Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

20-Mar-20
4:00 PM

Facilities: **Genwal Resources Inc.** **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 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

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) 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**	0.531	lbs/day	750.00	ug/l	4.574	lbs/day
Arsenic	190.00	ug/l	1.159	lbs/day	340.00	ug/l	2.074	lbs/day
Cadmium	0.46	ug/l	0.003	lbs/day	4.41	ug/l	0.027	lbs/day
Chromium III	154.75	ug/l	0.944	lbs/day	3237.63	ug/l	19.746	lbs/day
ChromiumVI	11.00	ug/l	0.067	lbs/day	16.00	ug/l	0.098	lbs/day
Copper	17.18	ug/l	0.105	lbs/day	27.45	ug/l	0.167	lbs/day
Iron					1000.00	ug/l	6.099	lbs/day
Lead	7.90	ug/l	0.048	lbs/day	202.80	ug/l	1.237	lbs/day
Mercury	0.0120	ug/l	0.000	lbs/day	2.40	ug/l	0.015	lbs/day
Nickel	95.49	ug/l	0.582	lbs/day	858.89	ug/l	5.238	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	12.94	ug/l	0.079	lbs/day
Zinc	219.54	ug/l	1.339	lbs/day	219.54	ug/l	1.339	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 204.36 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	0.009	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

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	2.29 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	3.66 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			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
ocyclohexane (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]

	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	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
Benzidine	0.00012 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Carbon tetrachloride	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				
Hexachlorobenzene	0.00075 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Dichloroethane	0.38 ug/l	0.12 lbs/day	99.0 ug/l	32.03 lbs/day
1,1,1-Trichloroethane				
Hexachloroethane	1.90 ug/l	0.61 lbs/day	8.9 ug/l	2.88 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	0.61 ug/l	0.20 lbs/day	42.0 ug/l	13.59 lbs/day
1,1,2,2-Tetrachloroethai	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) ether	0.03 ug/l	0.01 lbs/day	1.4 ug/l	0.45 lbs/day
2-Chloroethyl vinyl ethei	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2-Chloronaphthalene	1700.00 ug/l	550.05 lbs/day	4300.0 ug/l	1391.30 lbs/day
2,4,6-Trichlorophenol	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-Dichlorobenzene	2700.00 ug/l	873.61 lbs/day	17000.0 ug/l	5500.49 lbs/day
1,3-Dichlorobenzene	400.00 ug/l	129.42 lbs/day	2600.0 ug/l	841.25 lbs/day
1,4-Dichlorobenzene	400.00 ug/l	129.42 lbs/day	2600.0 ug/l	841.25 lbs/day
3,3'-Dichlorobenzidine	0.04 ug/l	0.01 lbs/day	0.1 ug/l	0.02 lbs/day
1,1-Dichloroethylene	0.06 ug/l	0.02 lbs/day	3.2 ug/l	1.04 lbs/day
1,2-trans-Dichloroethyle	700.00 ug/l	226.49 lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dichlorophenol	93.00 ug/l	30.09 lbs/day	790.0 ug/l	255.61 lbs/day
1,2-Dichloropropane	0.52 ug/l	0.17 lbs/day	39.0 ug/l	12.62 lbs/day
1,3-Dichloropropylene	10.00 ug/l	3.24 lbs/day	1700.0 ug/l	550.05 lbs/day

