

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

1-Jul-22
4:00 PM

Facilities: Emery County Coal Resources, Inc. – Princess Mine (aka Crandall Canyon Mine), UPDES No: UT-0024368

Discharging to: Huntington 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 in terms of total ammonia), and dissolved oxygen.

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

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

II. Receiving Water and Stream Classification

Huntington Creek:	1C, 2B, 3A, 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)	6.50 mg/l (30 Day Average) 9.50 mg/l (7Day Average) 8.00 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

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Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aluminum	87.00 ug/l**	0.530 lbs/day	750.00	ug/l	4.565 lbs/day
Arsenic	190.00 ug/l	1.157 lbs/day	340.00	ug/l	2.070 lbs/day
Cadmium	0.75 ug/l	0.005 lbs/day	8.71	ug/l	0.053 lbs/day
Chromium III	267.65 ug/l	1.629 lbs/day	5599.83	ug/l	34.086 lbs/day
ChromiumVI	11.00 ug/l	0.067 lbs/day	16.00	ug/l	0.097 lbs/day
Copper	30.43 ug/l	0.185 lbs/day	51.56	ug/l	0.314 lbs/day
Iron			1000.00	ug/l	6.087 lbs/day
Lead	18.52 ug/l	0.113 lbs/day	475.25	ug/l	2.893 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.015 lbs/day
Nickel	168.17 ug/l	1.024 lbs/day	1512.61	ug/l	9.207 lbs/day
Selenium	4.60 ug/l	0.028 lbs/day	20.00	ug/l	0.122 lbs/day
Silver	N/A ug/l	N/A lbs/day	40.89	ug/l	0.249 lbs/day
Zinc	386.98 ug/l	2.356 lbs/day	386.98	ug/l	2.356 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 398.97 mg/l as CaCO3

Organics [Pesticides]

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aldrin			1.500	ug/l	0.009 lbs/day
Chlordane	0.004 ug/l	1.391 lbs/day	1.200	ug/l	0.007 lbs/day
DDT, DDE	0.001 ug/l	0.324 lbs/day	0.550	ug/l	0.003 lbs/day
Dieldrin	0.002 ug/l	0.615 lbs/day	1.250	ug/l	0.008 lbs/day
Endosulfan	0.056 ug/l	18.119 lbs/day	0.110	ug/l	0.001 lbs/day
Endrin	0.002 ug/l	0.744 lbs/day	0.090	ug/l	0.001 lbs/day
Guthion			0.010	ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	1.230 lbs/day	0.260	ug/l	0.002 lbs/day
Lindane	0.080 ug/l	25.885 lbs/day	1.000	ug/l	0.006 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	4.530 lbs/day	2.000	ug/l	0.012 lbs/day
pentachlorophenol	13.00 ug/l	4206.254 lbs/day	20.000	ug/l	0.122 lbs/day
Toxephene	0.0002 ug/l	0.065 lbs/day	0.7300	ug/l	0.004 lbs/day

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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	2.28 lbs/day
Cadmium			10.0 ug/l	0.03 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	3.65 tons/day

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

Metals	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			50.0 ug/l	16.178 lbs/day
Barium			1000.0 ug/l	323.558 lbs/day
Cadmium			10.0 ug/l	3.236 lbs/day
Chromium			50.0 ug/l	16.178 lbs/day
Lead			50.0 ug/l	16.178 lbs/day
Mercury			2.0 ug/l	0.647 lbs/day
Selenium			10.0 ug/l	3.236 lbs/day
Silver			50.0 ug/l	16.178 lbs/day
Fluoride (3)			1.4 ug/l	0.453 lbs/day
to			2.4 ug/l	0.777 lbs/day
Nitrates as N			10.0 ug/l	3.236 lbs/day
Chlorophenoxy Herbicides				
2,4-D			100.0 ug/l	32.356 lbs/day
2,4,5-TP			10.0 ug/l	3.236 lbs/day
Endrin			0.2 ug/l	0.065 lbs/day
hexane (Lindane)			4.0 ug/l	1.294 lbs/day
Methoxychlor			100.0 ug/l	32.356 lbs/day
Toxaphene			5.0 ug/l	1.618 lbs/day

