Utah Division of Water Quality
Statement of Basis
ADDENDUM
Wasteload Analysis and Antidegradation Level I Review
Date: **February 24, 2017**

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Standards and Technical Services

Facility: **Bronco Utah Operations; Emery Deep Mine**
UPDES No. UT0022616

Receiving water: **Quitchupah Creek (2B, 3C, 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

001	Mine water discharge, Pond 1	0.6 cfs
002	Sedimentation Pond 2	0.07 cfs
003	Mine water discharge, Pond 6	0.6 cfs
004	Mine water discharge, Farmers Pond	0.7 cfs
005	Sedimentation Pond 3	0.07 cfs
006	Sedimentation Pond 8	0.07 cfs
007	Sedimentation Pond 5	0.07 cfs
008	Sedimentation Pond (slurry pond)	0.07 cfs
009	Sedimentation Pond	0.07 cfs
		2.32 cfs (1.5 MGD)

Receiving Water

The receiving water for Outfalls 001-008 are Quitchupah Creek.

The receiving water for Outfall 009 is Christiansen Wash, a tributary to Quitchupah Creek.

Per UAC R317-2-13.1, the designated beneficial uses of Quitchupah Creek and Christiansen Wash (tributaries of Muddy Creek) are: Muddy Creek and tributaries, from confluence with Fremont River to Highway U-10 crossing, (with exceptions) are 2B, 3C, 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 3C - Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.*

- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

As per R317-2, Table 2.14.1, footnote (4), the segment of the Quitchupah Creek from the confluence with Ivie Creek to U-10 has a site specific TDS standard of 3,800 mg/l provided that total sulfate not exceed 2,000 mg/l to protect the livestock watering agricultural existing use.

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 records, the 20th percentile of available flow measurements was calculated for the period of record to approximate the 7Q10 low flow condition. The source of flow data was Division of Oil, Gas and Mining (DOGM) sampling station #1A; (QUITCHUPAH CK AT ST RD #10 BRIDGE) for Discharge 001-008 and DOGM Station #2 (CHRISTIANSEN WASH UPSTREAM OF MINE FACILITY) for Discharge 009. Ambient water quality for the receiving water for each discharge was characterized using data from these same two stations from the period 2006-2016. For the purposes of the wasteload calculations, discharge points 001-008 were aggregated.

The critical low flow condition for Discharges 001-008 is 2.35 cfs.
The critical low flow condition for Discharge 009 is 0.105 cfs.

TMDL

According to the Utah's 2014 303(d) Water Quality Assessment, the assessment unit for this section of Quitchupah Creek (Quitchipah Creek and tributaries from confluence with Ivie Creek to U-10 crossing; UT14070002-007) was listed as impaired for O/E Bioassessment (Class 3C use), and total dissolved solids (Class 4 use). Total dissolved solids (TDS) values in this area are naturally elevated due to the presence of shale layers. Several site-specific TDS standards have been developed in the watershed (Quitchupah, Ivie and Muddy Creeks). Quitchupah Creek's listing for total dissolved solids (TDS) was based solely on samples obtained from Christiansen Wash, a tributary to Quitchupah Creek, where values were compared to the state standard of 1200 mg/l, instead of Quitchupah Creek's site specific standard of 3,800 mg/l. While it shares the same characteristics as Quitchupah, Christiansen Wash was inadvertently not included in the site specific language for Quitchupah Creek and should share the same 3,800 mg/l standard. The standard will be modified in the upcoming triannual review.

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.

Since the receiving water low flow is equal to or less than twice the flow of a point source discharge, the combined flows are considered to be totally mixed. 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 TDS, sulfate and iron, as determined in consultation with 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.

IC25 WET limits for Outfalls 001-008 should be based on 48.9% effluent.
IC25 WET limits for Outfall 009 should be based on 39.9% effluent.

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 Addendums.

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 of an existing UPDES permit. No increase in flow or concentration of pollutants over those authorized in the the existing permit is being requested.

Documents:

WLA Document*: Bronco_Emery WLADoc_2-23-27.docx*
Wasteload Analysis and Addendums: *Bronco_Emery_001-008_WLA_2-23-17.xlsm, Bronco_Emery_009_WLA_2-23-17.xlsm*

References:

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

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis
SUMMARY

Discharging Facility:	**Emery Deep to Quitchupah Creek**		
UPDES No:	UT-0022616		
Current Flow:	1.46	MGD	Design Flow
Design Flow	1.46	MGD	

Receiving Water:	**Quitchupah Creek**		
Stream Classification:	2B, 3C, 4		
Stream Flows [cfs]:	2.35	Summer (July-Sept)	20th Percentile
	2.35	Fall (Oct-Dec)	20th Percentile
	2.35	Winter (Jan-Mar)	20th Percentile
	2.35	Spring (Apr-June)	20th Percentile
	23.0	Average	
Stream TDS Values:	939.7	Summer (July-Sept)	Average
	868.5	Fall (Oct-Dec)	Average
	852.7	Winter (Jan-Mar)	Average
	786.1	Spring (Apr-June)	Average

Effluent Limits:				**WQ Standard:**
Flow, MGD:	1.46	MGD	Design Flow	
BOD, mg/l:	25.0	Summer	5.0	Indicator
Dissolved Oxygen, mg/l	5.0	Summer	5.0	30 Day Average
TNH3, Chronic, mg/l:	8.3	Summer	Varies	Function of pH and Temperature
TDS, mg/l:	6786.2	Summer	3800.0	Site Specific

Modeling Parameters:

Acute River Width:	50.0%
Chronic River Width:	100.0%

Level 1 Antidegradation Level Completed: Level II Review not required.

