WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis
SUMMARY

Discharging Facility:	**Flaming Gorge WWTP**		
UPDES No:	UT-0020338		
Current Flow:	0.0064	MGD	0.0099 cfs
Design Flow	0.0064	MGD	0.0099 cfs

Receiving Water:	**Green River**		
Stream Classification:	2B, 3A, 4		
Stream Flows [cfs]:	800.0	Summer (July-Sept)	7Q10
	800.0	Fall (Oct-Dec)	7Q10
	800.0	Winter (Jan-Mar)	7Q10
	800.0	Spring (Apr-June)	7Q10
	0.0	Average	
Stream TDS Values:	428.0	Summer (July-Sept)	80th Percentile
	456.0	Fall (Oct-Dec)	80th Percentile
	448.0	Winter (Jan-Mar)	80th Percentile
	420.0	Spring (Apr-June)	80th Percentile

Effluent Limits:				**WQ Standard:**
Flow, MGD:	0.01	MGD	Design Flow	
BOD, mg/l:	25.0	Summer	5.0	Indicator
Dissolved Oxygen, mg/l	4.5	Summer	6.5	30 Day Average
TNH3, Chronic, mg/l:	102477.8	Summer	Varies	Function of pH and Temperature
TDS, mg/l:	62379997.7	Summer	1200.0	

Modeling Parameters:

Acute River Width:	50.0%	
Chronic River Width:	76.8%	Plume Model Used

Antidegradation Level II Review is NOT Required

Date: 11/29/2017

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

29-Nov-17
4:00 PM

Facilities: **Flaming Gorge WWTP** **UPDES No: UT-0020338**
Discharging to: **Green River**

I. Introduction

Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses [R317-2-8, UAC]. Projected concentrations are compared to numeric water quality standards to determine acceptability. The anti-degradation policy and procedures are also considered. The primary in-stream parameters of concern may include metals (as a function of hardness), total dissolved solids (TDS), total residual chlorine (TRC), un-ionized ammonia (as a function of pH and temperature, measured and evaluated interms of total ammonia), and dissolved oxygen.

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

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

II. Receiving Water and Stream Classification

Green River:	2B, 3A, 4
Antidegradation Review:	Antidegradation Level II Review is NOT Required

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	6.50 mg/l (30 Day Average) 5.00 mg/l (7Day Average) 4.00 mg/l (1 Day Average
Maximum Total Dissolved Solids	1200.0 mg/l

Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard Concentration	Load*	1 Hour Average (Acute) Standard Concentration	Load*
Aluminum	87.00 ug/l**	0.005 lbs/day	750.00 ug/l	0.040 lbs/day
Arsenic	190.00 ug/l	0.010 lbs/day	340.00 ug/l	0.018 lbs/day
Cadmium	0.53 ug/l	0.000 lbs/day	5.33 ug/l	0.000 lbs/day
Chromium III	180.13 ug/l	0.010 lbs/day	3768.61 ug/l	0.201 lbs/day
ChromiumVI	11.00 ug/l	0.001 lbs/day	16.00 ug/l	0.001 lbs/day
Copper	20.13 ug/l	0.001 lbs/day	32.69 ug/l	0.002 lbs/day
Iron			1000.00 ug/l	0.053 lbs/day
Lead	10.01 ug/l	0.001 lbs/day	256.80 ug/l	0.014 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40 ug/l	0.000 lbs/day
Nickel	111.71 ug/l	0.006 lbs/day	1004.76 ug/l	0.054 lbs/day
Selenium	4.60 ug/l	0.000 lbs/day	20.00 ug/l	0.001 lbs/day
Silver	N/A ug/l	N/A lbs/day	17.80 ug/l	0.001 lbs/day
Zinc	256.89 ug/l	0.014 lbs/day	256.89 ug/l	0.014 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 246 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	0.000 lbs/day
Chlordane	0.004 ug/l	13.232 lbs/day	1.200 ug/l	0.000 lbs/day
DDT, DDE	0.001 ug/l	3.077 lbs/day	0.550 ug/l	0.000 lbs/day
Dieldrin	0.002 ug/l	5.847 lbs/day	1.250 ug/l	0.000 lbs/day
Endosulfan	0.056 ug/l	172.326 lbs/day	0.110 ug/l	0.000 lbs/day
Endrin	0.002 ug/l	7.078 lbs/day	0.090 ug/l	0.000 lbs/day
Guthion			0.010 ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	11.694 lbs/day	0.260 ug/l	0.000 lbs/day
Lindane	0.080 ug/l	246.180 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	43.082 lbs/day	2.000 ug/l	0.000 lbs/day
Pentachlorophenol	13.00 ug/l	40004.259 lbs/day	20.000 ug/l	0.001 lbs/day
Toxephene	0.0002 ug/l	0.615 lbs/day	0.7300 ug/l	0.000 lbs/day