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

Toxic Organics	Maximum Conc., ug/l - Acute Standards			
	Class 1C [2 Liters/Day for 70 Kg Person over 70 Yr.]		Class 3A, 3B [6.5 g for 70 Kg Person over 70 Yr.]	
Acenaphthene	1200.00 ug/l	388.27 lbs/day	2700.0 ug/l	873.61 lbs/day
Acrolein	320.00 ug/l	103.54 lbs/day	780.0 ug/l	252.38 lbs/day
Acrylonitrile	0.06 ug/l	0.02 lbs/day	0.7 ug/l	0.21 lbs/day
Benzene	1.20 ug/l	0.39 lbs/day	71.0 ug/l	22.97 lbs/day
Benidine	0.00012 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Carbon tetrachlo	0.25 ug/l	0.08 lbs/day	4.4 ug/l	1.42 lbs/day
Chlorobenzene	680.00 ug/l	220.02 lbs/day	21000.0 ug/l	6794.72 lbs/day
1,2,4-Trichlorobenzene				
Hexachlorobenze	0.00075 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Dichloroethai	0.38 ug/l	0.12 lbs/day	99.0 ug/l	32.03 lbs/day
1,1,1-Trichloroethane				
Hexachloroethan	1.90 ug/l	0.61 lbs/day	8.9 ug/l	2.88 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroeti	0.61 ug/l	0.20 lbs/day	42.0 ug/l	13.59 lbs/day
1,1,2,2-Tetrachlc	0.17 ug/l	0.06 lbs/day	11.0 ug/l	3.56 lbs/day
Chloroethane			0.0 ug/l	0.00 lbs/day
Bis(2-chloroethyl	0.03 ug/l	0.01 lbs/day	1.4 ug/l	0.45 lbs/day
2-Chloroethyl vin	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2-Chloronaphtha	1700.00 ug/l	550.05 lbs/day	4300.0 ug/l	1391.30 lbs/day
2,4,6-Trichloroph	2.10 ug/l	0.68 lbs/day	6.5 ug/l	2.10 lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00 lbs/day
Chloroform (HM)	5.70 ug/l	1.84 lbs/day	470.0 ug/l	152.07 lbs/day
2-Chlorophenol	120.00 ug/l	38.83 lbs/day	400.0 ug/l	129.42 lbs/day
1,2-Dichlorobenz	2700.00 ug/l	873.61 lbs/day	17000.0 ug/l	5500.49 lbs/day
1,3-Dichlorobenz	400.00 ug/l	129.42 lbs/day	2600.0 ug/l	841.25 lbs/day
1,4-Dichlorobenz	400.00 ug/l	129.42 lbs/day	2600.0 ug/l	841.25 lbs/day
3,3'-Dichloroben:	0.04 ug/l	0.01 lbs/day	0.1 ug/l	0.02 lbs/day
1,1-Dichloroethyl	0.06 ug/l	0.02 lbs/day	3.2 ug/l	1.04 lbs/day
1,2-trans-Dichlor	700.00 ug/l	226.49 lbs/day	0.0 ug/l	0.00 lbs/day