Date: 10/2/2017

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

2-Oct-17
4:00 PM

Facilities: **Emery Deep to Quitchupah Creek** **UPDES No: UT-0022616**
Discharging to: **Quitchupah Creek**

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

Quitchupah Creek:	2B, 3C, 4
Antidegradation Review:	Level I review completed. Level II review 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)	5.00 mg/l (30 Day Average) N/A mg/l (7Day Average) 3.00 mg/l (1 Day Average	
Maximum Total Dissolved Solids	3800.0 mg/l	Background

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**	1.058 lbs/day	750.00 ug/l	9.117 lbs/day
Arsenic	190.00 ug/l	2.310 lbs/day	340.00 ug/l	4.133 lbs/day
Cadmium	0.82 ug/l	0.010 lbs/day	9.84 ug/l	0.120 lbs/day
Chromium III	295.41 ug/l	3.591 lbs/day	6180.59 ug/l	75.130 lbs/day
ChromiumVI	11.00 ug/l	0.134 lbs/day	16.00 ug/l	0.194 lbs/day
Copper	33.73 ug/l	0.410 lbs/day	57.76 ug/l	0.702 lbs/day
Iron			1000.00 ug/l	12.156 lbs/day
Lead	21.59 ug/l	0.262 lbs/day	554.03 ug/l	6.735 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40 ug/l	0.029 lbs/day
Nickel	186.22 ug/l	2.264 lbs/day	1674.92 ug/l	20.360 lbs/day
Selenium	4.60 ug/l	0.056 lbs/day	20.00 ug/l	0.243 lbs/day
Silver	N/A ug/l	N/A lbs/day	50.31 ug/l	0.612 lbs/day
Zinc	428.58 ug/l	5.210 lbs/day	428.58 ug/l	5.210 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 450.06 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	0.018 lbs/day
Chlordane	0.004 ug/l	0.107 lbs/day	1.200 ug/l	0.015 lbs/day
DDT, DDE	0.001 ug/l	0.025 lbs/day	0.550 ug/l	0.007 lbs/day
Dieldrin	0.002 ug/l	0.047 lbs/day	1.250 ug/l	0.015 lbs/day
Endosulfan	0.056 ug/l	1.389 lbs/day	0.110 ug/l	0.001 lbs/day
Endrin	0.002 ug/l	0.057 lbs/day	0.090 ug/l	0.001 lbs/day
Guthion			0.010 ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	0.094 lbs/day	0.260 ug/l	0.003 lbs/day
Lindane	0.080 ug/l	1.984 lbs/day	1.000 ug/l	0.012 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	0.347 lbs/day	2.000 ug/l	0.024 lbs/day
Pentachlorophenol	13.00 ug/l	322.384 lbs/day	20.000 ug/l	0.243 lbs/day
Toxephene	0.0002 ug/l	0.005 lbs/day	0.7300 ug/l	0.009 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	0.06 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			3800.0 mg/l	23.10 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	66.96 lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	19.34 lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	0.02 lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	1.76 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	0.11 lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	520.77 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	2.46 lbs/day

1,1,1-Trichloroethane					
Hexachloroethane	ug/l	lbs/day	8.9	ug/l	0.22 lbs/day
1,1-Dichloroethane					
1,1,2-Trichloroethane	ug/l	lbs/day	42.0	ug/l	1.04 lbs/day
1,1,2,2-Tetrachloroethai	ug/l	lbs/day	11.0	ug/l	0.27 lbs/day
Chloroethane			0.0	ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4	ug/l	0.03 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	106.63 lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5	ug/l	0.16 lbs/day
p-Chloro-m-cresol			0.0	ug/l	0.00 lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0	ug/l	11.66 lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0	ug/l	9.92 lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0	ug/l	421.58 lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	64.48 lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	64.48 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	0.08 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	19.59 lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0	ug/l	0.97 lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0	ug/l	42.16 lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0	ug/l	57.04 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1	ug/l	0.23 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	0.01 lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0	ug/l	719.16 lbs/day
Fluoranthene	ug/l	lbs/day	370.0	ug/l	9.18 lbs/day
4-Chlorophenyl phenyl ether					
4-Bromophenyl phenyl ether					
Bis(2-chloroisopropyl) e	ug/l	lbs/day	170000.0	ug/l	4215.79 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	39.68 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	8.93 lbs/day
Dichlorobromomethane	ug/l	lbs/day	22.0	ug/l	0.55 lbs/day
Chlorodibromomethane	ug/l	lbs/day	34.0	ug/l	0.84 lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0	ug/l	1.24 lbs/day
Hexachlorocyclopentadi	ug/l	lbs/day	17000.0	ug/l	421.58 lbs/day
Isophorone	ug/l	lbs/day	600.0	ug/l	14.88 lbs/day
Naphthalene					
Nitrobenzene	ug/l	lbs/day	1900.0	ug/l	47.12 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	347.18 lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0	ug/l	18.97 lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1	ug/l	0.20 lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0	ug/l	0.40 lbs/day
N-Nitrosodi-n-propylami	ug/l	lbs/day	1.4	ug/l	0.03 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2	ug/l	0.20 lbs/day

Phenol	ug/l	lbs/day	4.6E+06	ug/l	1.14E+05 lbs/day
Bis(2-ethylhexyl)phthala	ug/l	lbs/day	5.9	ug/l	0.15 lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0	ug/l	128.95 lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0	ug/l	297.59 lbs/day
Di-n-octyl phthlate					
Diethyl phthalate	ug/l	lbs/day	120000.0	ug/l	2975.85 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06	ug/l	7.19E+04 lbs/day
Benzo(a)anthracene (P/	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 (F	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Benzo(k)fluoranthene (F	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	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Indeno(1,2,3-cd)pyrene	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0	ug/l	272.79 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9	ug/l	0.22 lbs/day
Toluene	ug/l	lbs/day	200000	ug/l	4959.75 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0	ug/l	2.01 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0	ug/l	13.02 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	0.05 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0	ug/l	0.05 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0	ug/l	0.05 lbs/day
Endrin	ug/l	lbs/day	0.8	ug/l	0.02 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8	ug/l	0.02 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	106.63 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	5455.73 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	114.07 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.16 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)	2.35	15.1	7.6	0.01	0.05	7.23	0.00	939.7
Fall	2.35	4.4	7.5	0.01	0.05	---	0.00	868.5
Winter	2.35	4.5	7.5	0.01	0.05	---	0.00	852.7
Spring	2.35	15.2	7.6	0.01	0.05	---	0.00	786.1

