

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis
SUMMARY

Discharging Facility: Springdale WWTP
UPDES No: UT-0025224
Current Flow: 0.29 MGD Design Flow
Design Flow 0.29 MGD

Receiving Water: Virgin River
Stream Classification: 1C, 2B, 3C, 4
Stream Flows [cfs]:
74.0 Summer (July-Sept) 7Q10
74.0 Fall (Oct-Dec) 7Q10
74.0 Winter (Jan-Mar) 7Q10
74.0 Spring (Apr-June) 7Q10
126.9 Average
Stream TDS Values:
510.0 Summer (July-Sept) 80th Percentile
510.0 Fall (Oct-Dec) 80th Percentile
510.0 Winter (Jan-Mar) 80th Percentile
510.0 Spring (Apr-June) 80th Percentile

Effluent Limits:		WQ Standard:
Flow, MGD:	0.29 MGD	Design Flow
BOD, mg/l:	25.0 Summer	5.0 Indicator
Dissolved Oxygen, mg/l	4.0 Summer	5.0 30 Day Average
TNH3, Chronic, mg/l:	173.0 Summer	Varies Function of pH and Temperature
TDS, mg/l:	115013.2 Summer	1200.0

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

Level 1 Antidegradation Level Completed: Level II Review required.

Date: 3/1/2011

Permit Writer: _____
WLA by: Eric M. Wain _____
WQM Sec. Approval: _____
TMDL Sec. Approval: _____

**Utah Division of Water Quality
Salt Lake City, Utah**

**WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis**

1-Mar-11
4:00 PM

Facilities: Springdale WWTP
Discharging to: Virgin River

UPDES No: UT-0025224

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

Virgin River:	1C, 2B, 3C, 4
Antidegradation Review:	Level I review completed. Level II review not required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH ₃)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	5.00 mg/l (30 Day Average) N/A mg/l (7Day Average) 3.00 mg/l (1 Day Average)
Maximum Total Dissolved Solids	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**	0.211 lbs/day	750.00	ug/l	1.817 lbs/day
Arsenic	190.00 ug/l	0.460 lbs/day	340.00	ug/l	0.824 lbs/day
Cadmium	0.61 ug/l	0.001 lbs/day	6.44	ug/l	0.016 lbs/day
Chromium III	209.96 ug/l	0.509 lbs/day	4392.84	ug/l	10.643 lbs/day
ChromiumVI	11.00 ug/l	0.027 lbs/day	16.00	ug/l	0.039 lbs/day
Copper	23.62 ug/l	0.057 lbs/day	39.00	ug/l	0.094 lbs/day
Iron			1000.00	ug/l	2.423 lbs/day
Lead	12.70 ug/l	0.031 lbs/day	325.88	ug/l	0.790 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.006 lbs/day
Nickel	130.87 ug/l	0.317 lbs/day	1177.12	ug/l	2.852 lbs/day
Selenium	4.60 ug/l	0.011 lbs/day	20.00	ug/l	0.048 lbs/day
Silver	N/A ug/l	N/A lbs/day	24.56	ug/l	0.060 lbs/day
Zinc	301.04 ug/l	0.729 lbs/day	301.04	ug/l	0.729 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 296.63 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	0.004 lbs/day
Chlordane	0.004 ug/l	1.725 lbs/day	1.200	ug/l	0.003 lbs/day
DDT, DDE	0.001 ug/l	0.401 lbs/day	0.550	ug/l	0.001 lbs/day
Dieldrin	0.002 ug/l	0.762 lbs/day	1.250	ug/l	0.003 lbs/day
Endosulfan	0.056 ug/l	22.472 lbs/day	0.110	ug/l	0.000 lbs/day
Endrin	0.002 ug/l	0.923 lbs/day	0.090	ug/l	0.000 lbs/day
Guthion			0.010	ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	1.525 lbs/day	0.260	ug/l	0.001 lbs/day
Lindane	0.080 ug/l	32.102 lbs/day	1.000	ug/l	0.002 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	5.618 lbs/day	2.000	ug/l	0.005 lbs/day
Pentachlorophenol	13.00 ug/l	5216.616 lbs/day	20.000	ug/l	0.048 lbs/day
Toxephene	0.0002 ug/l	0.080 lbs/day	0.7300	ug/l	0.002 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	0.91 lbs/day
Cadmium			10.0 ug/l	0.01 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	1.45 tons/day