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2,4-Dichloropher	93.00 ug/l	30.09 lbs/day	790.0 ug/l	255.61 lbs/day
1,2-Dichloroprop	0.52 ug/l	0.17 lbs/day	39.0 ug/l	12.62 lbs/day
1,3-Dichloroprop	10.00 ug/l	3.24 lbs/day	1700.0 ug/l	550.05 lbs/day
2,4-Dimethylphei	540.00 ug/l	174.72 lbs/day	2300.0 ug/l	744.18 lbs/day
2,4-Dinitrotoluen	0.11 ug/l	0.04 lbs/day	9.1 ug/l	2.94 lbs/day
2,6-Dinitrotoluen	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Diphenylhydr	0.04 ug/l	0.01 lbs/day	0.5 ug/l	0.17 lbs/day
Ethylbenzene	3100.00 ug/l	1003.03 lbs/day	29000.0 ug/l	9383.18 lbs/day
Fluoranthene	300.00 ug/l	97.07 lbs/day	370.0 ug/l	119.72 lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopr	1400.00 ug/l	452.98 lbs/day	170000.0 ug/l	5.50E+04 lbs/day
Bis(2-chloroetho:	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Methylene chloric	4.70 ug/l	1.52 lbs/day	1600.0 ug/l	517.69 lbs/day
Methyl chloride (l	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Methyl bromide (0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Bromoform (HM)	4.30 ug/l	1.39 lbs/day	360.0 ug/l	116.48 lbs/day
Dichlorobromom	0.27 ug/l	0.09 lbs/day	22.0 ug/l	7.12 lbs/day
Chlorodibromom	0.41 ug/l	0.13 lbs/day	34.0 ug/l	11.00 lbs/day
Hexachlorobutad	0.44 ug/l	0.14 lbs/day	50.0 ug/l	16.18 lbs/day
Hexachlorocyclo	240.00 ug/l	77.65 lbs/day	17000.0 ug/l	5500.49 lbs/day
Isophorone	8.40 ug/l	2.72 lbs/day	600.0 ug/l	194.13 lbs/day
Naphthalene				
Nitrobenzene	17.00 ug/l	5.50 lbs/day	1900.0 ug/l	614.76 lbs/day
2-Nitrophenol	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4-Nitrophenol	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dinitropheno	70.00 ug/l	22.65 lbs/day	14000.0 ug/l	4529.81 lbs/day
4,6-Dinitro-o-cres	13.00 ug/l	4.21 lbs/day	765.0 ug/l	247.52 lbs/day
N-Nitrosodimethy	0.00069 ug/l	0.00 lbs/day	8.1 ug/l	2.62 lbs/day
N-Nitrosodipheny	5.00 ug/l	1.62 lbs/day	16.0 ug/l	5.18 lbs/day
N-Nitrosodi-n-prc	0.01 ug/l	0.00 lbs/day	1.4 ug/l	0.45 lbs/day
Pentachlorophen	0.28 ug/l	0.09 lbs/day	8.2 ug/l	2.65 lbs/day
Phenol	2.10E+04 ug/l	6.79E+03 lbs/day	4.6E+06 ug/l	1.49E+06 lbs/day
Bis(2-ethylhexyl)	1.80 ug/l	0.58 lbs/day	5.9 ug/l	1.91 lbs/day
Butyl benzyl phth	3000.00 ug/l	970.67 lbs/day	5200.0 ug/l	1682.50 lbs/day
Di-n-butyl phthak	2700.00 ug/l	873.61 lbs/day	12000.0 ug/l	3882.70 lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	23000.00 ug/l	7441.83 lbs/day	120000.0 ug/l	38826.96 lbs/day
Dimethyl phthlate	3.13E+05 ug/l	1.01E+05 lbs/day	2.9E+06 ug/l	9.38E+05 lbs/day
Benzo(a)anthrac	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Benzo(a)pyrene	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Benzo(b)fluorant	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Benzo(k)fluorantl	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Chrysene (PAH)	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)	9600.00 ug/l	3106.16 lbs/day	0.0 ug/l	0.00 lbs/day
Dibenzo(a,h)antf	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Indeno(1,2,3-cd)	0.0028 ug/l	0.00 lbs/day	0.0 ug/l	0.01 lbs/day
Pyrene (PAH)	960.00 ug/l	310.62 lbs/day	11000.0 ug/l	3559.14 lbs/day
Tetrachloroethyle	0.80 ug/l	0.26 lbs/day	8.9 ug/l	2.88 lbs/day
Toluene	6800.00 ug/l	2200.19 lbs/day	200000 ug/l	64711.60 lbs/day
Trichloroethylene	2.70 ug/l	0.87 lbs/day	81.0 ug/l	26.21 lbs/day
Vinyl chloride	2.00 ug/l	0.65 lbs/day	525.0 ug/l	169.87 lbs/day
			0.0	0.00 lbs/day
Pesticides			0.0	0.00 lbs/day
Aldrin	0.0001 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Dieldrin	0.0001 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Chlordane	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDT	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDE	0.0006 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDD	0.0008 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
alpha-Endosulfar	0.9300 ug/l	0.30 lbs/day	2.0 ug/l	0.65 lbs/day
beta-Endosulfan	0.9300 ug/l	0.30 lbs/day	2.0 ug/l	0.65 lbs/day
Endosulfan sulfa	0.9300 ug/l	0.30 lbs/day	2.0 ug/l	0.65 lbs/day
Endrin	0.7600 ug/l	0.25 lbs/day	0.8 ug/l	0.26 lbs/day
Endrin aldehyde	0.7600 ug/l	0.25 lbs/day	0.8 ug/l	0.26 lbs/day
Heptachlor	0.0002 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Heptachlor epoxide				