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	2.385*	0.795*	0.0795*	0.795*	3.975*	0.8*	15.0	0.795*

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

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	1.45500	18.8	3085.00	18.71403
Fall	1.45500	11.7		
Winter	1.45500	8.9		
Spring	1.45500	14.0		

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	1.455 MGD	2.251 cfs
Fall	1.455 MGD	2.251 cfs
Winter	1.455 MGD	2.251 cfs
Spring	1.455 MGD	2.251 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 1.455 MGD. If the discharger is allowed to have a flow greater than 1.455 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 >	EOP Effluent	[Acute]
	IC25 >	48.9% 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	303.3 lbs/day
Fall	25.0 mg/l as BOD5	303.3 lbs/day
Winter	25.0 mg/l as BOD5	303.3 lbs/day
Spring	25.0 mg/l as BOD5	303.3 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	5.00
Fall	5.00
Winter	5.00
Spring	5.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

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

Season		**Concentration**		**Load**	
Summer	4 Day Avg. - Chronic	8.3	mg/l as N	100.7	lbs/day
	1 Hour Avg. - Acute	34.9	mg/l as N	423.6	lbs/day
Fall	4 Day Avg. - Chronic	9.9	mg/l as N	119.7	lbs/day
	1 Hour Avg. - Acute	24.7	mg/l as N	299.5	lbs/day
Winter	4 Day Avg. - Chronic	9.3	mg/l as N	113.0	lbs/day
	1 Hour Avg. - Acute	21.8	mg/l as N	264.0	lbs/day
Spring	4 Day Avg. - Chronic	9.8	mg/l as N	118.5	lbs/day
	1 Hour Avg. - Acute	24.7	mg/l as N	299.5	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	0.021	mg/l	0.26	lbs/day
	1 Hour Avg. - Acute	0.038	mg/l	0.46	lbs/day
Fall	4 Day Avg. - Chronic	0.021	mg/l	0.26	lbs/day
	1 Hour Avg. - Acute	0.038	mg/l	0.46	lbs/day
Winter	4 Day Avg. - Chronic	0.021	mg/l	0.26	lbs/day
	1 Hour Avg. - Acute	0.038	mg/l	0.46	lbs/day
Spring	4 Day Avg. - Chronic	0.021	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	0.038	mg/l	0.00	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	6786.2	mg/l	41.17	tons/day
Fall	Maximum, Acute	6860.6	mg/l	41.62	tons/day
Winter	Maximum, Acute	6877.1	mg/l	41.72	tons/day
Spring	4 Day Avg. - Chronic	6946.6	mg/l	42.14	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 450.06 mg/l):

	4 Day Average Concentration		Load	1 Hour Average Concentration		Load	
Aluminum*	N/A		N/A	1,140.3	ug/l	13.9	lbs/day
Arsenic*	387.54	ug/l	3.0 lbs/day	517.1	ug/l	6.3	lbs/day
Cadmium	1.60	ug/l	0.0 lbs/day	14.9	ug/l	0.2	lbs/day
Chromium III	603.00	ug/l	4.7 lbs/day	9,406.5	ug/l	114.3	lbs/day
Chromium VI*	18.33	ug/l	0.1 lbs/day	22.3	ug/l	0.3	lbs/day
Copper	68.12	ug/l	0.5 lbs/day	87.5	ug/l	1.1	lbs/day
Iron*	N/A		N/A	1,514.2	ug/l	18.4	lbs/day
Lead	43.30	ug/l	0.3 lbs/day	842.8	ug/l	10.2	lbs/day
Mercury*	0.02	ug/l	0.0 lbs/day	3.7	ug/l	0.0	lbs/day
Nickel	379.81	ug/l	3.0 lbs/day	2,548.8	ug/l	31.0	lbs/day
Selenium*	7.74	ug/l	0.1 lbs/day	29.6	ug/l	0.4	lbs/day
Silver	N/A	ug/l	N/A lbs/day	76.6	ug/l	0.9	lbs/day

Zinc	875.94 ug/l	6.9 lbs/day	652.3	ug/l	7.9 lbs/day
Cyanide*	10.63 ug/l	0.1 lbs/day	33.5	ug/l	0.4 lbs/day

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

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	23.3 Deg. C.	73.9 Deg. F
Fall	12.6 Deg. C.	54.6 Deg. F
Winter	12.7 Deg. C.	54.8 Deg. F
Spring	23.4 Deg. C.	74.1 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	2.82E-02 lbs/day
Chlordane	4.30E-03 ug/l	5.22E-02 lbs/day	1.2E+00	ug/l	2.26E-02 lbs/day
DDT, DDE	1.00E-03 ug/l	1.21E-02 lbs/day	5.5E-01	ug/l	1.03E-02 lbs/day
Dieldrin	1.90E-03 ug/l	2.31E-02 lbs/day	1.3E+00	ug/l	2.35E-02 lbs/day
Endosulfan	5.60E-02 ug/l	6.79E-01 lbs/day	1.1E-01	ug/l	2.07E-03 lbs/day
Endrin	2.30E-03 ug/l	2.79E-02 lbs/day	9.0E-02	ug/l	1.69E-03 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	1.88E-04 lbs/day
Heptachlor	3.80E-03 ug/l	4.61E-02 lbs/day	2.6E-01	ug/l	4.89E-03 lbs/day
Lindane	8.00E-02 ug/l	9.71E-01 lbs/day	1.0E+00	ug/l	1.88E-02 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	5.64E-04 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	1.88E-04 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	7.52E-04 lbs/day
PCB's	1.40E-02 ug/l	1.70E-01 lbs/day	2.0E+00	ug/l	3.76E-02 lbs/day
Pentachlorophenol	1.30E+01 ug/l	1.58E+02 lbs/day	2.0E+01	ug/l	3.76E-01 lbs/day
Toxephene	2.00E-04 ug/l	2.43E-03 lbs/day	7.3E-01	ug/l	1.37E-02 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	60.8 lbs/day
Nitrates as N	4.0 mg/l	48.6 lbs/day
Total Phosphorus as P	0.05 mg/l	0.6 lbs/day
Total Suspended Solids	90.0 mg/l	1094.0 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	5.52E+03 ug/l	6.70E+01 lbs/day
Acrolein	1.59E+03 ug/l	1.93E+01 lbs/day
Acrylonitrile	1.35E+00 ug/l	1.64E-02 lbs/day
Benzene	1.45E+02 ug/l	1.76E+00 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	8.99E+00 ug/l	1.09E-01 lbs/day
Chlorobenzene	4.29E+04 ug/l	5.21E+02 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	1.57E-03 ug/l	1.91E-05 lbs/day
1,2-Dichloroethane	2.02E+02 ug/l	2.46E+00 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	1.82E+01 ug/l	2.21E-01 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	8.58E+01 ug/l	1.04E+00 lbs/day
1,1,2,2-Tetrachloroethane	2.25E+01 ug/l	2.73E-01 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	2.86E+00 ug/l	3.47E-02 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	8.79E+03 ug/l	1.07E+02 lbs/day
2,4,6-Trichlorophenol	1.33E+01 ug/l	1.61E-01 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	9.61E+02 ug/l	1.17E+01 lbs/day
2-Chlorophenol	8.18E+02 ug/l	9.92E+00 lbs/day
1,2-Dichlorobenzene	3.47E+04 ug/l	4.22E+02 lbs/day
1,3-Dichlorobenzene	5.31E+03 ug/l	6.45E+01 lbs/day

