

**STATEMENT OF BASIS  
LAKE SIDE POWER PLANT PERMIT  
UPDES PERMIT NUMBER: UT0025623  
MAJOR INDUSTRIAL**

**FACILITY CONTACTS**

Company Name: Lake Side Power Plant  
PacifiCorp Energy  
1407 W. North Temple, Suite 330  
Salt Lake City, UT 84116

Person Name: David Lucas  
Position: Managing Director, Gas Plants  
Lakeside Phone 801-796-1911

Person Name: Kerry Powell  
Position: Environmental Engineer  
Lakeside Phone 801-796-1916

Person Name: Angie Skinner  
Position: Plant Manager  
Phone 801-796-1918

Facility Name: Lake Side Power Plant  
Telephone: 24 hour number 801-796-1835  
Actual Address: PacifiCorp Energy  
Lake Side Power Plant  
1825 North Pioneer Lane  
Vineyard, UT 84042

Mailing Address: Lake Side Power Plant  
1825 North Pioneer Lane  
Vineyard, UT 84042

**DESCRIPTION OF FACILITY**

Lake Side Power Plant (LSPP) is located in Vineyard, Utah at latitude 40°19'46" and longitude 111°45'17". LSPP's Standard Industrial Classification (SIC) code is 4911, and the North American Industry Classification System (NAICS) code is 221111 for Steam Electric Power Generation.

The LSPP was completed in 2007 and started discharging in August 2007. The facility has an electric output capacity of 565 MW. The facility utilizes 2 gas-fired combustion turbines with 2 heat recovery steam generators and a steam turbine operating in a combined-cycle mode. The facility is in the process of doubling the power generation capacity and relocating the outfall.

This permit modification is to address the interim thermal limits for Outfall 002. It was determined that there were some problems with the calculations in the WLA. No date has been determined for completion of the outfall relocation.

## SUMMARY OF CHANGES FROM PREVIOUS PERMIT

The facility is in the process of doubling the power generation capacity and relocating the outfall. The relocation of the outfall will be complete before the facility capacity is doubled. During the permit renewal a WLA was generated and seasonal discharge limits for the facility were developed. Upon further investigation an error was found in the thermal limits from the WLA. The numbers were re-generated and new thermal limits were developed. The new/modified temperature limits will replace the Interim limits included in the 2010 renewal permit. The limits for Outfall 002 that are to apply after the expansion are already shown in the existing permit

The old/original limits and the new/modified limits for Outfall 002 are indicated in the table below.

Temperature °F	Old Interim Limits	New Interim Limits
Summer (Jul-Sept)	82.6	87.2
Fall (Oct-Dec)	75.8	87.0
Winter (Jan-Mar)	66.3	87.7
Spring (Apr-Jun)	100.3	104.5

## DISCHARGE

### **DESCRIPTION OF DISCHARGE**

Plant water is obtained from wells. The water is used in the evaporative cooler, the demineralizer, the combustion turbine, the heat recovery steam generator, and the cooling tower. Waste streams from the evaporative cooler, the demineralizer, the combustion turbine, and the heat recovery steam generator are collected and reused in the cooling tower. Blow down from the cooling tower is discharged to Lindon Hollow Creek. Sanitary flows will be discharged to Lindon City sewer system.

<u>Outfall</u>	<u>Description of Discharge Point</u>
002	Located at latitude 40°19'54.45" and longitude 111°45'47.85" The discharge is through a pipe to Lindon Hollow Creek which flows to Utah Lake.

## PERMIT DURATION

It is recommended that this permit be effective for the remainder of the initial permits five (5) years.

Drafted by  
Daniel R Griffin P.E., Discharge  
Utah Division of Water Quality

ADDENDUM TO FSSOB

A public notice for the draft permit was published in the Provo Daily Herald on April 12, 2012. Proof of publication as supplied by the Provo Daily Herald is attached.

This paragraph is a place holder and will be modified during issuance. If any written comments have been received during the public notice period regarding this modification they will be included along with copies of the response to the comments. Otherwise the following sentence will be left in. No comments requiring any edits were received during the public notice period that started on April 2, 2012 and closed on May 2, 2012. These changes will be considered minor.