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PCB's

PCB 1242 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1254 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1221 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1232 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1248 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1260 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1016 (Arocl	0.000044 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day

Pesticide

Toxaphene	0.000750 ug/l	0.00	0.0 ug/l	0.00 lbs/day
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Dioxin

Dioxin (2,3,7,8-T	1.30E-08 ug/l	0.00 lbs/day	1.40E-08	0.00
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Metals

Antimony	14.0 ug/l	4.53 lbs/day		
Arsenic	50.0 ug/l	16.18 lbs/day	4300.00 ug/l	1391.30 lbs/day
Asbestos	7.00E+06 ug/l	2.26E+06 lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	1.30E+03 ug/l	420.63 lbs/day	2.2E+05 ug/l	71182.76 lbs/day
Lead	700.0 ug/l	226.49 lbs/day		
Mercury			0.15 ug/l	0.05 lbs/day
Nickel			4600.00 ug/l	1488.37 lbs/day
Selenium	0.1 ug/l	0.05 lbs/day		
Silver	610.0 ug/l	197.37 lbs/day		
Thallium			6.30 ug/l	2.04 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.

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VIII. Modeling Information

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

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

Other Conditions

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

Model Inputs

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

Current Upstream Information

	Stream Critical								
	Low Flow	Temp.	pH	T-NH3	BOD5	DO	TRC	TDS	
	cfs	Deg. C		mg/l as N	mg/l	mg/l	mg/l	mg/l	mg/l
er (Irrig. Season)	58.90	8.0	8.7	0.01	0.50	---	0.00	196.7	
Fall	58.90	8.0	8.7	0.01	0.50	---	0.00	196.7	
Winter	58.90	8.0	8.0	0.01	0.50	---	0.00	196.7	
Spring	58.90	8.0	8.0	0.01	0.50	8.06	0.00	196.7	
Dissolved	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb	
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*	
Dissolved	Hg	Ni	Se	Ag	Zn	Boron			
Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l			
All Seasons	0.0795*	0.795*	1.59*	0.15*	0.0795*	1.59*			* ~80% MDL

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Projected Discharge Information

Season	Flow, MGD	Temp.
Summer	0.73000	14.1
Fall	0.73000	10.3
Winter	0.73000	10.5
Spring	0.73000	12.8

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	0.730 MGD	1.129 cfs
Fall	0.730 MGD	1.129 cfs
Winter	0.730 MGD	1.129 cfs
Spring	0.730 MGD	1.129 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.73 MGD. If the discharger is allowed to have a flow greater than 0.73 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occurring, the permit writers must include the discharge flow limitation as indicated above; or, include loading effluent limits in the permit.

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

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

WET Requirements	LC50 >	100.0% Effluent	[Acute]
	IC25 >	1.9% Effluent	[Chronic]

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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	6.50
Fall	6.50
Winter	6.50
Spring	6.50

Effluent Limitation for Total Ammonia based upon Water Quality Standards

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

Season		Concentration	Load	
Summer	4 Day Avg. - Chronic	46.78 mg/l as N	284.7	lbs/day
	1 Hour Avg. - Acute	28.6 mg/l as N	174.3	lbs/day
Fall	4 Day Avg. - Chronic	145.4 mg/l as N	885.1	lbs/day
	1 Hour Avg. - Acute	104.0 mg/l as N	632.9	lbs/day
Winter	4 Day Avg. - Chronic	145.4 mg/l as N	885.1	lbs/day
	1 Hour Avg. - Acute	104.0 mg/l as N	632.9	lbs/day
Spring	4 Day Avg. - Chronic	47.4 mg/l as N	288.5	lbs/day
	1 Hour Avg. - Acute	29.7 mg/l as N	180.5	lbs/day

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

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Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	53527.9	mg/l	162.91	tons/day
Fall	Maximum, Acute	53527.9	mg/l	162.91	tons/day
Winter	Maximum, Acute	53527.9	mg/l	162.91	tons/day
Spring	Maximum, Acute	53527.9	mg/l	162.91	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 398.97 mg/l):