1,4-Dichlorobenzene	5.31E+03 ug/l	6.45E+01 lbs/day
3,3'-Dichlorobenzidine	1.57E-01 ug/l	1.91E-03 lbs/day
1,1-Dichloroethylene	6.54E+00 ug/l	7.94E-02 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	1.61E+03 ug/l	1.96E+01 lbs/day
1,2-Dichloropropane	7.97E+01 ug/l	9.67E-01 lbs/day
1,3-Dichloropropylene	3.47E+03 ug/l	4.22E+01 lbs/day
2,4-Dimethylphenol	4.70E+03 ug/l	5.70E+01 lbs/day
2,4-Dinitrotoluene	1.86E+01 ug/l	2.26E-01 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	1.10E+00 ug/l	1.34E-02 lbs/day
Ethylbenzene	5.93E+04 ug/l	7.19E+02 lbs/day
Fluoranthene	7.56E+02 ug/l	9.18E+00 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	3.47E+05 ug/l	4.22E+03 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	3.27E+03 ug/l	3.97E+01 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	7.36E+02 ug/l	8.93E+00 lbs/day
Dichlorobromomethane(HM)	4.50E+01 ug/l	5.46E-01 lbs/day
Chlorodibromomethane (HM)	6.95E+01 ug/l	8.43E-01 lbs/day
Hexachlorocyclopentadiene	3.47E+04 ug/l	4.22E+02 lbs/day
Isophorone	1.23E+03 ug/l	1.49E+01 lbs/day
Naphthalene		
Nitrobenzene	3.88E+03 ug/l	4.71E+01 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	2.86E+04 ug/l	3.47E+02 lbs/day
4,6-Dinitro-o-cresol	1.56E+03 ug/l	1.90E+01 lbs/day
N-Nitrosodimethylamine	1.66E+01 ug/l	2.01E-01 lbs/day
N-Nitrosodiphenylamine	3.27E+01 ug/l	3.97E-01 lbs/day
N-Nitrosodi-n-propylamine	2.86E+00 ug/l	3.47E-02 lbs/day
Pentachlorophenol	1.68E+01 ug/l	2.03E-01 lbs/day
Phenol	9.40E+06 ug/l	1.14E+05 lbs/day
Bis(2-ethylhexyl)phthalate	1.21E+01 ug/l	1.46E-01 lbs/day
Butyl benzyl phthalate	1.06E+04 ug/l	1.29E+02 lbs/day
Di-n-butyl phthalate	2.45E+04 ug/l	2.98E+02 lbs/day
Di-n-octyl phthlate		
Diethyl phthalate	2.45E+05 ug/l	2.98E+03 lbs/day
Dimethyl phthlate	5.93E+06 ug/l	7.19E+04 lbs/day
Benzo(a)anthracene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Benzo(a)pyrene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Benzo(b)fluoranthene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Benzo(k)fluoranthene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Chrysene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	6.34E-02 ug/l	7.69E-04 lbs/day

Pyrene (PAH)	2.25E+04 ug/l	2.73E+02 lbs/day
Tetrachloroethylene	1.82E+01 ug/l	2.21E-01 lbs/day
Toluene	4.09E+05 ug/l	4.96E+03 lbs/day
Trichloroethylene	1.66E+02 ug/l	2.01E+00 lbs/day
Vinyl chloride	1.07E+03 ug/l	1.30E+01 lbs/day
Pesticides		
Aldrin	2.86E-04 ug/l	3.47E-06 lbs/day
Dieldrin	2.86E-04 ug/l	3.47E-06 lbs/day
Chlordane	1.21E-03 ug/l	1.46E-05 lbs/day
4,4'-DDT	1.21E-03 ug/l	1.46E-05 lbs/day
4,4'-DDE	1.21E-03 ug/l	1.46E-05 lbs/day
4,4'-DDD	1.72E-03 ug/l	2.08E-05 lbs/day
alpha-Endosulfan	4.09E+00 ug/l	4.96E-02 lbs/day
beta-Endosulfan	4.09E+00 ug/l	4.96E-02 lbs/day
Endosulfan sulfate	4.09E+00 ug/l	4.96E-02 lbs/day
Endrin	1.66E+00 ug/l	2.01E-02 lbs/day
Endrin aldehyde	1.66E+00 ug/l	2.01E-02 lbs/day
Heptachlor	4.29E-04 ug/l	5.21E-06 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1254 (Arochlor 1254)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1221 (Arochlor 1221)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1232 (Arochlor 1232)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1248 (Arochlor 1248)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1260 (Arochlor 1260)	9.20E-05 ug/l	1.12E-06 lbs/day
PCB-1016 (Arochlor 1016)	9.20E-05 ug/l	1.12E-06 lbs/day
Pesticide		
Toxaphene	1.53E-03 ug/l	1.86E-05 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)	2.86E-08 ug/l	3.47E-10 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		1140.3				1140.3	N/A
Antimony				8789.3		8789.3	
Arsenic	204.4	517.1			0.0	204.4	387.5
Barium						0.0	
Beryllium						0.0	
Cadmium	20.4	14.9			0.0	14.9	1.6
Chromium (III)		9406.5			0.0	9406.5	603.0
Chromium (VI)	203.6	22.3			0.0	22.28	18.33
Copper	408.0	87.5				87.5	68.1
Cyanide		33.5	449687.4			33.5	10.6
Iron		1514.2				1514.2	
Lead	203.6	842.8			0.0	203.6	43.3
Mercury		3.65		0.31	0.0	0.31	0.025
Nickel		2548.8		9402.6		2548.8	379.8
Selenium	100.5	29.6			0.0	29.6	7.7
Silver		76.6			0.0	76.6	
Thallium				12.9		12.9	
Zinc		652.3				652.3	875.9
Boron	1533.0					1533.0	
Sulfate	3718.5					3718.5	