IV. Numeric Stream Standards for Protection of Agriculture

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			100.0 ug/l	lbs/day
Boron			750.0 ug/l	lbs/day
Cadmium			10.0 ug/l	0.00 lbs/day
Chromium			100.0 ug/l	lbs/day
Copper			200.0 ug/l	lbs/day
Lead			100.0 ug/l	lbs/day
Selenium			50.0 ug/l	lbs/day
TDS, Summer			1200.0 mg/l	0.03 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	8308.58 lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	2400.26 lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	2.03 lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	218.48 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	13.54 lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	64622.26 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	304.65 lbs/day

1,1,1-Trichloroethane					
Hexachloroethane	ug/l	lbs/day	8.9	ug/l	27.39 lbs/day
1,1-Dichloroethane					
1,1,2-Trichloroethane	ug/l	lbs/day	42.0	ug/l	129.24 lbs/day
1,1,2,2-Tetrachloroethai	ug/l	lbs/day	11.0	ug/l	33.85 lbs/day
Chloroethane			0.0	ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4	ug/l	4.31 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	13232.18 lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5	ug/l	20.00 lbs/day
p-Chloro-m-cresol			0.0	ug/l	0.00 lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0	ug/l	1446.31 lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0	ug/l	1230.90 lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0	ug/l	52313.26 lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	8000.85 lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0	ug/l	8000.85 lbs/day
3,3'-Dichlorobenzidine	ug/l	lbs/day	0.1	ug/l	0.24 lbs/day
1,1-Dichloroethylene	ug/l	lbs/day	3.2	ug/l	9.85 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	2431.03 lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0	ug/l	120.01 lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0	ug/l	5231.33 lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0	ug/l	7077.68 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1	ug/l	28.00 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	1.66 lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0	ug/l	89240.27 lbs/day
Fluoranthene	ug/l	lbs/day	370.0	ug/l	1138.58 lbs/day
4-Chlorophenyl phenyl ether					
4-Bromophenyl phenyl ether					
Bis(2-chloroisopropyl) e	ug/l	lbs/day	170000.0	ug/l	523132.62 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	4923.60 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	1107.81 lbs/day
Dichlorobromomethane	ug/l	lbs/day	22.0	ug/l	67.70 lbs/day
Chlorodibromomethane	ug/l	lbs/day	34.0	ug/l	104.63 lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0	ug/l	153.86 lbs/day
Hexachlorocyclopentadi	ug/l	lbs/day	17000.0	ug/l	52313.26 lbs/day
Isophorone	ug/l	lbs/day	600.0	ug/l	1846.35 lbs/day
Naphthalene					
Nitrobenzene	ug/l	lbs/day	1900.0	ug/l	5846.78 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	43081.51 lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0	ug/l	2354.10 lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1	ug/l	24.93 lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0	ug/l	49.24 lbs/day
N-Nitrosodi-n-propylami	ug/l	lbs/day	1.4	ug/l	4.31 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2	ug/l	25.23 lbs/day