DRAFT

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

**Discharging Facility: Lake Side Power**

UPDES No: UT-0025623  
Current Flow: 2.00 MGD Design Flow  
Design Flow 2.00 MGD

**Receiving Water: Lindon Hollow Creek => Utah Lake**

Stream Classification: 2B, 3B, 4  
Stream Flows [cfs]:  
7.4 Summer (July-Sept) 20th Percentile  
13.1 Fall (Oct-Dec) 20th Percentile  
15.1 Winter (Jan-Mar) 20th Percentile  
18.7 Spring (Apr-June) 20th Percentile  
22.2 Average  
Stream TDS Values:  
387.3 Summer (July-Sept) Average  
376.5 Fall (Oct-Dec) Average  
494.9 Winter (Jan-Mar) Average  
392.9 Spring (Apr-June) Average

**Effluent Limits:**

Flow, MGD: 2.00 MGD Design Flow  
BOD, mg/l: 25.0 Summer 5.0 Indicator  
Dissolved Oxygen, mg/l: 5.0 Summer 5.5 30 Day Average  
TNH3, Chronic, mg/l: 9.9 Summer Varies Function of pH and Temperature  
TDS, mg/l: 3143.8 Summer 1200.0

**WQ Standard:**

**Modeling Parameters:**

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

**Level 1 Antidegradation Level Completed: Level II Review required.**

Date: 2/1/2012

Permit Writer:

WLA by:

WQM Sec. Approval:

TMDL Sec. Approval:

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*Neil W. W...*  
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2/1/12  
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Utah Division of Water Quality  
Salt Lake City, Utah

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

1-Feb-12
4:00 PM

**Facilities:** Lake Side Power  
**Discharging to:** Lindon Hollow Creek => Utah Lake

**UPDES No:** UT-0025623

**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**

Lindon Hollow Creek => Utah Lake : 2B, 3B, 4  
Antidegradation Review: Level I review completed. Level II review required.

**III. Numeric Stream Standards for Protection of Aquatic Wildlife**

Total Ammonia (TNH <sub>3</sub> )	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)	5.50 mg/l (30 Day Average) 4.00 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**	1.451 lbs/day	750.00	ug/l	12.507 lbs/day
Arsenic	190.00 ug/l	3.169 lbs/day	340.00	ug/l	5.670 lbs/day
Cadmium	0.72 ug/l	0.012 lbs/day	8.11	ug/l	0.135 lbs/day
Chromium III	252.63 ug/l	4.213 lbs/day	5285.45	ug/l	88.144 lbs/day
ChromiumVI	11.00 ug/l	0.183 lbs/day	16.00	ug/l	0.267 lbs/day
Copper	28.65 ug/l	0.478 lbs/day	48.24	ug/l	0.805 lbs/day
Iron			1000.00	ug/l	16.677 lbs/day
Lead	16.93 ug/l	0.282 lbs/day	434.43	ug/l	7.245 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.040 lbs/day
Nickel	158.43 ug/l	2.642 lbs/day	1424.97	ug/l	23.764 lbs/day
Selenium	4.60 ug/l	0.077 lbs/day	20.00	ug/l	0.334 lbs/day
Silver	N/A ug/l	N/A lbs/day	36.22	ug/l	0.604 lbs/day
Zinc	364.53 ug/l	6.079 lbs/day	364.53	ug/l	6.079 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 371.79 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	0.025 lbs/day
Chlordane	0.004 ug/l	0.243 lbs/day	1.200	ug/l	0.020 lbs/day
DDT, DDE	0.001 ug/l	0.057 lbs/day	0.550	ug/l	0.009 lbs/day
Dieldrin	0.002 ug/l	0.107 lbs/day	1.250	ug/l	0.021 lbs/day
Endosulfan	0.056 ug/l	3.168 lbs/day	0.110	ug/l	0.002 lbs/day
Endrin	0.002 ug/l	0.130 lbs/day	0.090	ug/l	0.002 lbs/day
Guthion			0.010	ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	0.215 lbs/day	0.260	ug/l	0.004 lbs/day
Lindane	0.080 ug/l	4.525 lbs/day	1.000	ug/l	0.017 lbs/day
Methoxychlor			0.030	ug/l	0.001 lbs/day
Mirex			0.010	ug/l	0.000 lbs/day
Parathion			0.040	ug/l	0.001 lbs/day
PCB's	0.014 ug/l	0.792 lbs/day	2.000	ug/l	0.033 lbs/day
Pentachlorophenol	13.00 ug/l	735.315 lbs/day	20.000	ug/l	0.334 lbs/day
Toxephene	0.0002 ug/l	0.011 lbs/day	0.7300	ug/l	0.012 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	lbs/day
Cadmium			10.0 ug/l	0.08 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	10.01 tons/day