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	1140.3	N/A	
Antimony	8789.35		
Arsenic	204.4	387.5	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	14.9	1.6	
Chromium (III)	9406.5	603	
Chromium (VI)	22.3	18.3	
Copper	87.5	68.1	

Cyanide	33.5	10.6	
Iron	1514.2		
Lead	203.6	43.3	
Mercury	0.307	0.025	
Nickel	2548.8	380	
Selenium	29.6	7.7	
Silver	76.6	N/A	
Thallium	12.9		
Zinc	652.3	875.9	Acute Controls
Boron	1533.03		
Sulfate	3718.5		

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. Basic renewal, no increase in effluent 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.

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.

Antidegredation 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 the proposed discharge will not require a Level II Antidegradation Review. The Proposed permit is a simple renewal. No increase in effluent flow or concentration.

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis
SUMMARY

Discharging Facility:	**Emery Deep to Christiansen Wash**		
UPDES No:	UT-0022616		
Current Flow:	0.05	MGD	Design Flow
Design Flow	0.05	MGD	

Receiving Water:	**Christiansen Wash**		
Stream Classification:	2B, 3C, 4		
Stream Flows [cfs]:	0.11	Summer (July-Sept)	20th Percentile
	0.11	Fall (Oct-Dec)	20th Percentile
	0.11	Winter (Jan-Mar)	20th Percentile
	0.11	Spring (Apr-June)	20th Percentile
	2.3	Average	
Stream TDS Values:	5281.0	Summer (July-Sept)	Average
	1470.0	Fall (Oct-Dec)	Average
	1415.0	Winter (Jan-Mar)	Average
	1767.0	Spring (Apr-June)	Average

Effluent Limits:				**WQ Standard:**
Flow, MGD:	0.05	MGD	Design Flow	
BOD, mg/l:	25.0	Summer	5.0	Indicator
Dissolved Oxygen, mg/l	5.0	Summer	5.0	30 Day Average
TNH3, Chronic, mg/l:	10.3	Summer	Varies	Function of pH and Temperature
TDS, mg/l:	1566.2	Summer	3800.0	Site Specific

Modeling Parameters:

Acute River Width:	50.0%
Chronic River Width:	100.0%

Level 1 Antidegradation Level Completed: Level II Review not required.

Date: 10/2/2017

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

2-Oct-17
4:00 PM

Facilities: **Emery Deep to Christiansen Wash** **UPDES No: UT-0022616**
Discharging to: **Christiansen Wash**

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

Christiansen Wash:	2B, 3C, 4
Antidegradation Review:	Level I review completed. Level II review 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)	5.00 mg/l (30 Day Average) N/A mg/l (7Day Average) 3.00 mg/l (1 Day Average
Maximum Total Dissolved Solids	3800.0 mg/l Background

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**	0.033 lbs/day	750.00	ug/l	0.282 lbs/day
Arsenic	190.00	ug/l	0.071 lbs/day	340.00	ug/l	0.128 lbs/day
Cadmium	0.84	ug/l	0.000 lbs/day	10.04	ug/l	0.004 lbs/day
Chromium III	300.17	ug/l	0.113 lbs/day	6280.22	ug/l	2.361 lbs/day
ChromiumVI	11.00	ug/l	0.004 lbs/day	16.00	ug/l	0.006 lbs/day
Copper	34.30	ug/l	0.013 lbs/day	58.83	ug/l	0.022 lbs/day
Iron				1000.00	ug/l	0.376 lbs/day
Lead	22.13	ug/l	0.008 lbs/day	567.98	ug/l	0.214 lbs/day
Mercury	0.0120	ug/l	0.000 lbs/day	2.40	ug/l	0.001 lbs/day
Nickel	189.32	ug/l	0.071 lbs/day	1702.82	ug/l	0.640 lbs/day
Selenium	4.60	ug/l	0.002 lbs/day	20.00	ug/l	0.008 lbs/day
Silver	N/A	ug/l	N/A lbs/day	52.02	ug/l	0.020 lbs/day
Zinc	435.72	ug/l	0.164 lbs/day	435.72	ug/l	0.164 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 458.93 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	0.001 lbs/day
Chlordane	0.004	ug/l	0.004 lbs/day	1.200	ug/l	0.000 lbs/day
DDT, DDE	0.001	ug/l	0.001 lbs/day	0.550	ug/l	0.000 lbs/day
Dieldrin	0.002	ug/l	0.002 lbs/day	1.250	ug/l	0.000 lbs/day
Endosulfan	0.056	ug/l	0.053 lbs/day	0.110	ug/l	0.000 lbs/day
Endrin	0.002	ug/l	0.002 lbs/day	0.090	ug/l	0.000 lbs/day
Guthion				0.010	ug/l	0.000 lbs/day
Heptachlor	0.004	ug/l	0.004 lbs/day	0.260	ug/l	0.000 lbs/day
Lindane	0.080	ug/l	0.075 lbs/day	1.000	ug/l	0.000 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	0.013 lbs/day	2.000	ug/l	0.001 lbs/day
Pentachlorophenol	13.00	ug/l	12.235 lbs/day	20.000	ug/l	0.008 lbs/day
Toxephene	0.0002	ug/l	0.000 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			3800.0 mg/l	0.71 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	2.54 lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	0.73 lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	0.00 lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	0.07 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	0.00 lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	19.76 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	0.09 lbs/day