Phenol	ug/l	lbs/day	4.6E+06	ug/l	1.42E+07 lbs/day
Bis(2-ethylhexyl)phthala	ug/l	lbs/day	5.9	ug/l	18.16 lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0	ug/l	16001.70 lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0	ug/l	36927.01 lbs/day
Di-n-octyl phthlate					
Diethyl phthalate	ug/l	lbs/day	120000.0	ug/l	369270.08 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06	ug/l	8.92E+06 lbs/day
Benzo(a)anthracene (P/	ug/l	lbs/day	0.0	ug/l	0.10 lbs/day
Benzo(a)pyrene (PAH)	ug/l	lbs/day	0.0	ug/l	0.10 lbs/day
Benzo(b)fluoranthene (F	ug/l	lbs/day	0.0	ug/l	0.10 lbs/day
Benzo(k)fluoranthene (F	ug/l	lbs/day	0.0	ug/l	0.10 lbs/day
Chrysene (PAH)	ug/l	lbs/day	0.0	ug/l	0.10 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	0.10 lbs/day
Indeno(1,2,3-cd)pyrene	ug/l	lbs/day	0.0	ug/l	0.10 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0	ug/l	33849.76 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9	ug/l	27.39 lbs/day
Toluene	ug/l	lbs/day	200000	ug/l	615450.14 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0	ug/l	249.26 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0	ug/l	1615.56 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	6.15 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0	ug/l	6.15 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0	ug/l	6.15 lbs/day
Endrin	ug/l	lbs/day	0.8	ug/l	2.49 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8	ug/l	2.49 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	13232.18 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	676995.16 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.46 lbs/day
Nickel			4600.00 ug/l	14155.35 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	19.39 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)	800.0	13.4	8.4	0.03	0.10	7.62	0.00	428.0
Fall	800.0	8.4	7.9	0.03	0.10	---	0.00	456.0
Winter	800.0	3.9	8.2	0.03	0.10	---	0.00	456.0
Spring	800.0	8.5	8.3	0.03	0.10	---	0.00	456.0

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	1.59*	0.53*	0.053*	0.53*	2.65*	0.53*	0.83*	0.53*

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

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.00640	16.3	732.00	0.01953
Fall	0.00640	16.3		
Winter	0.00640	16.3		
Spring	0.00640	16.3		

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

IX. Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort coincide with the environmental conditions expected at low stream flows.

Effluent Limitation for Flow based upon Water Quality Standards

In-stream criteria of downstream segments will be met with an effluent flow maximum value as follows:

Season	Daily Average	
Summer	0.006 MGD	0.010 cfs
Fall	0.006 MGD	0.010 cfs
Winter	0.006 MGD	0.010 cfs
Spring	0.006 MGD	0.010 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.0064 MGD. If the discharger is allowed to have a flow greater than 0.0064 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occuring, the permit writers must include the discharge flow limititation as indicated above; or, include loading effluent limits in the permit.

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

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

WET Requirements	LC50 >	0.0% Effluent	[Acute]
	IC25 >	0.0% 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	1.3 lbs/day
Fall	25.0 mg/l as BOD5	1.3 lbs/day
Winter	25.0 mg/l as BOD5	1.3 lbs/day
Spring	25.0 mg/l as BOD5	1.3 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	4.50
Fall	4.50
Winter	4.50
Spring	4.50

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	102477.8	mg/l as N	5,468.8	lbs/day
	1 Hour Avg. - Acute	72337.1	mg/l as N	3,860.3	lbs/day
Fall	4 Day Avg. - Chronic	224733.2	mg/l as N	11,993.0	lbs/day
	1 Hour Avg. - Acute	128599.2	mg/l as N	6,862.7	lbs/day
Winter	4 Day Avg. - Chronic	143148.9	mg/l as N	7,639.2	lbs/day
	1 Hour Avg. - Acute	106722.8	mg/l as N	5,695.3	lbs/day
Spring	4 Day Avg. - Chronic	224727.6	mg/l as N	11,992.7	lbs/day
	1 Hour Avg. - Acute	128599.2	mg/l as N	6,862.7	lbs/day

