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

Date: **October 10, 2023**

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

Facility: **Coalville City WWTP**
UPDES No. UT-0025976

Receiving water: **Unnamed Tributary => Chalk Creek (1C, 2B, 3A, 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: Unnamed tributary to Chalk Creek

The mean monthly design discharge is 0.58 MGD (0.90 cfs) for the facility.

Receiving Water Body

The receiving water for Outfall 001 is an unnamed tributary of Chalk Creek.

Per UAC R317-2-13.4(a), the designated beneficial uses for Weber River and tributaries, from Stoddard diversion to headwaters (includes Chalk Creek) is 1C, 2B, 3A and 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.*

- *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.*

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). Due to a lack of flow data, the 7Q10 flow was estimated by calculating the 20th percentile of available data. Chalk Creek tributary flows were determined from DWQ monitoring station #4926323, Receiving Stream ab New Coalville WWTP Discharge, for the period 2012-2023 (all available data). The receiving water was characterized by samples collected from the same site and time period.

The calculated annual low value is 0.21 cfs.

TMDL

According to DWQ 2022 Integrated Report, 303(d) Assessment, Chalk Creek1-Coalville (Chalk Creek and tributaries from confluence with Weber River to South Fork confluence, UT16020101-010_00) supports all designated uses.

Echo Reservoir (UT-L-16020101-001_00), located immediately downstream of the discharge, is listed as impaired (Class 3A use) for total phosphorus.

The Rockport Reservoir and Echo Reservoir Total Maximum Daily Load study was approved March 26, 2014. The TMDL limited Coalville WWTP's total phosphorus load to 582 kg annually and 291 kg during the summer (April 1st - September 30th) and total nitrogen to 5,819 kg annually and 2,909 kg during the summer.

Protection of Downstream Uses

Per UAC R317-2-8, *all actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses*. For this discharge, 3A numeric aquatic life use criteria apply to the immediate receiving water (Chalk Creek).

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.

As per DEQ's mixing zone policy, the effluent was considered to be totally mixed as the ratio of river flow (7Q10) to discharge flow was 0.35 (<=2). Acute limits were calculated using 50% of the seasonal critical low flow.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were ammonia and total phosphorus as determined in consultation with the UPDES Permit Writer. Additional parameters of concern may become apparent as a result of reasonable potential analysis, technology-based standards, or other factors as determined by the UPDES Permit Writer.

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, 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 1: WET Limits for IC_{25}

Outfall	Percent Effluent
Outfall 001	81.0%

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. The proposed permit is a simple renewal, with no increase in flow or concentration over that which was approved in the existing permit.

Documents:

WLA Document *: Coalville_WLADoc_2023.docx*
Wasteload Analysis and Addendum: *Coalville_WLA_2023.xls*

References:

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

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

Utah Division of Water Quality. 2014. Echo Reservoir TMDL Water Quality. March 26, 2014.

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

9-Oct-23
4:00 PM

Facilities: **COALVILLE CITY CORPORATION WTF** **UPDES No: UT-0025976**
Discharging to: **Unamed Trib. => Chalk Creek => Echo Reservoir**

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

Unamed Trib. => Chalk Creek => Echo Reservoir:	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)	6.50 mg/l (30 Day Average) 9.50 mg/l (7Day Average) 7.22 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