1,1,1-Trichloroethane					
Hexachloroethane	ug/l	lbs/day	8.9	ug/l	0.01 lbs/day
1,1-Dichloroethane					
1,1,2-Trichloroethane	ug/l	lbs/day	42.0	ug/l	0.04 lbs/day
1,1,2,2-Tetrachloroethai	ug/l	lbs/day	11.0	ug/l	0.01 lbs/day
Chloroethane			0.0	ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4	ug/l	0.00 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	4.05 lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5	ug/l	0.01 lbs/day
p-Chloro-m-cresol			0.0	ug/l	0.00 lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0	ug/l	0.44 lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0	ug/l	0.38 lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0	ug/l	16.00 lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	2.45 lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	2.45 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	0.00 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	0.74 lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0	ug/l	0.04 lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0	ug/l	1.60 lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0	ug/l	2.16 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1	ug/l	0.01 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	27.29 lbs/day
Fluoranthene	ug/l	lbs/day	370.0	ug/l	0.35 lbs/day
4-Chlorophenyl phenyl ether					
4-Bromophenyl phenyl ether					
Bis(2-chloroisopropyl) e	ug/l	lbs/day	170000.0	ug/l	160.00 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	1.51 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	0.34 lbs/day
Dichlorobromomethane	ug/l	lbs/day	22.0	ug/l	0.02 lbs/day
Chlorodibromomethane	ug/l	lbs/day	34.0	ug/l	0.03 lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0	ug/l	0.05 lbs/day
Hexachlorocyclopentadi	ug/l	lbs/day	17000.0	ug/l	16.00 lbs/day
Isophorone	ug/l	lbs/day	600.0	ug/l	0.56 lbs/day
Naphthalene					
Nitrobenzene	ug/l	lbs/day	1900.0	ug/l	1.79 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	13.18 lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0	ug/l	0.72 lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1	ug/l	0.01 lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0	ug/l	0.02 lbs/day
N-Nitrosodi-n-propylami	ug/l	lbs/day	1.4	ug/l	0.00 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2	ug/l	0.01 lbs/day

Phenol	ug/l	lbs/day	4.6E+06	ug/l	4.33E+03 lbs/day
Bis(2-ethylhexyl)phthala	ug/l	lbs/day	5.9	ug/l	0.01 lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0	ug/l	4.89 lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0	ug/l	11.29 lbs/day
Di-n-octyl phthlate					
Diethyl phthalate	ug/l	lbs/day	120000.0	ug/l	112.94 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06	ug/l	2.73E+03 lbs/day
Benzo(a)anthracene (P/	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 (F	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Benzo(k)fluoranthene (F	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	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Indeno(1,2,3-cd)pyrene	ug/l	lbs/day	0.0	ug/l	0.00 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0	ug/l	10.35 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9	ug/l	0.01 lbs/day
Toluene	ug/l	lbs/day	200000	ug/l	188.23 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0	ug/l	0.08 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0	ug/l	0.49 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	0.00 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0	ug/l	0.00 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0	ug/l	0.00 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 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	4.05 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	207.06 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	4.33 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.01 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)	0.11	14.9	7.7	0.01	0.05	7.26	0.00	5281.0
Fall	0.11	6.0	7.5	0.01	0.05	---	0.00	1470.0
Winter	0.11	4.6	7.7	0.01	0.05	---	0.00	1415.0
Spring	0.11	16.7	7.8	0.01	0.05	---	0.00	1767.0

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	2.385*	0.795*	0.0795*	0.795*	3.975*	0.8*	50.0	0.795*

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

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.04500	18.8	3085.00	0.57878
Fall	0.04500	11.7		
Winter	0.04500	8.9		
Spring	0.04500	14.0		

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	0.045 MGD	0.070 cfs
Fall	0.045 MGD	0.070 cfs
Winter	0.045 MGD	0.070 cfs
Spring	0.045 MGD	0.070 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.045 MGD. If the discharger is allowed to have a flow greater than 0.045 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 >	EOP Effluent	[Acute]
	IC25 >	39.9% 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	9.4 lbs/day
Fall	25.0 mg/l as BOD5	9.4 lbs/day
Winter	25.0 mg/l as BOD5	9.4 lbs/day
Spring	25.0 mg/l as BOD5	9.4 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	5.00
Fall	5.00
Winter	5.00
Spring	5.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

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

Season		**Concentration**		**Load**	
Summer	4 Day Avg. - Chronic	10.3	mg/l as N	3.9	lbs/day
	1 Hour Avg. - Acute	46.9	mg/l as N	17.6	lbs/day
Fall	4 Day Avg. - Chronic	12.9	mg/l as N	4.9	lbs/day
	1 Hour Avg. - Acute	48.7	mg/l as N	18.3	lbs/day
Winter	4 Day Avg. - Chronic	10.9	mg/l as N	4.1	lbs/day
	1 Hour Avg. - Acute	39.5	mg/l as N	14.8	lbs/day
Spring	4 Day Avg. - Chronic	12.5	mg/l as N	4.7	lbs/day
	1 Hour Avg. - Acute	48.7	mg/l as N	18.3	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	0.026	mg/l	0.01	lbs/day
	1 Hour Avg. - Acute	0.046	mg/l	0.02	lbs/day
Fall	4 Day Avg. - Chronic	0.026	mg/l	0.01	lbs/day
	1 Hour Avg. - Acute	0.046	mg/l	0.02	lbs/day
Winter	4 Day Avg. - Chronic	0.026	mg/l	0.01	lbs/day
	1 Hour Avg. - Acute	0.046	mg/l	0.02	lbs/day
Spring	4 Day Avg. - Chronic	0.026	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	0.046	mg/l	0.00	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	1566.2	mg/l	0.29	tons/day
Fall	Maximum, Acute	7314.3	mg/l	1.37	tons/day
Winter	Maximum, Acute	7397.3	mg/l	1.39	tons/day
Spring	4 Day Avg. - Chronic	6866.4	mg/l	1.29	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 458.93 mg/l):