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

Effluent Limitation for Total Residual Chlorine based upon Water Quality Standards

In-stream criteria of downstream segments for Total Residual Chlorine will be met with an effluent limitation as follows:

Season		Concentration		Load	
Summer	4 Day Avg. - Chronic	628.536	mg/l	33.54	lbs/day
	1 Hour Avg. - Acute	763.594	mg/l	40.75	lbs/day
Fall	4 Day Avg. - Chronic	628.536	mg/l	33.54	lbs/day
	1 Hour Avg. - Acute	763.594	mg/l	40.75	lbs/day
Winter	4 Day Avg. - Chronic	628.536	mg/l	33.54	lbs/day
	1 Hour Avg. - Acute	763.594	mg/l	40.75	lbs/day
Spring	4 Day Avg. - Chronic	628.536	mg/l	33.54	lbs/day
	1 Hour Avg. - Acute	763.594	mg/l	40.75	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	6.24E+07	mg/l	1,664.46	tons/day
Fall	Maximum, Acute	6.01E+07	mg/l	1,604.10	tons/day
Winter	Maximum, Acute	6.08E+07	mg/l	1,621.34	tons/day
Spring	4 Day Avg. - Chronic	6.30E+07	mg/l	1,681.71	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 246 mg/l):

	4 Day Average Concentration		Load	1 Hour Average Concentration		Load
Aluminum	N/A		N/A	3.02E+07	ug/l	1611.9 lbs/day
Arsenic	#########	ug/l	404.9 lbs/day	1.37E+07	ug/l	731.3 lbs/day
Cadmium	27,777.36	ug/l	1.0 lbs/day	211,993.4	ug/l	11.3 lbs/day
Chromium III	#########	ug/l	383.8 lbs/day	1.52E+08	ug/l	8123.6 lbs/day
Chromium VI	435,827.38	ug/l	15.0 lbs/day	485,835.3	ug/l	25.9 lbs/day
Copper	#########	ug/l	41.4 lbs/day	#########	ug/l	68.8 lbs/day
Iron	N/A		N/A	4.04E+07	ug/l	2153.4 lbs/day
Lead	571,503.40	ug/l	19.7 lbs/day	1.03E+07	ug/l	552.0 lbs/day
Mercury	744.09	ug/l	0.0 lbs/day	96,964.0	ug/l	5.2 lbs/day
Nickel	#########	ug/l	237.4 lbs/day	4.06E+07	ug/l	2164.6 lbs/day
Selenium	186,738.74	ug/l	6.4 lbs/day	743,798.3	ug/l	39.7 lbs/day
Silver	N/A	ug/l	N/A lbs/day	719,129.4	ug/l	38.4 lbs/day

Zinc	#########	ug/l	549.6	lbs/day	1.04E+07	ug/l	553.7 lbs/day
Cyanide	322,602.38	ug/l	11.1	lbs/day	888,839.1	ug/l	47.4 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