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

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Metals				
Arsenic			50.0 ug/l	20.064 lbs/day
Barium			1000.0 ug/l	401.278 lbs/day
Cadmium			10.0 ug/l	4.013 lbs/day
Chromium			50.0 ug/l	20.064 lbs/day
Lead			50.0 ug/l	20.064 lbs/day
Mercury			2.0 ug/l	0.803 lbs/day
Selenium			10.0 ug/l	4.013 lbs/day
Silver			50.0 ug/l	20.064 lbs/day
Fluoride (3) to			1.4 ug/l	0.562 lbs/day
Nitrates as N			2.4 ug/l	0.963 lbs/day
			10.0 ug/l	4.013 lbs/day

Chlorophenoxy Herbicides

2,4-D	100.0 ug/l	40.128 lbs/day
2,4,5-TP	10.0 ug/l	4.013 lbs/day
Endrin	0.2 ug/l	0.080 lbs/day
ocyclohexane (Lindane)	4.0 ug/l	1.605 lbs/day
Methoxychlor	100.0 ug/l	40.128 lbs/day
Toxaphene	5.0 ug/l	2.006 lbs/day

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

	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.]	
Toxic Organics				
Acenaphthene	1200.00 ug/l	481.53 lbs/day	2700.0 ug/l	1083.45 lbs/day
Acrolein	320.00 ug/l	128.41 lbs/day	780.0 ug/l	313.00 lbs/day
Acrylonitrile	0.06 ug/l	0.02 lbs/day	0.7 ug/l	0.26 lbs/day
Benzene	1.20 ug/l	0.48 lbs/day	71.0 ug/l	28.49 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	0.10 lbs/day	4.4 ug/l	1.77 lbs/day
Chlorobenzene	680.00 ug/l	272.87 lbs/day	21000.0 ug/l	8426.84 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	0.15 lbs/day	99.0 ug/l	39.73 lbs/day