2,4-Dimethylphenol	540.00	ug/l	174.72	lbs/day	2300.0	ug/l	744.18 lbs/day
2,4-Dinitrotoluene	0.11	ug/l	0.04	lbs/day	9.1	ug/l	2.94 lbs/day
2,6-Dinitrotoluene	0.00	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
1,2-Diphenylhydrazine	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-chloroisopropyl) e	1400.00	ug/l	452.98	lbs/day	170000.0	ug/l	55004.86 lbs/day
Bis(2-chloroethoxy) met	0.00	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
Methylene chloride (HM	4.70	ug/l	1.52	lbs/day	1600.0	ug/l	517.69 lbs/day
Methyl chloride (HM)	0.00	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
Methyl bromide (HM)	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
Dichlorobromomethane(	0.27	ug/l	0.09	lbs/day	22.0	ug/l	7.12 lbs/day
Chlorodibromomethane	0.41	ug/l	0.13	lbs/day	34.0	ug/l	11.00 lbs/day
Hexachlorobutadiene(c)	0.44	ug/l	0.14	lbs/day	50.0	ug/l	16.18 lbs/day
Hexachlorocyclopentadi	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-Dinitrophenol	70.00	ug/l	22.65	lbs/day	14000.0	ug/l	4529.81 lbs/day
4,6-Dinitro-o-cresol	13.00	ug/l	4.21	lbs/day	765.0	ug/l	247.52 lbs/day
N-Nitrosodimethylamine	0.00069	ug/l	0.00	lbs/day	8.1	ug/l	2.62 lbs/day
N-Nitrosodiphenylamine	5.00	ug/l	1.62	lbs/day	16.0	ug/l	5.18 lbs/day
N-Nitrosodi-n-propylami	0.01	ug/l	0.00	lbs/day	1.4	ug/l	0.45 lbs/day
Pentachlorophenol	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)phthala	1.80	ug/l	0.58	lbs/day	5.9	ug/l	1.91 lbs/day
Butyl benzyl phthalate	3000.00	ug/l	970.67	lbs/day	5200.0	ug/l	1682.50 lbs/day
Di-n-butyl phthalate	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)anthracene (P/	0.0028	ug/l	0.00	lbs/day	0.0	ug/l	0.01 lbs/day
Benzo(a)pyrene (PAH)	0.0028	ug/l	0.00	lbs/day	0.0	ug/l	0.01 lbs/day
Benzo(b)fluoranthene (F	0.0028	ug/l	0.00	lbs/day	0.0	ug/l	0.01 lbs/day
Benzo(k)fluoranthene (F	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)anthracene	0.0028	ug/l	0.00	lbs/day	0.0	ug/l	0.01 lbs/day
Indeno(1,2,3-cd)pyrene	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
Tetrachloroethylene	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-Endosulfan	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 sulfate	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							
PCB's							
PCB 1242 (Arochlor 124	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1254 (Arochlor 125	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1221 (Arochlor 122	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1232 (Arochlor 123	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1248 (Arochlor 124	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day
PCB-1260 (Arochlor 126	0.000044	ug/l	0.00	lbs/day	0.0	ug/l	0.00 lbs/day

PCB-1016 (Arochlor 10:	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
Dioxin							
Dioxin (2,3,7,8-TCDD)	1.30E-08	ug/l	0.00	lbs/day	1.40E-08		0.00
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.

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)	58.9	8.0	8.7	0.01	0.50	7.89	0.00	197.0
Fall	58.9	8.0	8.7	0.01	0.50	---	0.00	197.0
Winter	58.9	8.0	8.7	0.01	0.50	---	0.00	197.0
Spring	58.9	8.0	8.7	0.01	0.50	---	0.00	197.0

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

	Hg	Ni	Se	Ag	Zn	Boron	
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	0.53*	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	0.73000	11.7	619.00	1.88392
Fall	0.73000	11.7		
Winter	0.73000	11.7		
Spring	0.73000	11.7		

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 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 >	12.8%	Effluent	[Acute]
	IC25 >	1.9%	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	152.2 lbs/day
Fall	25.0 mg/l as BOD5	152.2 lbs/day
Winter	25.0 mg/l as BOD5	152.2 lbs/day
Spring	25.0 mg/l as BOD5	152.2 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	5.50
Fall	5.50
Winter	5.50
Spring	5.50

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	41.7	mg/l as N	253.8	lbs/day
	1 Hour Avg. - Acute	37.0	mg/l as N	225.1	lbs/day
Fall	4 Day Avg. - Chronic	41.7	mg/l as N	253.8	lbs/day
	1 Hour Avg. - Acute	37.0	mg/l as N	225.1	lbs/day
Winter	4 Day Avg. - Chronic	41.7	mg/l as N	253.8	lbs/day
	1 Hour Avg. - Acute	37.0	mg/l as N	225.1	lbs/day
Spring	4 Day Avg. - Chronic	41.7	mg/l as N	253.8	lbs/day
	1 Hour Avg. - Acute	37.0	mg/l as N	225.1	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	0.532	mg/l	3.24	lbs/day
	1 Hour Avg. - Acute	0.487	mg/l	2.97	lbs/day
Fall	4 Day Avg. - Chronic	0.532	mg/l	3.24	lbs/day
	1 Hour Avg. - Acute	0.487	mg/l	2.97	lbs/day
Winter	4 Day Avg. - Chronic	0.532	mg/l	3.24	lbs/day
	1 Hour Avg. - Acute	0.487	mg/l	2.97	lbs/day
Spring	4 Day Avg. - Chronic	0.532	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	0.487	mg/l	0.00	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	53512.2	mg/l	162.86	tons/day
Fall	Maximum, Acute	53512.2	mg/l	162.86	tons/day
Winter	Maximum, Acute	53512.2	mg/l	162.86	tons/day
Spring	4 Day Avg. - Chronic	53512.2	mg/l	162.86	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 204.36 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum*	N/A		N/A		20,246.2	ug/l	123.5	lbs/day
Arsenic*	10,058.13	ug/l	39.6	lbs/day	9,185.7	ug/l	56.0	lbs/day
Cadmium	20.28	ug/l	0.1	lbs/day	117.4	ug/l	0.7	lbs/day
Chromium III	8,184.29	ug/l	32.2	lbs/day	87,647.4	ug/l	534.5	lbs/day
Chromium VI*	377.39	ug/l	1.5	lbs/day	329.6	ug/l	2.0	lbs/day
Copper	871.85	ug/l	3.4	lbs/day	722.6	ug/l	4.4	lbs/day
Iron*	N/A		N/A		27,045.3	ug/l	164.9	lbs/day
Lead	378.62	ug/l	1.5	lbs/day	5,470.7	ug/l	33.4	lbs/day
Mercury*	0.64	ug/l	0.0	lbs/day	65.0	ug/l	0.4	lbs/day
Nickel	5,034.46	ug/l	19.8	lbs/day	23,236.1	ug/l	141.7	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	350.4	ug/l	2.1	lbs/day
Zinc	11,665.87	ug/l	45.9	lbs/day	5,942.7	ug/l	36.2	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	62.2	Deg. C.	143.9	Deg. F
Fall	62.2	Deg. C.	143.9	Deg. F
Winter	62.2	Deg. C.	143.9	Deg. F
Spring	62.2	Deg. C.	143.9	Deg. F