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

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

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

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aldrin					1.5E+00	ug/l	1.24E-04	lbs/day
Chlordane	4.30E-03	ug/l	2.29E-04	lbs/day	1.2E+00	ug/l	9.91E-05	lbs/day
DDT, DDE	1.00E-03	ug/l	5.34E-05	lbs/day	5.5E-01	ug/l	4.54E-05	lbs/day
Dieldrin	1.90E-03	ug/l	1.01E-04	lbs/day	1.3E+00	ug/l	1.03E-04	lbs/day
Endosulfan	5.60E-02	ug/l	2.99E-03	lbs/day	1.1E-01	ug/l	9.08E-06	lbs/day
Endrin	2.30E-03	ug/l	1.23E-04	lbs/day	9.0E-02	ug/l	7.43E-06	lbs/day
Guthion	0.00E+00	ug/l	0.00E+00	lbs/day	1.0E-02	ug/l	8.26E-07	lbs/day
Heptachlor	3.80E-03	ug/l	2.03E-04	lbs/day	2.6E-01	ug/l	2.15E-05	lbs/day
Lindane	8.00E-02	ug/l	4.27E-03	lbs/day	1.0E+00	ug/l	8.26E-05	lbs/day
Methoxychlor	0.00E+00	ug/l	0.00E+00	lbs/day	3.0E-02	ug/l	2.48E-06	lbs/day
Mirex	0.00E+00	ug/l	0.00E+00	lbs/day	1.0E-02	ug/l	8.26E-07	lbs/day
Parathion	0.00E+00	ug/l	0.00E+00	lbs/day	4.0E-02	ug/l	3.30E-06	lbs/day
PCB's	1.40E-02	ug/l	7.47E-04	lbs/day	2.0E+00	ug/l	1.65E-04	lbs/day
Pentachlorophenol	1.30E+01	ug/l	6.94E-01	lbs/day	2.0E+01	ug/l	1.65E-03	lbs/day
Toxephene	2.00E-04	ug/l	1.07E-05	lbs/day	7.3E-01	ug/l	6.03E-05	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	0.3 lbs/day
Nitrates as N	4.0 mg/l	0.2 lbs/day
Total Phosphorus as P	0.05 mg/l	0.0 lbs/day
Total Suspended Solids	90.0 mg/l	4.8 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	2.18E+08 ug/l	1.16E+04 lbs/day
Acrolein	6.30E+07 ug/l	3.36E+03 lbs/day
Acrylonitrile	5.33E+04 ug/l	2.85E+00 lbs/day
Benzene	5.74E+06 ug/l	3.06E+02 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	3.56E+05 ug/l	1.90E+01 lbs/day
Chlorobenzene	1.70E+09 ug/l	9.06E+04 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	6.22E+01 ug/l	3.32E-03 lbs/day
1,2-Dichloroethane	8.00E+06 ug/l	4.27E+02 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	7.19E+05 ug/l	3.84E+01 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	3.39E+06 ug/l	1.81E+02 lbs/day
1,1,2,2-Tetrachloroethane	8.89E+05 ug/l	4.74E+01 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	1.13E+05 ug/l	6.04E+00 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	3.47E+08 ug/l	1.85E+04 lbs/day
2,4,6-Trichlorophenol	5.25E+05 ug/l	2.80E+01 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	3.80E+07 ug/l	2.03E+03 lbs/day
2-Chlorophenol	3.23E+07 ug/l	1.72E+03 lbs/day
1,2-Dichlorobenzene	1.37E+09 ug/l	7.33E+04 lbs/day
1,3-Dichlorobenzene	2.10E+08 ug/l	1.12E+04 lbs/day