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1,1,1-Trichloroethane				
Hexachloroethane	1.90 ug/l	0.76 lbs/day	8.9 ug/l	3.57 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	0.61 ug/l	0.24 lbs/day	42.0 ug/l	16.85 lbs/day
1,1,2,2-Tetrachloroethane	0.17 ug/l	0.07 lbs/day	11.0 ug/l	4.41 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	0.56 lbs/day
2-Chloroethyl vinyl ether	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
2-Chloronaphthalene	1700.00 ug/l	682.17 lbs/day	4300.0 ug/l	1725.50 lbs/day
2,4,6-Trichlorophenol	2.10 ug/l	0.84 lbs/day	6.5 ug/l	2.61 lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00 lbs/day
Chloroform (HM)	5.70 ug/l	2.29 lbs/day	470.0 ug/l	188.60 lbs/day
2-Chlorophenol	120.00 ug/l	48.15 lbs/day	400.0 ug/l	160.51 lbs/day
1,2-Dichlorobenzene	2700.00 ug/l	1083.45 lbs/day	17000.0 ug/l	6821.73 lbs/day
1,3-Dichlorobenzene	400.00 ug/l	160.51 lbs/day	2600.0 ug/l	1043.32 lbs/day
1,4-Dichlorobenzene	400.00 ug/l	160.51 lbs/day	2600.0 ug/l	1043.32 lbs/day
3,3'-Dichlorobenzidine	0.04 ug/l	0.02 lbs/day	0.1 ug/l	0.03 lbs/day
1,1-Dichloroethylene	0.06 ug/l	0.02 lbs/day	3.2 ug/l	1.28 lbs/day
1,2-trans-Dichloroethylene	700.00 ug/l	280.89 lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dichlorophenol	93.00 ug/l	37.32 lbs/day	790.0 ug/l	317.01 lbs/day
1,2-Dichloropropane	0.52 ug/l	0.21 lbs/day	39.0 ug/l	15.65 lbs/day
1,3-Dichloropropylene	10.00 ug/l	4.01 lbs/day	1700.0 ug/l	682.17 lbs/day
2,4-Dimethylphenol	540.00 ug/l	216.69 lbs/day	2300.0 ug/l	922.94 lbs/day
2,4-Dinitrotoluene	0.11 ug/l	0.04 lbs/day	9.1 ug/l	3.65 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	0.02 lbs/day	0.5 ug/l	0.22 lbs/day
Ethylbenzene	3100.00 ug/l	1243.96 lbs/day	29000.0 ug/l	11637.07 lbs/day
Fluoranthene	300.00 ug/l	120.38 lbs/day	370.0 ug/l	148.47 lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopropyl) ether	1400.00 ug/l	561.79 lbs/day	170000.0 ug/l	68217.28 lbs/day
Bis(2-chloroethoxy) methane	0.00 ug/l	0.00 lbs/day	0.0 ug/l	0.00 lbs/day
Methylene chloride (HM)	4.70 ug/l	1.89 lbs/day	1600.0 ug/l	642.04 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	1.73 lbs/day	360.0 ug/l	144.46 lbs/day
Dichlorobromomethane	0.27 ug/l	0.11 lbs/day	22.0 ug/l	8.83 lbs/day
Chlorodibromomethane	0.41 ug/l	0.16 lbs/day	34.0 ug/l	13.64 lbs/day
Hexachlorobutadiene(c)	0.44 ug/l	0.18 lbs/day	50.0 ug/l	20.06 lbs/day
Hexachlorocyclopentadiene	240.00 ug/l	96.31 lbs/day	17000.0 ug/l	6821.73 lbs/day
Isophorone	8.40 ug/l	3.37 lbs/day	600.0 ug/l	240.77 lbs/day
Naphthalene				
Nitrobenzene	17.00 ug/l	6.82 lbs/day	1900.0 ug/l	762.43 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	28.09 lbs/day	14000.0 ug/l	5617.89 lbs/day
4,6-Dinitro-o-cresol	13.00 ug/l	5.22 lbs/day	765.0 ug/l	306.98 lbs/day
N-Nitrosodimethylamine	0.00069 ug/l	0.00 lbs/day	8.1 ug/l	3.25 lbs/day
N-Nitrosodiphenylamine	5.00 ug/l	2.01 lbs/day	16.0 ug/l	6.42 lbs/day
N-Nitrosodi-n-propylamine	0.01 ug/l	0.00 lbs/day	1.4 ug/l	0.56 lbs/day
Pentachlorophenol	0.28 ug/l	0.11 lbs/day	8.2 ug/l	3.29 lbs/day

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Phenol	2.10E+04 ug/l	8.43E+03 lbs/day	4.6E+06 ug/l	1.85E+06 lbs/day
Bis(2-ethylhexyl)phthala	1.80 ug/l	0.72 lbs/day	5.9 ug/l	2.37 lbs/day
Butyl benzyl phthalate	3000.00 ug/l	1203.83 lbs/day	5200.0 ug/l	2086.65 lbs/day
Di-n-butyl phthalate	2700.00 ug/l	1083.45 lbs/day	12000.0 ug/l	4815.34 lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	23000.00 ug/l	9229.40 lbs/day	120000.0 ug/l	48153.37 lbs/day
Dimethyl phthlate	3.13E+05 ug/l	1.26E+05 lbs/day	2.9E+06 ug/l	1.16E+06 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	3852.27 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	385.23 lbs/day	11000.0 ug/l	4414.06 lbs/day
Tetrachloroethylene	0.80 ug/l	0.32 lbs/day	8.9 ug/l	3.57 lbs/day
Toluene	6800.00 ug/l	2728.69 lbs/day	200000 ug/l	80255.62 lbs/day
Trichloroethylene	2.70 ug/l	1.08 lbs/day	81.0 ug/l	32.50 lbs/day
Vinyl chloride	2.00 ug/l	0.80 lbs/day	525.0 ug/l	210.67 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	0.37 lbs/day	2.0 ug/l	0.80 lbs/day
beta-Endosulfan	0.9300 ug/l	0.37 lbs/day	2.0 ug/l	0.80 lbs/day
Endosulfan sulfate	0.9300 ug/l	0.37 lbs/day	2.0 ug/l	0.80 lbs/day
Endrin	0.7600 ug/l	0.30 lbs/day	0.8 ug/l	0.33 lbs/day
Endrin aldehyde	0.7600 ug/l	0.30 lbs/day	0.8 ug/l	0.33 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 101	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