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

Metals	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			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
cyclohexane (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]**

Toxic Organics	Maximum Conc., ug/l - Acute Standards			
	Class 1C [2 Liters/Day for 70 Kg Person over 70 Yr.]		Class 3A, 3B [6.5 g for 70 Kg Person over 70 Yr.]	
Acenaphthene	ug/l	lbs/day	2700.0 ug/l	152.72 lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	44.12 lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	0.04 lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	4.02 lbs/day
Benzidine	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Carbon tetrachloride	ug/l	lbs/day	4.4 ug/l	0.25 lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	1187.82 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	5.60 lbs/day

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1,1,1-Trichloroethane				
Hexachloroethane	ug/l	lbs/day	8.9 ug/l	0.50 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	ug/l	lbs/day	42.0 ug/l	2.38 lbs/day
1,1,2,2-Tetrachloroethane	ug/l	lbs/day	11.0 ug/l	0.62 lbs/day
Chloroethane			0.0 ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4 ug/l	0.08 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	243.22 lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5 ug/l	0.37 lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00 lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0 ug/l	26.58 lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0 ug/l	22.63 lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0 ug/l	961.57 lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0 ug/l	147.06 lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0 ug/l	147.06 lbs/day
3,3'-Dichlorobenzidine	ug/l	lbs/day	0.1 ug/l	0.00 lbs/day
1,1-Dichloroethylene	ug/l	lbs/day	3.2 ug/l	0.18 lbs/day
1,2-trans-Dichloroethylene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dichlorophenol	ug/l	lbs/day	790.0 ug/l	44.68 lbs/day
1,2-Dichloropropane	ug/l	lbs/day	39.0 ug/l	2.21 lbs/day
1,3-Dichloropropylene	ug/l	lbs/day	1700.0 ug/l	96.16 lbs/day
2,4-Dimethylphenol	ug/l	lbs/day	2300.0 ug/l	130.09 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1 ug/l	0.51 lbs/day
2,6-Dinitrotoluene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Diphenylhydrazine	ug/l	lbs/day	0.5 ug/l	0.03 lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0 ug/l	1640.32 lbs/day
Fluoranthene	ug/l	lbs/day	370.0 ug/l	20.93 lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopropyl) e	ug/l	lbs/day	170000.0 ug/l	9615.65 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	90.50 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	20.36 lbs/day
Dichlorobromomethane	ug/l	lbs/day	22.0 ug/l	1.24 lbs/day
Chlorodibromomethane	ug/l	lbs/day	34.0 ug/l	1.92 lbs/day
Hexachlorobutadiene(c)	ug/l	lbs/day	50.0 ug/l	2.83 lbs/day
Hexachlorocyclopentadi	ug/l	lbs/day	17000.0 ug/l	961.57 lbs/day
Isophorone	ug/l	lbs/day	600.0 ug/l	33.94 lbs/day
Naphthalene				
Nitrobenzene	ug/l	lbs/day	1900.0 ug/l	107.47 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	791.88 lbs/day
4,6-Dinitro-o-cresol	ug/l	lbs/day	765.0 ug/l	43.27 lbs/day
N-Nitrosodimethylamine	ug/l	lbs/day	8.1 ug/l	0.46 lbs/day
N-Nitrosodiphenylamine	ug/l	lbs/day	16.0 ug/l	0.91 lbs/day
N-Nitrosodi-n-propylami	ug/l	lbs/day	1.4 ug/l	0.08 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2 ug/l	0.46 lbs/day