Utah Division of Water Quality
Salt Lake City, Utah

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**	0.422 lbs/day	750.00	ug/l	3.634 lbs/day
Arsenic	190.00	ug/l	0.921 lbs/day	340.00	ug/l	1.648 lbs/day
Cadmium	0.74	ug/l	0.004 lbs/day	8.46	ug/l	0.041 lbs/day
Chromium III	261.58	ug/l	1.267 lbs/day	5472.66	ug/l	26.518 lbs/day
ChromiumVI	11.00	ug/l	0.053 lbs/day	16.00	ug/l	0.078 lbs/day
Copper	29.71	ug/l	0.144 lbs/day	50.21	ug/l	0.243 lbs/day
Iron				1000.00	ug/l	4.846 lbs/day
Lead	17.87	ug/l	0.087 lbs/day	458.58	ug/l	2.222 lbs/day
Mercury	0.0120	ug/l	0.000 lbs/day	2.40	ug/l	0.012 lbs/day
Nickel	164.23	ug/l	0.796 lbs/day	1477.14	ug/l	7.158 lbs/day
Selenium	4.60	ug/l	0.022 lbs/day	20.00	ug/l	0.097 lbs/day
Silver	N/A	ug/l	N/A lbs/day	38.96	ug/l	0.189 lbs/day
Zinc	377.89	ug/l	1.831 lbs/day	377.89	ug/l	1.831 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 387.93 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	0.007 lbs/day
Chlordane	0.004	ug/l	0.026 lbs/day	1.200	ug/l	0.006 lbs/day
DDT, DDE	0.001	ug/l	0.006 lbs/day	0.550	ug/l	0.003 lbs/day
Dieldrin	0.002	ug/l	0.011 lbs/day	1.250	ug/l	0.006 lbs/day
Endosulfan	0.056	ug/l	0.334 lbs/day	0.110	ug/l	0.001 lbs/day
Endrin	0.002	ug/l	0.014 lbs/day	0.090	ug/l	0.000 lbs/day
Guthion				0.010	ug/l	0.000 lbs/day
Heptachlor	0.004	ug/l	0.023 lbs/day	0.260	ug/l	0.001 lbs/day
Lindane	0.080	ug/l	0.477 lbs/day	1.000	ug/l	0.005 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	0.084 lbs/day	2.000	ug/l	0.010 lbs/day
Pentachlorophenol	13.00	ug/l	77.586 lbs/day	20.000	ug/l	0.097 lbs/day
Toxephene	0.0002	ug/l	0.001 lbs/day	0.7300	ug/l	0.004 lbs/day

Utah Division of Water Quality
Salt Lake City, Utah

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	0.02 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	2.91 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
xachlorocyclohexane (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	16.11	lbs/day
Acrolein	ug/l	lbs/day	780.0	ug/l	4.66	lbs/day
Acrylonitrile	ug/l	lbs/day	0.7	ug/l	0.00	lbs/day
Benzene	ug/l	lbs/day	71.0	ug/l	0.42	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	0.03	lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0	ug/l	125.33	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	0.59	lbs/day
1,1,1-Trichloroethane						
Hexachloroethane	ug/l	lbs/day	8.9	ug/l	0.05	lbs/day
1,1-Dichloroethane						
1,1,2-Trichloroethane	ug/l	lbs/day	42.0	ug/l	0.25	lbs/day
1,1,2,2-Tetrachloroethane	ug/l	lbs/day	11.0	ug/l	0.07	lbs/day
Chloroethane			0.0	ug/l	0.00	lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4	ug/l	0.01	lbs/day
2-Chloroethyl vinyl ether	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day
2-Chloronaphthalene	ug/l	lbs/day	4300.0	ug/l	25.66	lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5	ug/l	0.04	lbs/day
p-Chloro-m-cresol			0.0	ug/l	0.00	lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0	ug/l	2.81	lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0	ug/l	2.39	lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0	ug/l	101.46	lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	15.52	lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	15.52	lbs/day
3,3'-Dichlorobenzidine	ug/l	lbs/day	0.1	ug/l	0.00	lbs/day
1,1-Dichloroethylene	ug/l	lbs/day	3.2	ug/l	0.02	lbs/day
1,2-trans-Dichloroethylene1	ug/l	lbs/day	0.0	ug/l	0.00	lbs/day