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Metals

Antimony	14.0 ug/l	5.62 lbs/day		
Arsenic	50.0 ug/l	20.06 lbs/day	4300.00 ug/l	1725.50 lbs/day
Asbestos	7.00E+06 ug/l	2.81E+06 lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	1.30E+03 ug/l	521.66 lbs/day	2.2E+05 ug/l	88281.19 lbs/day
Lead	700.0 ug/l	280.89 lbs/day		
Mercury			0.15 ug/l	0.06 lbs/day
Nickel			4600.00 ug/l	1845.88 lbs/day
Selenium	0.1 ug/l	0.06 lbs/day		
Silver	610.0 ug/l	244.78 lbs/day		
Thallium			6.30 ug/l	2.53 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.

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(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	Temp.	pH	T-NH3	BOD5	DO	TRC	TDS	
	cfs	Deg. C		mg/l as N	mg/l	mg/l	mg/l	mg/l	
Summer (Irrig. Season)	74.0	20.3	8.3	0.03	1.00	7.09	0.00	510.0	
Fall	74.0	9.0	8.3	0.03	1.00	---	0.00	510.0	
Winter	74.0	8.9	8.3	0.03	1.00	---	0.00	510.0	
Spring	74.0	16.5	8.4	0.03	1.00	---	0.00	510.0	
Dissolved Metals	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb	
	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*	
Dissolved Metals	Hg	Ni	Se	Ag	Zn	Boron			
	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		

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Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.29000	17.2	600.00	0.72543
Fall	0.29000	12.1		
Winter	0.29000	9.0		
Spring	0.29000	11.3		

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	0.290 MGD	0.449 cfs
Fall	0.290 MGD	0.449 cfs
Winter	0.290 MGD	0.449 cfs
Spring	0.290 MGD	0.449 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.29 MGD. If the discharger is allowed to have a flow greater than 0.29 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 >	4.0% Effluent	[Acute]
	IC25 >	0.6% Effluent	[Chronic]

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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	60.5 lbs/day
Fall	25.0 mg/l as BOD5	60.5 lbs/day
Winter	25.0 mg/l as BOD5	60.5 lbs/day
Spring	25.0 mg/l as BOD5	60.5 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	4.00
Fall	4.00
Winter	4.00
Spring	4.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

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

Season		Concentration	Load
Summer	4 Day Avg. - Chronic	173.0 mg/l as N	418.3 lbs/day
	1 Hour Avg. - Acute	277.0 mg/l as N	669.8 lbs/day
Fall	4 Day Avg. - Chronic	222.6 mg/l as N	538.3 lbs/day
	1 Hour Avg. - Acute	273.7 mg/l as N	661.9 lbs/day
Winter	4 Day Avg. - Chronic	222.9 mg/l as N	538.9 lbs/day
	1 Hour Avg. - Acute	273.7 mg/l as N	661.8 lbs/day
Spring	4 Day Avg. - Chronic	222.6 mg/l as N	538.3 lbs/day
	1 Hour Avg. - Acute	273.7 mg/l as N	661.9 lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 50.0%.

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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	1.805	mg/l	4.37	lbs/day
	1 Hour Avg. - Acute	1.575	mg/l	3.81	lbs/day
Fall	4 Day Avg. - Chronic	1.805	mg/l	4.37	lbs/day
	1 Hour Avg. - Acute	1.575	mg/l	3.81	lbs/day
Winter	4 Day Avg. - Chronic	1.805	mg/l	4.37	lbs/day
	1 Hour Avg. - Acute	1.575	mg/l	3.81	lbs/day
Spring	4 Day Avg. - Chronic	1.805	mg/l	4.37	lbs/day
	1 Hour Avg. - Acute	1.575	mg/l	3.81	lbs/day

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	115013.2	mg/l	139.06	tons/day
Fall	Maximum, Acute	115013.2	mg/l	139.06	tons/day
Winter	Maximum, Acute	115013.2	mg/l	139.06	tons/day
Spring	4 Day Avg. - Chronic	115013.2	mg/l	139.06	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 296.63 mg/l):