	4 Day Average Concentration		Load	1 Hour Average Concentration		Load
Aluminum*	N/A		N/A	1,877.6	ug/l	0.7 lbs/day
Arsenic*	475.38	ug/l	0.1 lbs/day	851.6	ug/l	0.3 lbs/day
Cadmium	1.98	ug/l	0.0 lbs/day	25.1	ug/l	0.0 lbs/day
Chromium III	751.73	ug/l	0.2 lbs/day	15,751.5	ug/l	5.9 lbs/day
Chromium VI*	21.60	ug/l	0.0 lbs/day	34.1	ug/l	0.0 lbs/day
Copper	84.83	ug/l	0.0 lbs/day	146.4	ug/l	0.1 lbs/day
Iron*	N/A		N/A	2,432.9	ug/l	0.9 lbs/day
Lead	54.32	ug/l	0.0 lbs/day	1,423.5	ug/l	0.5 lbs/day
Mercury*	0.03	ug/l	0.0 lbs/day	6.0	ug/l	0.0 lbs/day
Nickel	473.67	ug/l	0.1 lbs/day	4,270.0	ug/l	1.6 lbs/day
Selenium*	9.14	ug/l	0.0 lbs/day	47.8	ug/l	0.0 lbs/day
Silver	N/A	ug/l	N/A lbs/day	130.5	ug/l	0.0 lbs/day

Zinc	1,092.81 ug/l	0.3 lbs/day	1,092.8	ug/l	0.4 lbs/day
Cyanide*	13.04 ug/l	0.0 lbs/day	55.2	ug/l	0.0 lbs/day

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

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	24.9 Deg. C.	76.9 Deg. F
Fall	16.0 Deg. C.	60.9 Deg. F
Winter	14.6 Deg. C.	58.3 Deg. F
Spring	26.7 Deg. C.	80.1 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	8.72E-04 lbs/day
Chlordane	4.30E-03 ug/l	1.61E-03 lbs/day	1.2E+00	ug/l	6.98E-04 lbs/day
DDT, DDE	1.00E-03 ug/l	3.75E-04 lbs/day	5.5E-01	ug/l	3.20E-04 lbs/day
Dieldrin	1.90E-03 ug/l	7.13E-04 lbs/day	1.3E+00	ug/l	7.27E-04 lbs/day
Endosulfan	5.60E-02 ug/l	2.10E-02 lbs/day	1.1E-01	ug/l	6.40E-05 lbs/day
Endrin	2.30E-03 ug/l	8.63E-04 lbs/day	9.0E-02	ug/l	5.23E-05 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	5.82E-06 lbs/day
Heptachlor	3.80E-03 ug/l	1.43E-03 lbs/day	2.6E-01	ug/l	1.51E-04 lbs/day
Lindane	8.00E-02 ug/l	3.00E-02 lbs/day	1.0E+00	ug/l	5.82E-04 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	1.74E-05 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	5.82E-06 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	2.33E-05 lbs/day
PCB's	1.40E-02 ug/l	5.25E-03 lbs/day	2.0E+00	ug/l	1.16E-03 lbs/day
Pentachlorophenol	1.30E+01 ug/l	4.88E+00 lbs/day	2.0E+01	ug/l	1.16E-02 lbs/day
Toxephene	2.00E-04 ug/l	7.50E-05 lbs/day	7.3E-01	ug/l	4.25E-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	1.9 lbs/day
Nitrates as N	4.0 mg/l	1.5 lbs/day
Total Phosphorus as P	0.05 mg/l	0.0 lbs/day
Total Suspended Solids	90.0 mg/l	33.8 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	6.77E+03 ug/l	2.54E+00 lbs/day
Acrolein	1.96E+03 ug/l	7.34E-01 lbs/day
Acrylonitrile	1.66E+00 ug/l	6.21E-04 lbs/day
Benzene	1.78E+02 ug/l	6.68E-02 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	1.10E+01 ug/l	4.14E-03 lbs/day
Chlorobenzene	5.27E+04 ug/l	1.98E+01 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	1.93E-03 ug/l	7.25E-07 lbs/day
1,2-Dichloroethane	2.48E+02 ug/l	9.32E-02 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	2.23E+01 ug/l	8.38E-03 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	1.05E+02 ug/l	3.95E-02 lbs/day
1,1,2,2-Tetrachloroethane	2.76E+01 ug/l	1.04E-02 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	3.51E+00 ug/l	1.32E-03 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	1.08E+04 ug/l	4.05E+00 lbs/day
2,4,6-Trichlorophenol	1.63E+01 ug/l	6.12E-03 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	1.18E+03 ug/l	4.42E-01 lbs/day
2-Chlorophenol	1.00E+03 ug/l	3.76E-01 lbs/day
1,2-Dichlorobenzene	4.26E+04 ug/l	1.60E+01 lbs/day
1,3-Dichlorobenzene	6.52E+03 ug/l	2.45E+00 lbs/day