2,4-Dichlorophenol	ug/l	lbs/day	790.0	ug/l	4.71 lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0	ug/l	0.23 lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0	ug/l	10.15 lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0	ug/l	13.73 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1	ug/l	0.05 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	0.00 lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0	ug/l	173.08 lbs/day
Fluoranthene	ug/l	lbs/day	370.0	ug/l	2.21 lbs/day
4-Chlorophenyl phenyl ether					
4-Bromophenyl phenyl ether					
Bis(2-chloroisopropyl) ether	ug/l	lbs/day	170000.0	ug/l	1.01E+03 lbs/day
Bis(2-chloroethoxy) methane	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Methylene chloride (HM)	ug/l	lbs/day	1600.0	ug/l	9.55 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	2.15 lbs/day
Dichlorobromomethane(HM)	ug/l	lbs/day	22.0	ug/l	0.13 lbs/day
Chlorodibromomethane (HM)	ug/l	lbs/day	34.0	ug/l	0.20 lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0	ug/l	0.30 lbs/day
Hexachlorocyclopentadiene	ug/l	lbs/day	17000.0	ug/l	101.46 lbs/day
Isophorone	ug/l	lbs/day	600.0	ug/l	3.58 lbs/day
Naphthalene					
Nitrobenzene	ug/l	lbs/day	1900.0	ug/l	11.34 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	83.55 lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0	ug/l	4.57 lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1	ug/l	0.05 lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0	ug/l	0.10 lbs/day
N-Nitrosodi-n-propylamine	ug/l	lbs/day	1.4	ug/l	0.01 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2	ug/l	0.05 lbs/day
Phenol	ug/l	lbs/day	4.6E+06	ug/l	2.75E+04 lbs/day
Bis(2-ethylhexyl)phthalate	ug/l	lbs/day	5.9	ug/l	0.04 lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0	ug/l	31.03 lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0	ug/l	71.62 lbs/day
Di-n-octyl phthlate					
Diethyl phthalate	ug/l	lbs/day	120000.0	ug/l	716.18 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06	ug/l	1.73E+04 lbs/day
Benzo(a)anthracene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Benzo(a)pyrene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Benzo(b)fluoranthene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Benzo(k)fluoranthene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Chrysene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Acenaphthylene (PAH)					
Anthracene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Dibenzo(a,h)anthracene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0	ug/l	65.65 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9	ug/l	0.05 lbs/day
Toluene	ug/l	lbs/day	200000	ug/l	1193.63 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0	ug/l	0.48 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0	ug/l	3.13 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	0.01 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0	ug/l	0.01 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0	ug/l	0.01 lbs/day
Endrin	ug/l	lbs/day	0.8	ug/l	0.00 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8	ug/l	0.00 lbs/day
Heptachlor	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Heptachlor epoxide					

PCB's				
PCB 1242 (Arochlor 1242)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1254 (Arochlor 1254)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1221 (Arochlor 1221)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1232 (Arochlor 1232)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1248 (Arochlor 1248)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1260 (Arochlor 1260)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1016 (Arochlor 1016)	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	25.66 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	1312.99 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	27.45 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.04 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)	0.21	15.9	7.5	0.04	2.50	7.22	0.00	857.3
Fall	0.21	4.6	8.0	0.05	3.33	---	0.00	635.7
Winter	0.21	2.6	7.9	0.06	2.50	---	0.00	752.0
Spring	0.21	10.2	8.0	0.05	3.33	---	0.00	863.0

	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
All Seasons	2.385*	0.795*	0.0795*	0.795*	3.975*	0.8*	1.25*	0.795*

	Hg	Ni	Se	Ag	Zn	Boron	
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	0.795*	1.59*	0.15*	0.0795*	1.59*	* ~80% MDL

Projected Discharge Information

Season	Flow, MGD	Temp.
Summer	0.58000	18.1
Fall	0.58000	13.4
Winter	0.58000	8.6
Spring	0.58000	12.6

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	0.580 MGD	0.897 cfs
Fall	0.580 MGD	0.897 cfs
Winter	0.580 MGD	0.897 cfs
Spring	0.580 MGD	0.897 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.58 MGD. If the discharger is allowed to have a flow greater than 0.58 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 >	100.0%	Effluent	[Acute]
	IC25 >	81.0%	Effluent	[Chronic]

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	8.00
Fall	8.00
Winter	8.00
Spring	8.00

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	5.32	mg/l as N	25.7	lbs/day
	1 Hour Avg. - Acute	20.4	mg/l as N	98.6	lbs/day
Fall	4 Day Avg. - Chronic	4.5	mg/l as N	21.6	lbs/day
	1 Hour Avg. - Acute	11.2	mg/l as N	54.4	lbs/day
Winter	4 Day Avg. - Chronic	5.0	mg/l as N	24.4	lbs/day
	1 Hour Avg. - Acute	12.1	mg/l as N	58.4	lbs/day
Spring	4 Day Avg. - Chronic	4.8	mg/l as N	23.1	lbs/day
	1 Hour Avg. - Acute	12.5	mg/l as N	60.4	lbs/day

