Mercury		ug/l		lbs/day
Nickel		ug/l		lbs/day
Selenium				
Silver				
Thallium		ug/l		lbs/day
Zinc				
Dioxin				
Dioxin (2,3,7,8-TCDD)	1.14E-05	ug/l	6.64E-09	lbs/day

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		304207.5				304207.5	N/A
Antimony				3495047.1		3495047.1	
Arsenic	81280.2	138023.6			0.0	81280.2	153786.9
Barium						0.0	
Beryllium						0.0	
Cadmium	8063.5	2798.0			0.0	2798.0	456.0
Chromium (III)		1900891.8			0.0	1900891.8	180875.0
Chromium (VI)	80634.8	4897.0			0.0	4896.96	5713.91
Copper	161914.9	16711.9				16711.9	19832.1
Cyanide		8951.8	1.8E+08			8951.8	4226.6
Iron		406393.4				406393.4	
Lead	80634.8	145623.4			0.0	80634.8	10715.3
Mercury		976.56		121.92	0.0	121.92	9.749
Nickel		510171.9		3738887.6		510171.9	112729.4
Selenium	39349.3	7492.6			0.0	7492.6	2448.1
Silver		11375.4			0.0	11375.4	
Thallium				5120.7		5120.7	
Zinc		130533.8				130533.8	260746.6
Boron	609601.2					609601.2	

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	304207.5	N/A	
Antimony	3.50E+06		
Arsenic	81280.2	153786.9	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	2798.0	456.0	
Chromium (III)	1900891.8	180875	
Chromium (VI)	4897.0	5713.9	Acute Controls
Copper	16711.9	19832.1	Acute Controls
Cyanide	8951.8	4226.6	
Iron	406393.4		
Lead	80634.8	10715.3	
Mercury	121.920	9.749	
Nickel	510171.9	112729	
Selenium	7492.6	2448.1	
Silver	11375.4	N/A	
Thallium	5120.7		
Zinc	130533.8	260746.6	Acute Controls
Boron	609601.23		

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 **increase in permitted flow or concentration.**

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 down-stream 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.

XIV. Special Considerations - TMDL

The Corinne Lagoons discharge to a segment of the Bear River that is 303(d) listed for total phosphorous (TP). A TP TMDL was completed for the Bear River on September 9th, 2002. The TMDL indicated that the three point sources in this segment, Corinne, Bear River and Tremonton cities, accounted for approximately 3% of the total phosphorous load to the Lower Bear River. The remaining 97% is attributed to nonpoint sources. Given that the non-point source TP loads overshadow the point source contributions, the time-frame for including TP effluent limits for the small towns of Bear River City, Tremonton and Corinne is not urgent. The Division of Water Quality recently completed a TMDL for Cutler Reservoir (immediately upstream of the lower Bear River segment). Following completion of the Cutler Reservoir TMDL, the Lower Bear River TMDL will be redone.

In 2018, an Implementation Plan developed by the Utah Division of Water Quality allocated 2.5 lb/d of total phosphors (previously the Corinne Lagoons were allocated 2.0 lb/d of total phosphorus). The Lower Bear River Implementation Plan is based on records from May 2011 through June 2016 where average monthly flows range from 0.06 to 0.22 mgd. Insufficient data are available to evaluate trends. Discharge TP concentrations range from 0.69 mg/l to 4.05 mg/l. There do not appear to be any discernible seasonal or long-term trends in discharge TP concentration. TP discharge loads range from 0.20 lb/d to 18.14 lb/d. As with concentration, insufficient data are available to evaluate trends. Additional TP data continues to be collected. A WLA of 2.5 lb/d was calculated by multiplying the average annual load (2.0 lb/d) by 125 percent. A daily average load for each calendar month was calculated by averaging paired TP and flow from June 2011 through May 2016. The daily average load for each month was then multiplied by the number of days per month and summed; the summation was divided by 365 days per year to yield the average annual load in lb/d.

The current average annual load is 2.0 lb/d, which was calculated using monthly averages of paired TP and effluent flow data from June 2011 through May 2016. Implementing the phosphorus loading cap (would result in an increase (on average) of 0.5 lb/d.

No assimilative capacity exists for this pollutant. Effluent limit equals the water quality standard.

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APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day	CBOD Coeff. FORCED (Kd)/day	CBOD Coeff. (Ka)T 1/day	REAER. Coeff. (Ka)20 (Ka)/day	REAER. Coeff. FORCED 1/day	REAER. Coeff. (Ka)T 1/day	NBOD Coeff. (Kn)20 1/day	NBOD Coeff. (Kn)T 1/day
1.000	0.000	1.155	8.299	0.000	8.939	0.400	0.509

Open Coeff. (K4)20 1/day	Open Coeff. (K4)T 1/day	NH3 LOSS (K5)20 1/day	NH3 (K5)T 1/day	NO2+NO3 LOSS (K6)20 1/day	NO2+NO3 (K6)T 1/day	TRC Decay K(Cl)20 1/day	TRC K(Cl)(T) 1/day
0.000	0.000	4.000	4.618	0.000	0.000	32.000	38.402

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	1.218

K1 CBOD {theta}	K2 Reaer. {theta}	K3 NH3 {theta}	K4 Open {theta}	K5 NH3 Loss {theta}	K6 NO2+3 {theta}	K(Cl) TRC {theta}	S Benthic {theta}
1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.1