	4 Day Average		1 Hour Average		
	Concentration	Load	Concentration		Load
Aluminum*	N/A	N/A	20,246.2	ug/l	123.2 lbs/day
Arsenic*	10,058.13 ug/l	39.6 lbs/day	9,185.7	ug/l	55.9 lbs/day
Cadmium	35.95 ug/l	0.1 lbs/day	233.7	ug/l	1.4 lbs/day
Chromium III	14,185.86 ug/l	55.8 lbs/day	151,610.8	ug/l	922.9 lbs/day
Chromium VI*	377.39 ug/l	1.5 lbs/day	329.6	ug/l	2.0 lbs/day
Copper	1,576.18 ug/l	6.2 lbs/day	1,375.4	ug/l	8.4 lbs/day
Iron*	N/A	N/A	30,542.5	ug/l	185.9 lbs/day
Lead	942.98 ug/l	3.7 lbs/day	12,848.1	ug/l	78.2 lbs/day
Mercury*	(3.51) ug/l	0.0 lbs/day	62.9	ug/l	0.4 lbs/day
Nickel	8,897.90 ug/l	35.0 lbs/day	40,937.5	ug/l	249.2 lbs/day
Selenium*	161.59 ug/l	0.6 lbs/day	500.1	ug/l	3.0 lbs/day
Silver	N/A ug/l	N/A lbs/day	1,107.2	ug/l	6.7 lbs/day
Zinc	20,566.18 ug/l	80.9 lbs/day	10,476.6	ug/l	63.8 lbs/day
Cyanide*	276.41 ug/l	1.1 lbs/day	595.7	ug/l	3.6 lbs/day

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

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	114.3 Deg. C.	237.8 Deg. F
Fall	114.3 Deg. C.	237.8 Deg. F
Winter	114.3 Deg. C.	237.8 Deg. F
Spring	114.3 Deg. C.	237.8 Deg. F

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**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	1.41E-02 lbs/day
Chlordane	4.30E-03 ug/l	2.62E-02 lbs/day	1.2E+00	ug/l	1.13E-02 lbs/day
DDT, DDE	1.00E-03 ug/l	6.09E-03 lbs/day	5.5E-01	ug/l	5.18E-03 lbs/day
Dieldrin	1.90E-03 ug/l	1.16E-02 lbs/day	1.3E+00	ug/l	1.18E-02 lbs/day
Endosulfan	5.60E-02 ug/l	3.41E-01 lbs/day	1.1E-01	ug/l	1.04E-03 lbs/day
Endrin	2.30E-03 ug/l	1.40E-02 lbs/day	9.0E-02	ug/l	8.47E-04 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	9.42E-05 lbs/day
Heptachlor	3.80E-03 ug/l	2.31E-02 lbs/day	2.6E-01	ug/l	2.45E-03 lbs/day
Lindane	8.00E-02 ug/l	4.87E-01 lbs/day	1.0E+00	ug/l	9.42E-03 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	2.82E-04 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	9.42E-05 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	3.77E-04 lbs/day
PCB's	1.40E-02 ug/l	8.52E-02 lbs/day	2.0E+00	ug/l	1.88E-02 lbs/day
o,p'-Dichlorophenol	1.30E+01 ug/l	7.91E+01 lbs/day	2.0E+01	ug/l	1.88E-01 lbs/day
Toxephene	2.00E-04 ug/l	1.22E-03 lbs/day	7.3E-01	ug/l	6.87E-03 lbs/day

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**Effluent Targets for Pollution Indicators
Based upon Water Quality Standards**

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

	Concentration	1 Hour Average Loading
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	30.4 lbs/day
Nitrates as N	4.0 mg/l	24.3 lbs/day
Total Phosphorus as P	0.05 mg/l	0.3 lbs/day
Total Suspended Solids	90.0 mg/l	547.8 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:

	Concentration	Maximum Concentration Load
Toxic Organics		
Acenaphthene	6.38E+04 ug/l	3.88E+02 lbs/day
Acrolein	1.70E+04 ug/l	1.04E+02 lbs/day
Acrylonitrile	3.14E+00 ug/l	1.91E-02 lbs/day
Benzene	6.38E+01 ug/l	3.88E-01 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	1.33E+01 ug/l	8.09E-02 lbs/day
Chlorobenzene	3.61E+04 ug/l	2.20E+02 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	3.99E-02 ug/l	2.43E-04 lbs/day
1,2-Dichloroethane	2.02E+01 ug/l	1.23E-01 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	1.01E+02 ug/l	6.15E-01 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	3.24E+01 ug/l	1.97E-01 lbs/day
1,1,2,2-Tetrachloroethane	9.04E+00 ug/l	5.50E-02 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	1.65E+00 ug/l	1.00E-02 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	9.04E+04 ug/l	5.50E+02 lbs/day
2,4,6-Trichlorophenol	1.12E+02 ug/l	6.79E-01 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	3.03E+02 ug/l	1.84E+00 lbs/day
2-Chlorophenol	6.38E+03 ug/l	3.88E+01 lbs/day
1,2-Dichlorobenzene	1.44E+05 ug/l	8.74E+02 lbs/day
1,3-Dichlorobenzene	2.13E+04 ug/l	1.29E+02 lbs/day
1,4-Dichlorobenzene	2.13E+04 ug/l	1.29E+02 lbs/day
3,3'-Dichlorobenzidine	2.13E+00 ug/l	1.29E-02 lbs/day
1,1-Dichloroethylene	3.03E+00 ug/l	1.84E-02 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	4.94E+03 ug/l	3.01E+01 lbs/day
1,2-Dichloropropane	2.76E+01 ug/l	1.68E-01 lbs/day
1,3-Dichloropropylene	5.32E+02 ug/l	3.24E+00 lbs/day
2,4-Dimethylphenol	2.87E+04 ug/l	1.75E+02 lbs/day
2,4-Dinitrotoluene	5.85E+00 ug/l	3.56E-02 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	2.13E+00 ug/l	1.29E-02 lbs/day
Ethylbenzene	1.65E+05 ug/l	1.00E+03 lbs/day
Fluoranthene	1.59E+04 ug/l	9.71E+01 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	7.44E+04 ug/l	4.53E+02 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	2.50E+02 ug/l	1.52E+00 lbs/day
Methyl chloride (HM)		

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Methyl bromide (HM)		
Bromoform (HM)	2.29E+02 ug/l	1.39E+00 lbs/day
Dichlorobromomethane(HM)	1.44E+01 ug/l	8.74E-02 lbs/day
Chlorodibromomethane (HM)	2.18E+01 ug/l	1.33E-01 lbs/day
Hexachlorocyclopentadiene	1.28E+04 ug/l	7.77E+01 lbs/day
Isophorone	4.47E+02 ug/l	2.72E+00 lbs/day
Naphthalene		
Nitrobenzene	9.04E+02 ug/l	5.50E+00 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	3.72E+03 ug/l	2.26E+01 lbs/day
4,6-Dinitro-o-cresol	6.91E+02 ug/l	4.21E+00 lbs/day
N-Nitrosodimethylamine	3.67E-02 ug/l	2.23E-04 lbs/day
N-Nitrosodiphenylamine	2.66E+02 ug/l	1.62E+00 lbs/day
N-Nitrosodi-n-propylamine	2.66E-01 ug/l	1.62E-03 lbs/day
Pentachlorophenol	1.49E+01 ug/l	9.06E-02 lbs/day
Phenol	1.12E+06 ug/l	6.79E+03 lbs/day
Bis(2-ethylhexyl)phthalate	9.57E+01 ug/l	5.82E-01 lbs/day
Butyl benzyl phthalate	1.59E+05 ug/l	9.71E+02 lbs/day
Di-n-butyl phthalate	1.44E+05 ug/l	8.74E+02 lbs/day
Di-n-octyl phthalate		
Diethyl phthalate	1.22E+06 ug/l	7.44E+03 lbs/day
Dimethyl phthalate	1.66E+07 ug/l	1.01E+05 lbs/day
Benzo(a)anthracene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Benzo(a)pyrene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Benzo(b)fluoranthene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Benzo(k)fluoranthene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Chrysene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	1.49E-01 ug/l	9.06E-04 lbs/day
Pyrene (PAH)	5.10E+04 ug/l	3.11E+02 lbs/day
Tetrachloroethylene	4.25E+01 ug/l	2.59E-01 lbs/day
Toluene	3.61E+05 ug/l	2.20E+03 lbs/day
Trichloroethylene	1.44E+02 ug/l	8.74E-01 lbs/day
Vinyl chloride	1.06E+02 ug/l	6.47E-01 lbs/day
Pesticides		
Aldrin	6.91E-03 ug/l	4.21E-05 lbs/day
Dieldrin	7.44E-03 ug/l	4.53E-05 lbs/day
Chlordane	3.03E-02 ug/l	1.84E-04 lbs/day
4,4'-DDT	3.14E-02 ug/l	1.91E-04 lbs/day
4,4'-DDE	3.14E-02 ug/l	1.91E-04 lbs/day
4,4'-DDD	4.41E-02 ug/l	2.69E-04 lbs/day
alpha-Endosulfan	4.94E+01 ug/l	3.01E-01 lbs/day
beta-Endosulfan	4.94E+01 ug/l	3.01E-01 lbs/day
Endosulfan sulfate	4.94E+01 ug/l	3.01E-01 lbs/day
Endrin	4.04E+01 ug/l	2.46E-01 lbs/day
Endrin aldehyde	4.04E+01 ug/l	2.46E-01 lbs/day
Heptachlor	1.12E-02 ug/l	6.79E-05 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1254 (Arochlor 1254)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1221 (Arochlor 1221)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1232 (Arochlor 1232)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1248 (Arochlor 1248)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1260 (Arochlor 1260)	2.34E-03 ug/l	1.42E-05 lbs/day
PCB-1016 (Arochlor 1016)	2.34E-03 ug/l	1.42E-05 lbs/day
Pesticide		
Toxaphene	3.88E-02 ug/l	2.36E-04 lbs/day