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

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	1280.2	mg/l	3.10	tons/day
Fall	Maximum, Acute	1332.1	mg/l	3.22	tons/day
Winter	Maximum, Acute	1304.9	mg/l	3.16	tons/day
Spring	Maximum, Acute	1278.9	mg/l	3.09	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 387.93 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum*	N/A		N/A		925.0	ug/l	4.5	lbs/day
Arsenic*	234.28	ug/l	0.7	lbs/day	419.4	ug/l	2.0	lbs/day
Cadmium	0.89	ug/l	0.0	lbs/day	10.4	ug/l	0.1	lbs/day
Chromium III	322.61	ug/l	1.0	lbs/day	6,753.3	ug/l	32.7	lbs/day
Chromium VI*	12.64	ug/l	0.0	lbs/day	18.8	ug/l	0.1	lbs/day
Copper	36.48	ug/l	0.1	lbs/day	61.8	ug/l	0.3	lbs/day
Iron*	N/A		N/A		1,107.0	ug/l	5.4	lbs/day
Lead	21.87	ug/l	0.1	lbs/day	565.7	ug/l	2.7	lbs/day
Mercury*	0.01	ug/l	0.0	lbs/day	3.0	ug/l	0.0	lbs/day
Nickel	202.48	ug/l	0.6	lbs/day	1,822.7	ug/l	8.8	lbs/day
Selenium*	5.30	ug/l	0.0	lbs/day	24.3	ug/l	0.1	lbs/day
Silver	N/A	ug/l	N/A	lbs/day	48.1	ug/l	0.2	lbs/day
Zinc	466.32	ug/l	1.5	lbs/day	466.3	ug/l	2.3	lbs/day
Cyanide*	6.42	ug/l	0.0	lbs/day	27.1	ug/l	0.1	lbs/day

*Limits for these metals are based on the dissolved standard.

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	18.4 Deg. C.	65.1 Deg. F
Fall	7.1 Deg. C.	44.8 Deg. F
Winter	5.1 Deg. C.	41.1 Deg. F
Spring	12.7 Deg. C.	54.8 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			1 Hour Average		
	Concentration		Load	Concentration		Load
Aldrin				1.5E+00	ug/l	1.12E-02 lbs/day
Chlordane	4.30E-03	ug/l	2.08E-02 lbs/day	1.2E+00	ug/l	9.00E-03 lbs/day
DDT, DDE	1.00E-03	ug/l	4.84E-03 lbs/day	5.5E-01	ug/l	4.12E-03 lbs/day
Dieldrin	1.90E-03	ug/l	9.19E-03 lbs/day	1.3E+00	ug/l	9.37E-03 lbs/day
Endosulfan	5.60E-02	ug/l	2.71E-01 lbs/day	1.1E-01	ug/l	8.25E-04 lbs/day
Endrin	2.30E-03	ug/l	1.11E-02 lbs/day	9.0E-02	ug/l	6.75E-04 lbs/day
Guthion	0.00E+00	ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	7.50E-05 lbs/day
Heptachlor	3.80E-03	ug/l	1.84E-02 lbs/day	2.6E-01	ug/l	1.95E-03 lbs/day
Lindane	8.00E-02	ug/l	3.87E-01 lbs/day	1.0E+00	ug/l	7.50E-03 lbs/day
Methoxychlor	0.00E+00	ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	2.25E-04 lbs/day
Mirex	0.00E+00	ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	7.50E-05 lbs/day
Parathion	0.00E+00	ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	3.00E-04 lbs/day
PCB's	1.40E-02	ug/l	6.77E-02 lbs/day	2.0E+00	ug/l	1.50E-02 lbs/day
Pentachlorophenol	1.30E+01	ug/l	6.29E+01 lbs/day	2.0E+01	ug/l	1.50E-01 lbs/day
Toxephene	2.00E-04	ug/l	9.67E-04 lbs/day	7.3E-01	ug/l	5.47E-03 lbs/day

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:

	Concentration		Maximum Concentration Load	
Toxic Organics				
Acenaphthene	3.33E+03	ug/l	1.61E+01	lbs/day
Acrolein	9.63E+02	ug/l	4.66E+00	lbs/day
Acrylonitrile	8.14E-01	ug/l	3.94E-03	lbs/day
Benzene	8.76E+01	ug/l	4.24E-01	lbs/day
Benzidine		ug/l		lbs/day
Carbon tetrachloride	5.43E+00	ug/l	2.63E-02	lbs/day
Chlorobenzene	2.59E+04	ug/l	1.25E+02	lbs/day
1,2,4-Trichlorobenzene				
Hexachlorobenzene	9.50E-04	ug/l	4.60E-06	lbs/day
1,2-Dichloroethane	1.22E+02	ug/l	5.91E-01	lbs/day
1,1,1-Trichloroethane				
Hexachloroethane	1.10E+01	ug/l	5.31E-02	lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	5.18E+01	ug/l	2.51E-01	lbs/day
1,1,2,2-Tetrachloroethane	1.36E+01	ug/l	6.56E-02	lbs/day
Chloroethane				
Bis(2-chloroethyl) ether	1.73E+00	ug/l	8.36E-03	lbs/day
2-Chloroethyl vinyl ether				
2-Chloronaphthalene	5.31E+03	ug/l	2.57E+01	lbs/day
2,4,6-Trichlorophenol	8.02E+00	ug/l	3.88E-02	lbs/day
p-Chloro-m-cresol				
Chloroform (HM)	5.80E+02	ug/l	2.81E+00	lbs/day
2-Chlorophenol	4.94E+02	ug/l	2.39E+00	lbs/day
1,2-Dichlorobenzene	2.10E+04	ug/l	1.01E+02	lbs/day
1,3-Dichlorobenzene	3.21E+03	ug/l	1.55E+01	lbs/day
1,4-Dichlorobenzene	3.21E+03	ug/l	1.55E+01	lbs/day
3,3'-Dichlorobenzidine	9.50E-02	ug/l	4.60E-04	lbs/day
1,1-Dichloroethylene	3.95E+00	ug/l	1.91E-02	lbs/day
1,2-trans-Dichloroethylene1				
2,4-Dichlorophenol	9.75E+02	ug/l	4.71E+00	lbs/day
1,2-Dichloropropane	4.81E+01	ug/l	2.33E-01	lbs/day
1,3-Dichloropropylene	2.10E+03	ug/l	1.01E+01	lbs/day
2,4-Dimethylphenol	2.84E+03	ug/l	1.37E+01	lbs/day
2,4-Dinitrotoluene	1.12E+01	ug/l	5.43E-02	lbs/day
2,6-Dinitrotoluene				
1,2-Diphenylhydrazine	6.66E-01	ug/l	3.22E-03	lbs/day
Ethylbenzene	3.58E+04	ug/l	1.73E+02	lbs/day
Fluoranthene	4.57E+02	ug/l	2.21E+00	lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopropyl) ether	2.10E+05	ug/l	1.01E+03	lbs/day
Bis(2-chloroethoxy) methane				
Methylene chloride (HM)	1.97E+03	ug/l	9.55E+00	lbs/day
Methyl chloride (HM)				
Methyl bromide (HM)				
Bromoform (HM)	4.44E+02	ug/l	2.15E+00	lbs/day
Dichlorobromomethane(HM)	2.71E+01	ug/l	1.31E-01	lbs/day
Chlorodibromomethane (HM)	4.20E+01	ug/l	2.03E-01	lbs/day
Hexachlorocyclopentadiene	2.10E+04	ug/l	1.01E+02	lbs/day
Isophorone	7.40E+02	ug/l	3.58E+00	lbs/day
Naphthalene				
Nitrobenzene	2.34E+03	ug/l	1.13E+01	lbs/day
2-Nitrophenol				
4-Nitrophenol				
2,4-Dinitrophenol	1.73E+04	ug/l	8.36E+01	lbs/day
4,6-Dinitro-o-cresol	9.44E+02	ug/l	4.57E+00	lbs/day
N-Nitrosodimethylamine	1.00E+01	ug/l	4.83E-02	lbs/day
N-Nitrosodiphenylamine	1.97E+01	ug/l	9.55E-02	lbs/day
N-Nitrosodi-n-propylamine	1.73E+00	ug/l	8.36E-03	lbs/day
Pentachlorophenol	1.01E+01	ug/l	4.89E-02	lbs/day