1,4-Dichlorobenzene	2.10E+08 ug/l	1.12E+04 lbs/day
3,3'-Dichlorobenzidine	6.22E+03 ug/l	3.32E-01 lbs/day
1,1-Dichloroethylene	2.59E+05 ug/l	1.38E+01 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	6.38E+07 ug/l	3.41E+03 lbs/day
1,2-Dichloropropane	3.15E+06 ug/l	1.68E+02 lbs/day
1,3-Dichloropropylene	1.37E+08 ug/l	7.33E+03 lbs/day
2,4-Dimethylphenol	1.86E+08 ug/l	9.92E+03 lbs/day
2,4-Dinitrotoluene	7.35E+05 ug/l	3.92E+01 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	4.36E+04 ug/l	2.33E+00 lbs/day
Ethylbenzene	2.34E+09 ug/l	1.25E+05 lbs/day
Fluoranthene	2.99E+07 ug/l	1.60E+03 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	1.37E+10 ug/l	7.33E+05 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	1.29E+08 ug/l	6.90E+03 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	2.91E+07 ug/l	1.55E+03 lbs/day
Dichlorobromomethane(HM)	1.78E+06 ug/l	9.49E+01 lbs/day
Chlorodibromomethane (HM)	2.75E+06 ug/l	1.47E+02 lbs/day
Hexachlorocyclopentadiene	1.37E+09 ug/l	7.33E+04 lbs/day
Isophorone	4.85E+07 ug/l	2.59E+03 lbs/day
Naphthalene		
Nitrobenzene	1.54E+08 ug/l	8.19E+03 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	1.13E+09 ug/l	6.04E+04 lbs/day
4,6-Dinitro-o-cresol	6.18E+07 ug/l	3.30E+03 lbs/day
N-Nitrosodimethylamine	6.55E+05 ug/l	3.49E+01 lbs/day
N-Nitrosodiphenylamine	1.29E+06 ug/l	6.90E+01 lbs/day
N-Nitrosodi-n-propylamine	1.13E+05 ug/l	6.04E+00 lbs/day
Pentachlorophenol	6.63E+05 ug/l	3.54E+01 lbs/day
Phenol	3.72E+11 ug/l	1.98E+07 lbs/day
Bis(2-ethylhexyl)phthalate	4.77E+05 ug/l	2.54E+01 lbs/day
Butyl benzyl phthalate	4.20E+08 ug/l	2.24E+04 lbs/day
Di-n-butyl phthalate	9.70E+08 ug/l	5.17E+04 lbs/day
Di-n-octyl phthlate		
Diethyl phthalate	9.70E+09 ug/l	5.17E+05 lbs/day
Dimethyl phthlate	2.34E+11 ug/l	1.25E+07 lbs/day
Benzo(a)anthracene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Benzo(a)pyrene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Benzo(b)fluoranthene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Benzo(k)fluoranthene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Chrysene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	2.50E+03 ug/l	1.34E-01 lbs/day

Pyrene (PAH)	8.89E+08 ug/l	4.74E+04 lbs/day
Tetrachloroethylene	7.19E+05 ug/l	3.84E+01 lbs/day
Toluene	1.62E+10 ug/l	8.62E+05 lbs/day
Trichloroethylene	6.55E+06 ug/l	3.49E+02 lbs/day
Vinyl chloride	4.24E+07 ug/l	2.26E+03 lbs/day
Pesticides		
Aldrin	1.13E+01 ug/l	6.04E-04 lbs/day
Dieldrin	1.13E+01 ug/l	6.04E-04 lbs/day
Chlordane	4.77E+01 ug/l	2.54E-03 lbs/day
4,4'-DDT	4.77E+01 ug/l	2.54E-03 lbs/day
4,4'-DDE	4.77E+01 ug/l	2.54E-03 lbs/day
4,4'-DDD	6.79E+01 ug/l	3.62E-03 lbs/day
alpha-Endosulfan	1.62E+05 ug/l	8.62E+00 lbs/day
beta-Endosulfan	1.62E+05 ug/l	8.62E+00 lbs/day
Endosulfan sulfate	1.62E+05 ug/l	8.62E+00 lbs/day
Endrin	6.55E+04 ug/l	3.49E+00 lbs/day
Endrin aldehyde	6.55E+04 ug/l	3.49E+00 lbs/day
Heptachlor	1.70E+01 ug/l	9.06E-04 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1254 (Arochlor 1254)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1221 (Arochlor 1221)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1232 (Arochlor 1232)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1248 (Arochlor 1248)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1260 (Arochlor 1260)	3.64E+00 ug/l	1.94E-04 lbs/day
PCB-1016 (Arochlor 1016)	3.64E+00 ug/l	1.94E-04 lbs/day
Pesticide		
Toxaphene	6.06E+01 ug/l	3.23E-03 lbs/day
Metals		
Antimony	ug/l	lbs/day
Arsenic	ug/l	lbs/day
Asbestos	ug/l	lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	ug/l	lbs/day
Cyanide	ug/l	lbs/day
Lead		
Mercury	ug/l	lbs/day
Nickel	ug/l	lbs/day
Selenium		
Silver		
Thallium	ug/l	lbs/day
Zinc		