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Metals		
Antimony	744.18 ug/l	4.53 lbs/day
Arsenic	2616.32 ug/l	15.93 lbs/day
Asbestos	3.72E+08 ug/l	2.26E+06 lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	69102.46 ug/l	420.63 lbs/day
Cyanide	37209.02 ug/l	226.49 lbs/day
Lead	0.00	0.00
Mercury	3.30 ug/l	0.02 lbs/day
Nickel	32425.00 ug/l	197.37 lbs/day
Selenium	0.00	0.00
Silver	0.00	0.00
Thallium	90.36 ug/l	0.55 lbs/day
Zinc		
Dioxin		
Dioxin (2,3,7,8-TCDD)	6.91E-07 ug/l	4.21E-09 lbs/day

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

	Class 4 Acute Agricultural ug/l	Class 3 Acute Aquatic Wildlife ug/l	Acute Toxics Drinking Water Source ug/l	Acute Toxics Wildlife ug/l	1C Acute Health Criteria ug/l	Acute Most Stringent ug/l	Class 3 Chronic Aquatic Wildlife ug/l
Aluminum		20246.2				20246.2	N/A
Antimony			744.2	228569.7		744.2	
Arsenic	5315.6	9185.7	2616.3			2616.3	10058.1
Barium					53155.7	53155.7	
Beryllium						0.0	
Cadmium	527.4	233.7				233.7	36.0
Chromium (III)		151610.8				151610.8	14185.9
Chromium (VI)	5274.1	329.6				329.59	377.39
Copper	10589.7	1375.4	69102.5			1375.4	1576.2
Cyanide		595.7	11694263.0			595.7	276.4
Iron		30542.5				30542.5	
Lead	5274.1	12848.1				5274.1	943.0
Mercury		62.91	3.3	7.97		3.30	-3.509
Nickel		40937.5	32425.0	244516.4		32425.0	8897.9
Selenium	2574.9	500.1				500.1	161.6
Silver		1107.2				1107.2	
Thallium			90.4	334.9		90.4	
Zinc		10476.6				10476.6	20566.2
Boron	39866.8					39866.8	
Sulfate	106311.5					106311.5	

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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	20246.2	N/A	
Antimony	744.18		
Arsenic	2616.3	10058.1	Acute Controls
Asbestos	3.72E+08		
Barium			
Beryllium			
Cadmium	233.7	36.0	
Chromium (III)	151610.8	14186	
Chromium (VI)	329.6	377.4	Acute Controls
Copper	1375.4	1576.2	Acute Controls
Cyanide	595.7	276.4	
Iron	30542.5		
Lead	5274.1	943.0	
Mercury	3.295	-3.509	
Nickel	32425.0	8898	
Selenium	500.1	161.6	
Silver	1107.2	N/A	
Thallium	90.4		
Zinc	10476.6	20566.2	Acute Controls
Boron	39866.81		
Sulfate	106311.5		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.

XI. Colorado River Salinity Forum Considerations

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value.

This doesn't apply to facilities that do not discharge to the Colorado River Basin.

XII. Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important downstream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.