Phenol	5.68E+06	ug/l	2.75E+04	lbs/day
Bis(2-ethylhexyl)phthalate	7.28E+00	ug/l	3.52E-02	lbs/day
Butyl benzyl phthalate	6.42E+03	ug/l	3.10E+01	lbs/day
Di-n-butyl phthalate	1.48E+04	ug/l	7.16E+01	lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	1.48E+05	ug/l	7.16E+02	lbs/day
Dimethyl phthlate	3.58E+06	ug/l	1.73E+04	lbs/day
Benzo(a)anthracene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Benzo(a)pyrene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Benzo(b)fluoranthene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Benzo(k)fluoranthene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Chrysene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)				
Dibenzo(a,h)anthracene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	3.83E-02	ug/l	1.85E-04	lbs/day
Pyrene (PAH)	1.36E+04	ug/l	6.56E+01	lbs/day
Tetrachloroethylene	1.10E+01	ug/l	5.31E-02	lbs/day
Toluene	2.47E+05	ug/l	1.19E+03	lbs/day
Trichloroethylene	1.00E+02	ug/l	4.83E-01	lbs/day
Vinyl chloride	6.48E+02	ug/l	3.13E+00	lbs/day
Pesticides				
Aldrin	1.73E-04	ug/l	8.36E-07	lbs/day
Dieldrin	1.73E-04	ug/l	8.36E-07	lbs/day
Chlordane	7.28E-04	ug/l	3.52E-06	lbs/day
4,4'-DDT	7.28E-04	ug/l	3.52E-06	lbs/day
4,4'-DDE	7.28E-04	ug/l	3.52E-06	lbs/day
4,4'-DDD	1.04E-03	ug/l	5.01E-06	lbs/day
alpha-Endosulfan	2.47E+00	ug/l	1.19E-02	lbs/day
beta-Endosulfan	2.47E+00	ug/l	1.19E-02	lbs/day
Endosulfan sulfate	2.47E+00	ug/l	1.19E-02	lbs/day
Endrin	1.00E+00	ug/l	4.83E-03	lbs/day
Endrin aldehyde	1.00E+00	ug/l	4.83E-03	lbs/day
Heptachlor	2.59E-04	ug/l	1.25E-06	lbs/day
Heptachlor epoxide				
PCB's				
PCB 1242 (Arochlor 1242)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1254 (Arochlor 1254)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1221 (Arochlor 1221)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1232 (Arochlor 1232)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1248 (Arochlor 1248)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1260 (Arochlor 1260)	5.55E-05	ug/l	2.69E-07	lbs/day
PCB-1016 (Arochlor 1016)	5.55E-05	ug/l	2.69E-07	lbs/day
Pesticide				
Toxaphene	9.26E-04	ug/l	4.48E-06	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)	1.73E-08	ug/l	8.36E-11	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		925.0				925.0	N/A
Antimony				5306.4		5306.4	
Arsenic	123.4	419.4				123.4	234.3
Barium							
Beryllium						0.0	
Cadmium	12.3	10.4				10.4	0.9
Chromium (III)		6753.3				6753.3	322.6
Chromium (VI)	123.2	18.8				18.81	12.64
Copper	246.6	61.8				61.8	36.5
Cyanide		27.1	271490.1			27.1	6.4
Iron		1107.0				1107.0	
Lead	123.2	565.7				123.2	21.9
Mercury		2.96		0.19		0.19	0.015
Nickel		1822.7		5676.6		1822.7	202.5
Selenium	61.3	24.3				24.3	5.3
Silver		48.1				48.1	
Thallium				7.8		7.8	
Zinc		466.3				466.3	466.3
Boron	925.5					925.5	
Sulfate	2468.1					2468.1	

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	925.0	N/A	
Antimony	5306.40		
Arsenic	123.4	234.3	Acute Controls
Asbestos			
Barium			
Beryllium			
Cadmium	10.4	0.9	
Chromium (III)	6753.3	323	
Chromium (VI)	18.8	12.6	
Copper	61.8	36.5	
Cyanide	27.1	6.4	
Iron	1107.0		
Lead	123.2	21.9	
Mercury	0.185	0.015	
Nickel	1822.7	202	
Selenium	24.3	5.3	
Silver	48.1	N/A	
Thallium	7.8		
Zinc	466.3	466.3	
Boron	925.53		
Sulfate	2468.1		N/A at this Waterbody

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.

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. The proposed permit is not an increase in 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.