1,4-Dichlorobenzene	6.52E+03 ug/l	2.45E+00 lbs/day
3,3'-Dichlorobenzidine	1.93E-01 ug/l	7.25E-05 lbs/day
1,1-Dichloroethylene	8.03E+00 ug/l	3.01E-03 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	1.98E+03 ug/l	7.44E-01 lbs/day
1,2-Dichloropropane	9.78E+01 ug/l	3.67E-02 lbs/day
1,3-Dichloropropylene	4.26E+03 ug/l	1.60E+00 lbs/day
2,4-Dimethylphenol	5.77E+03 ug/l	2.16E+00 lbs/day
2,4-Dinitrotoluene	2.28E+01 ug/l	8.56E-03 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	1.35E+00 ug/l	5.08E-04 lbs/day
Ethylbenzene	7.27E+04 ug/l	2.73E+01 lbs/day
Fluoranthene	9.28E+02 ug/l	3.48E-01 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	4.26E+05 ug/l	1.60E+02 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	4.01E+03 ug/l	1.51E+00 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	9.03E+02 ug/l	3.39E-01 lbs/day
Dichlorobromomethane(HM)	5.52E+01 ug/l	2.07E-02 lbs/day
Chlorodibromomethane (HM)	8.53E+01 ug/l	3.20E-02 lbs/day
Hexachlorocyclopentadiene	4.26E+04 ug/l	1.60E+01 lbs/day
Isophorone	1.50E+03 ug/l	5.65E-01 lbs/day
Naphthalene		
Nitrobenzene	4.77E+03 ug/l	1.79E+00 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	3.51E+04 ug/l	1.32E+01 lbs/day
4,6-Dinitro-o-cresol	1.92E+03 ug/l	7.20E-01 lbs/day
N-Nitrosodimethylamine	2.03E+01 ug/l	7.62E-03 lbs/day
N-Nitrosodiphenylamine	4.01E+01 ug/l	1.51E-02 lbs/day
N-Nitrosodi-n-propylamine	3.51E+00 ug/l	1.32E-03 lbs/day
Pentachlorophenol	2.06E+01 ug/l	7.72E-03 lbs/day
Phenol	1.15E+07 ug/l	4.33E+03 lbs/day
Bis(2-ethylhexyl)phthalate	1.48E+01 ug/l	5.55E-03 lbs/day
Butyl benzyl phthalate	1.30E+04 ug/l	4.89E+00 lbs/day
Di-n-butyl phthalate	3.01E+04 ug/l	1.13E+01 lbs/day
Di-n-octyl phthlate		
Diethyl phthalate	3.01E+05 ug/l	1.13E+02 lbs/day
Dimethyl phthlate	7.27E+06 ug/l	2.73E+03 lbs/day
Benzo(a)anthracene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Benzo(a)pyrene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Benzo(b)fluoranthene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Benzo(k)fluoranthene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Chrysene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	7.78E-02 ug/l	2.92E-05 lbs/day

Pyrene (PAH)	2.76E+04 ug/l	1.04E+01 lbs/day
Tetrachloroethylene	2.23E+01 ug/l	8.38E-03 lbs/day
Toluene	5.02E+05 ug/l	1.88E+02 lbs/day
Trichloroethylene	2.03E+02 ug/l	7.62E-02 lbs/day
Vinyl chloride	1.32E+03 ug/l	4.94E-01 lbs/day
Pesticides		
Aldrin	3.51E-04 ug/l	1.32E-07 lbs/day
Dieldrin	3.51E-04 ug/l	1.32E-07 lbs/day
Chlordane	1.48E-03 ug/l	5.55E-07 lbs/day
4,4'-DDT	1.48E-03 ug/l	5.55E-07 lbs/day
4,4'-DDE	1.48E-03 ug/l	5.55E-07 lbs/day
4,4'-DDD	2.11E-03 ug/l	7.91E-07 lbs/day
alpha-Endosulfan	5.02E+00 ug/l	1.88E-03 lbs/day
beta-Endosulfan	5.02E+00 ug/l	1.88E-03 lbs/day
Endosulfan sulfate	5.02E+00 ug/l	1.88E-03 lbs/day
Endrin	2.03E+00 ug/l	7.62E-04 lbs/day
Endrin aldehyde	2.03E+00 ug/l	7.62E-04 lbs/day
Heptachlor	5.27E-04 ug/l	1.98E-07 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1254 (Arochlor 1254)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1221 (Arochlor 1221)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1232 (Arochlor 1232)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1248 (Arochlor 1248)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1260 (Arochlor 1260)	1.13E-04 ug/l	4.24E-08 lbs/day
PCB-1016 (Arochlor 1016)	1.13E-04 ug/l	4.24E-08 lbs/day
Pesticide		
Toxaphene	1.88E-03 ug/l	7.06E-07 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)	3.51E-08 ug/l	1.32E-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		1877.6				1877.6	N/A
Antimony				10785.7		10785.7	
Arsenic	250.8	851.6			0.0	250.8	475.4
Barium						0.0	
Beryllium						0.0	
Cadmium	25.0	25.1			0.0	25.0	2.0
Chromium (III)		15751.5			0.0	15751.5	751.7
Chromium (VI)	249.6	34.1			0.0	34.14	21.60
Copper	500.5	146.4				146.4	84.8
Cyanide		55.2	551825.0			55.2	13.0
Iron		2432.9				2432.9	
Lead	249.6	1423.5			0.0	249.6	54.3
Mercury		6.02		0.38	0.0	0.38	0.030
Nickel		4270.0		11538.2		4270.0	473.7
Selenium	123.0	47.8			0.0	47.8	9.1
Silver		130.5			0.0	130.5	
Thallium				15.8		15.8	
Zinc		1092.8				1092.8	1092.8
Boron	1881.2					1881.2	
Sulfate	2772.2					2772.2	

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	1877.6	N/A	
Antimony	10785.67		
Arsenic	250.8	475.4	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	25.0	2.0	
Chromium (III)	15751.5	752	
Chromium (VI)	34.1	21.6	
Copper	146.4	84.8	

Cyanide	55.2	13.0
Iron	2432.9	
Lead	249.6	54.3
Mercury	0.376	0.030
Nickel	4270.0	474
Selenium	47.8	9.1
Silver	130.5	N/A
Thallium	15.8	
Zinc	1092.8	1092.8
Boron	1881.22	
Sulfate	2772.2	

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. Basic renewal, no increase in effluent 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.

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.

Antidegredation 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 the proposed discharge will not require a Level II Antidegradation Review. The Proposed permit is a simple renewal. No increase in effluent flow or concentration.