	4 Day Average		1 Hour Average		Load
	Concentration	Load	Concentration	Load	
Aluminum	N/A	N/A	62,408.3	ug/l	151.2 lbs/day
Arsenic	31,398.72 ug/l	49.1 lbs/day	28,315.4	ug/l	68.6 lbs/day
Cadmium	87.39 ug/l	0.1 lbs/day	531.2	ug/l	1.3 lbs/day
Chromium III	34,711.55 ug/l	54.3 lbs/day	366,619.0	ug/l	888.2 lbs/day
Chromium VI	1,169.75 ug/l	1.8 lbs/day	1,007.7	ug/l	2.4 lbs/day
Copper	3,789.01 ug/l	5.9 lbs/day	3,189.5	ug/l	7.7 lbs/day
Iron	N/A	N/A	83,370.2	ug/l	202.0 lbs/day
Lead	1,976.21 ug/l	3.1 lbs/day	27,136.3	ug/l	65.7 lbs/day
Mercury	1.99 ug/l	0.0 lbs/day	200.3	ug/l	0.5 lbs/day
Nickel	21,586.84 ug/l	33.7 lbs/day	98,192.7	ug/l	237.9 lbs/day
Selenium	501.09 ug/l	0.8 lbs/day	1,538.3	ug/l	3.7 lbs/day
Silver	N/A ug/l	N/A lbs/day	2,050.0	ug/l	5.0 lbs/day

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Zinc	49,942.75 ug/l	78.1 lbs/day	25,121.9	ug/l	60.9 lbs/day
Cyanide	862.92 ug/l	1.3 lbs/day	1,836.4	ug/l	4.4 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		1 Hour Average		
	Concentration	Load	Concentration		Load
Aldrin			1.5E+00	ug/l	5.62E-03 lbs/day
Chlordane	4.30E-03 ug/l	1.04E-02 lbs/day	1.2E+00	ug/l	4.50E-03 lbs/day
DDT, DDE	1.00E-03 ug/l	2.42E-03 lbs/day	5.5E-01	ug/l	2.06E-03 lbs/day
Dieldrin	1.90E-03 ug/l	4.59E-03 lbs/day	1.3E+00	ug/l	4.69E-03 lbs/day
Endosulfan	5.60E-02 ug/l	1.35E-01 lbs/day	1.1E-01	ug/l	4.12E-04 lbs/day
Endrin	2.30E-03 ug/l	5.56E-03 lbs/day	9.0E-02	ug/l	3.37E-04 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	3.75E-05 lbs/day
Heptachlor	3.80E-03 ug/l	9.19E-03 lbs/day	2.6E-01	ug/l	9.75E-04 lbs/day
Lindane	8.00E-02 ug/l	1.93E-01 lbs/day	1.0E+00	ug/l	3.75E-03 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	1.12E-04 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	3.75E-05 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	1.50E-04 lbs/day
PCB's	1.40E-02 ug/l	3.39E-02 lbs/day	2.0E+00	ug/l	7.50E-03 lbs/day
Pentachlorophenol	1.30E+01 ug/l	3.14E+01 lbs/day	2.0E+01	ug/l	7.50E-02 lbs/day
Toxephene	2.00E-04 ug/l	4.84E-04 lbs/day	7.3E-01	ug/l	2.74E-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:

	1 Hour Average	
	Concentration	Loading
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	12.1 lbs/day
Nitrates as N	4.0 mg/l	9.7 lbs/day
Total Phosphorus as P	0.05 mg/l	0.1 lbs/day
Total Suspended Solids	90.0 mg/l	218.1 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	1.99E+05 ug/l	4.82E+02 lbs/day
Acrolein	5.31E+04 ug/l	1.28E+02 lbs/day
Acrylonitrile	9.79E+00 ug/l	2.37E-02 lbs/day
Benzene	1.99E+02 ug/l	4.82E-01 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	4.15E+01 ug/l	1.00E-01 lbs/day
Chlorobenzene	1.13E+05 ug/l	2.73E+02 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	1.24E-01 ug/l	3.01E-04 lbs/day
1,2-Dichloroethane	6.31E+01 ug/l	1.52E-01 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	3.15E+02 ug/l	7.62E-01 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	1.01E+02 ug/l	2.45E-01 lbs/day
1,1,2,2-Tetrachloroethane	2.82E+01 ug/l	6.82E-02 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	5.14E+00 ug/l	1.24E-02 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	2.82E+05 ug/l	6.82E+02 lbs/day
2,4,6-Trichlorophenol	3.48E+02 ug/l	8.43E-01 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	9.46E+02 ug/l	2.29E+00 lbs/day
2-Chlorophenol	1.99E+04 ug/l	4.82E+01 lbs/day
1,2-Dichlorobenzene	4.48E+05 ug/l	1.08E+03 lbs/day
1,3-Dichlorobenzene	6.64E+04 ug/l	1.61E+02 lbs/day

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1,4-Dichlorobenzene	6.64E+04 ug/l	1.61E+02 lbs/day
3,3'-Dichlorobenzidine	6.64E+00 ug/l	1.61E-02 lbs/day
1,1-Dichloroethylene	9.46E+00 ug/l	2.29E-02 lbs/day
1,2-trans-Dichloroethylene		
2,4-Dichlorophenol	1.54E+04 ug/l	3.73E+01 lbs/day
1,2-Dichloropropane	8.63E+01 ug/l	2.09E-01 lbs/day
1,3-Dichloropropylene	1.66E+03 ug/l	4.01E+00 lbs/day
2,4-Dimethylphenol	8.96E+04 ug/l	2.17E+02 lbs/day
2,4-Dinitrotoluene	1.83E+01 ug/l	4.41E-02 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	6.64E+00 ug/l	1.61E-02 lbs/day
Ethylbenzene	5.14E+05 ug/l	1.24E+03 lbs/day
Fluoranthene	4.98E+04 ug/l	1.20E+02 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	2.32E+05 ug/l	5.62E+02 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	7.80E+02 ug/l	1.89E+00 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	7.14E+02 ug/l	1.73E+00 lbs/day
Dichlorobromomethane(HM)	4.48E+01 ug/l	1.08E-01 lbs/day
Chlorodibromomethane (HM)	6.80E+01 ug/l	1.65E-01 lbs/day
Hexachlorocyclopentadiene	3.98E+04 ug/l	9.63E+01 lbs/day
Isophorone	1.39E+03 ug/l	3.37E+00 lbs/day
Naphthalene		
Nitrobenzene	2.82E+03 ug/l	6.82E+00 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	1.16E+04 ug/l	2.81E+01 lbs/day
4,6-Dinitro-o-cresol	2.16E+03 ug/l	5.22E+00 lbs/day
N-Nitrosodimethylamine	1.15E-01 ug/l	2.77E-04 lbs/day
N-Nitrosodiphenylamine	8.30E+02 ug/l	2.01E+00 lbs/day
N-Nitrosodi-n-propylamine	8.30E-01 ug/l	2.01E-03 lbs/day
Pentachlorophenol	4.65E+01 ug/l	1.12E-01 lbs/day
Phenol	3.48E+06 ug/l	8.43E+03 lbs/day
Bis(2-ethylhexyl)phthalate	2.99E+02 ug/l	7.22E-01 lbs/day
Butyl benzyl phthalate	4.98E+05 ug/l	1.20E+03 lbs/day
Di-n-butyl phthalate	4.48E+05 ug/l	1.08E+03 lbs/day
Di-n-octyl phthalate		
Diethyl phthalate	3.82E+06 ug/l	9.23E+03 lbs/day
Dimethyl phthalate	5.19E+07 ug/l	1.26E+05 lbs/day
Benzo(a)anthracene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Benzo(a)pyrene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Benzo(b)fluoranthene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Benzo(k)fluoranthene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Chrysene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	4.65E-01 ug/l	1.12E-03 lbs/day