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

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

	4 Day Average			1 Hour Average		
	Concentration		Load	Concentration		Load
Aldrin				1.5E+00	ug/l	1.42E-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	5.19E-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	8.49E-04 lbs/day
Guthion	0.00E+00	ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	9.43E-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	9.43E-03 lbs/day
Methoxychlor	0.00E+00	ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	2.83E-04 lbs/day
Mirex	0.00E+00	ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	9.43E-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	1.89E-02 lbs/day
Pentachlorophenol	1.30E+01	ug/l	7.91E+01 lbs/day	2.0E+01	ug/l	1.89E-01 lbs/day
Toxephene	2.00E-04	ug/l	1.22E-03 lbs/day	7.3E-01	ug/l	6.89E-03 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	30.5	lbs/day
Nitrates as N	4.0	mg/l	24.4	lbs/day
Total Phosphorus as P	0.05	mg/l	0.3	lbs/day
Total Suspended Solids	90.0	mg/l	548.9	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	6.38E+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)				
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 phthlate				
Diethyl phthalate	1.22E+06	ug/l	7.44E+03	lbs/day
Dimethyl phthlate	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
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	7.44	ug/l	0.05	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		0.0	2616.3	10058.1
Barium					53155.7	53155.7	
Beryllium						0.0	
Cadmium	527.4	117.4			0.0	117.4	20.3
Chromium (III)		87647.4			0.0	87647.4	8184.3
Chromium (VI)	5274.1	329.6			0.0	329.59	377.39
Copper	10589.7	722.6	69102.5			722.6	871.9
Cyanide		595.7	11694263.0			595.7	276.4
Iron		27045.3				27045.3	
Lead	5274.1	5470.7			0.0	5274.1	378.6
Mercury		64.99	7.4	7.97	0.0	7.44	0.638
Nickel		23236.1	32425.0	244516.4		23236.1	5034.5
Selenium	2574.9	500.1			0.0	500.1	161.6
Silver		350.4			0.0	350.4	
Thallium			90.4	334.9		90.4	
Zinc		5942.7				5942.7	11665.9
Boron	39866.8					39866.8	

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	117.4	20.3	
Chromium (III)	87647.4	8184	
Chromium (VI)	329.6	377.4	Acute Controls
Copper	722.6	871.9	Acute Controls
Cyanide	595.7	276.4	
Iron	27045.3		
Lead	5274.1	378.6	
Mercury	7.441	0.638	
Nickel	23236.1	5034	
Selenium	500.1	161.6	
Silver	350.4	N/A	
Thallium	90.4		
Zinc	5942.7	11665.9	Acute Controls
Boron	39866.81		

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 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.

Utah Division of Water Quality
801-538-6052
File Name: Genwal Coal WLA 04-20-2020.xls

APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day	CBOD Coeff. FORCED (Kd)/day	CBOD Coeff. (Ka)T 1/day	REAER. Coeff. (Ka)20 (Ka)/day	REAER. Coeff. FORCED 1/day	REAER. Coeff. (Ka)T 1/day	NBOD Coeff. (Kn)20 1/day	NBOD Coeff. (Kn)T 1/day
1.000	0.000	0.576	6.511	0.000	4.899	0.250	0.099

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	2.305	0.000	0.000	32.000	15.903

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.470

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

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 require a Level II Antidegradation Review.