Dioxin		
Dioxin (2,3,7,8-TCDD)	1.13E-03 ug/l	6.04E-08 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		########				########	N/A
Antimony				########		########	
Arsenic	8080255.1	########			0.0	8080255.1	11738074.5
Barium						0.0	
Beryllium						0.0	
Cadmium	801601.8	211993.4			0.0	211993.4	27777.4
Chromium (III)		########			0.0	########	11125570.4
Chromium (VI)	8016017.9	485835.3			0.0	485835.33	435827.38
Copper	16096273.0	1288683.4				1288683.4	1199638.4
Cyanide		888839.1	########			888839.1	322602.4
Iron		########				########	
Lead	8016017.9	########			0.0	8016017.9	571503.4
Mercury		96964.02		12120.38	0.0	12120.38	744.095
Nickel		########		########		########	6881052.7
Selenium	3911653.1	743798.3			0.0	743798.3	186738.7
Silver		719129.4			0.0	719129.4	
Thallium				509056.1		509056.1	
Zinc		########				########	15932490.8
Boron	60601913.5					########	

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	3.02E+07	N/A	
Antimony	3.47E+08		
Arsenic	8080255.1	1.17E+07	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	211993.4	27777.4	
Chromium (III)	1.52E+08	11125570	
Chromium (VI)	485835.3	435827.4	
Copper	1288683.4	1199638.4	

Cyanide	888839.1	322602.4	
Iron	4.04E+07		
Lead	8016017.9	571503.4	
Mercury	12120.383	744.095	
Nickel	4.06E+07	6881053	
Selenium	743798.3	186738.7	
Silver	719129.4	N/A	
Thallium	509056.1		
Zinc	1.04E+07	1.59E+07	Acute Controls
Boron	6.06E+07		

Other Effluent Limitations are based upon R317-1.

E. coli 126.0 organisms per 100 ml

X. Antidegradation Considerations

The Utah Antidegradation Policy allows for degradation of existing quality where it is determined that such lowering of water quality is necessary to accommodate important economic or social development in the area in which the waters are protected [R317-2-3]. It has been determined that certain chemical parameters introduced by this discharge will cause an increase of the concentration of said parameters in the receiving waters. Under no conditions will the increase in concentration be allowed to interfere with existing instream water uses.

The antidegradation rules and procedures allow for modification of effluent limits less than those based strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

An Antidegradation Level I Review was conducted on this discharge and its effect on the receiving water. Based upon that review, it has been determined that an Antidegradation Level II Review is NOT Required

XI. Colorado River Salinity Forum Considerations

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

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.

Utah Division of Water Quality
801-538-6052
File Name: FlamingGorge_WLA_2-27-13

APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day	CBOD Coeff. FORCED (Kd)/day	CBOD Coeff. (Ka)T 1/day	REAER. Coeff. (Ka)20 (Ka)/day	REAER. Coeff. FORCED 1/day	REAER. Coeff. (Ka)T 1/day	NBOD Coeff. (Kn)20 1/day	NBOD Coeff. (Kn)T 1/day
0.520	0.000	0.384	2.638	0.000	2.256	0.400	0.241

Open Coeff. (K4)20 1/day	Open Coeff. (K4)T 1/day	NH3 LOSS (K5)20 1/day	NH3 (K5)T 1/day	NO2+NO3 LOSS (K6)20 1/day	NO2+NO3 (K6)T 1/day	TRC Decay K(Cl)20 1/day	TRC K(Cl)(T) 1/day
0.000	0.000	4.000	2.954	0.000	0.000	32.000	21.784

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.660

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