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Pyrene (PAH)	1.59E+05 ug/l	3.85E+02 lbs/day
Tetrachloroethylene	1.33E+02 ug/l	3.21E-01 lbs/day
Toluene	1.13E+06 ug/l	2.73E+03 lbs/day
Trichloroethylene	4.48E+02 ug/l	1.08E+00 lbs/day
Vinyl chloride	3.32E+02 ug/l	8.03E-01 lbs/day
Pesticides		
Aldrin	2.16E-02 ug/l	5.22E-05 lbs/day
Dieldrin	2.32E-02 ug/l	5.62E-05 lbs/day
Chlordane	9.46E-02 ug/l	2.29E-04 lbs/day
4,4'-DDT	9.79E-02 ug/l	2.37E-04 lbs/day
4,4'-DDE	9.79E-02 ug/l	2.37E-04 lbs/day
4,4'-DDD	1.38E-01 ug/l	3.33E-04 lbs/day
alpha-Endosulfan	1.54E+02 ug/l	3.73E-01 lbs/day
beta-Endosulfan	1.54E+02 ug/l	3.73E-01 lbs/day
Endosulfan sulfate	1.54E+02 ug/l	3.73E-01 lbs/day
Endrin	1.26E+02 ug/l	3.05E-01 lbs/day
Endrin aldehyde	1.26E+02 ug/l	3.05E-01 lbs/day
Heptachlor	3.48E-02 ug/l	8.43E-05 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1254 (Arochlor 1254)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1221 (Arochlor 1221)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1232 (Arochlor 1232)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1248 (Arochlor 1248)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1260 (Arochlor 1260)	7.30E-03 ug/l	1.77E-05 lbs/day
PCB-1016 (Arochlor 1016)	7.30E-03 ug/l	1.77E-05 lbs/day
Pesticide		
Toxaphene	1.21E-01 ug/l	2.93E-04 lbs/day
Metals		
Antimony	2323.25 ug/l	5.62 lbs/day
Arsenic	8166.20 ug/l	19.75 lbs/day
Asbestos	1.16E+09 ug/l	2.81E+06 lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	215730.60 ug/l	521.66 lbs/day
Cyanide	116162.63 ug/l	280.89 lbs/day
Lead	0.00	0.00
Mercury	23.23 ug/l	0.06 lbs/day
Nickel	101227.44 ug/l	244.78 lbs/day
Selenium	0.00	0.00
Silver	0.00	0.00
Thallium	282.11 ug/l	0.68 lbs/day
Zinc		

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Cyanide	1836.4	862.9	
Iron	83370.2		
Lead	16463.5	1976.2	
Mercury	23.232	1.990	
Nickel	98192.7	21587	
Selenium	1538.3	501.1	
Silver	2050.0	N/A	
Thallium	282.1		
Zinc	25121.9	49942.8	Acute Controls
Boron	124459.96		

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 because the receiving water is a class 1C drinking water source.

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 downstream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

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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.

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File Name: Springdale WLA 3-1-11.xls

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APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day 1.000	CBOD Coeff. FORCED (Kd)/day 0.000	CBOD Coeff. (Ka)T 1/day 1.014	REAER. Coeff. (Ka)20 (Ka)/day 9.076	REAER. Coeff. FORCED 1/day 0.000	REAER. Coeff. (Ka)T 1/day 9.140	NBOD Coeff. (Kn)20 1/day 0.400	NBOD Coeff. (Kn)T 1/day 0.409
Open Coeff. (K4)20 1/day 0.000	Open Coeff. (K4)T 1/day 0.000	NH3 LOSS (K5)20 1/day 4.000	NH3 (K5)T 1/day 4.055	NO2+NO3 LOSS (K6)20 1/day 0.000	NO2+NO3 (K6)T 1/day 0.000	TRC Decay K(CI)20 1/day 32.000	TRC K(CI)(T) 1/day 32.564
BENTHIC DEMAND (SOD)20 gm/m2/day 1.000	BENTHIC DEMAND (SOD)T gm/m2/day 1.019						
K1 CBOD {theta} 1.0	K2 Reaer. {theta} 1.0	K3 NH3 {theta} 1.1	K4 Open {theta} 1.0	K5 NH3 Loss {theta} 1.0	K6 NO2+3 {theta} 1.0	K(CI) TRC {theta} 1.1	S Benthic {theta} 1.1

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Antidegradation 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 a Level II antidegradation Review is required because the receiving waterbody is classified as a 1C drinking water source.