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Phenol	ug/l	lbs/day	4.6E+06 ug/l	2.60E+05 lbs/day
Bis(2-ethylhexyl)phthala	ug/l	lbs/day	5.9 ug/l	0.33 lbs/day
Butyl benzyl phthalate	ug/l	lbs/day	5200.0 ug/l	294.13 lbs/day
Di-n-butyl phthalate	ug/l	lbs/day	12000.0 ug/l	678.75 lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	ug/l	lbs/day	120000.0 ug/l	6787.52 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06 ug/l	1.64E+05 lbs/day
Benzo(a)anthracene (P/	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(a)pyrene (PAH)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(b)fluoranthene (F	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(k)fluoranthene (F	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Chrysene (PAH)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Dibenzo(a,h)anthracene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Indeno(1,2,3-cd)pyrene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0 ug/l	622.19 lbs/day
Tetrachloroethylene	ug/l	lbs/day	8.9 ug/l	0.50 lbs/day
Toluene	ug/l	lbs/day	200000 ug/l	11312.53 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0 ug/l	4.58 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0 ug/l	29.70 lbs/day
				lbs/day
				lbs/day
<b>Pesticides</b>				
Aldrin	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Dieldrin	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Chlordane	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDT	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDE	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDD	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
alpha-Endosulfan	ug/l	lbs/day	2.0 ug/l	0.11 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0 ug/l	0.11 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0 ug/l	0.11 lbs/day
Endrin	ug/l	lbs/day	0.8 ug/l	0.05 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8 ug/l	0.05 lbs/day
Heptachlor	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Heptachlor epoxide				
<b>PCB's</b>				
PCB 1242 (Arochlor 124	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1254 (Arochlor 124	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1221 (Arochlor 122	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1232 (Arochlor 123	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1248 (Arochlor 124	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1260 (Arochlor 126	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1016 (Arochlor 101	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
<b>Pesticide</b>				
Toxaphene	ug/l		0.0 ug/l	0.00 lbs/day
<b>Dioxin</b>				
Dioxin (2,3,7,8-TCDD)	ug/l	lbs/day		

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**Metals**

Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	243.22 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	12443.79 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.01 lbs/day
Nickel			4600.00 ug/l	260.19 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.36 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**

	<b>Stream</b>								
	<b>Critical Low</b>								
	<b>Flow</b>	<b>Temp.</b>	<b>pH</b>	<b>T-NH3</b>	<b>BOD5</b>	<b>DO</b>	<b>TRC</b>	<b>TDS</b>	
	<b>cfs</b>	<b>Deg. C</b>		<b>mg/l as N</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>	<b>mg/l</b>
Summer (Irrig. Season)	7.4	17.1	8.2	0.03	1.00	7.35	0.00	387.3	
Fall	13.1	9.6	8.2	0.03	1.00	---	0.00	376.5	
Winter	15.1	7.4	8.3	0.03	1.00	---	0.00	494.9	
Spring	18.7	12.1	8.3	0.03	1.00	---	0.00	392.9	
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	2.00000	NA	814.00	6.78740
Fall	2.00000	NA		
Winter	2.00000	NA		
Spring	2.00000	NA		

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	2.000 MGD	3.094 cfs
Fall	2.000 MGD	3.094 cfs
Winter	2.000 MGD	3.094 cfs
Spring	2.000 MGD	3.094 cfs

**Flow Requirement or Loading Requirement**

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 2 MGD. If the discharger is allowed to have a flow greater than 2 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 >	EOP Effluent	[Acute]
	IC25 >	29.5% 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	416.9 lbs/day
Fall	25.0 mg/l as BOD5	416.9 lbs/day
Winter	25.0 mg/l as BOD5	416.9 lbs/day
Spring	25.0 mg/l as BOD5	416.9 lbs/day

**Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards**

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent D.O. limitation as follows:

Season	Concentration
Summer	5.00
Fall	5.00
Winter	5.00
Spring	5.00

**Effluent Limitation for Total Ammonia based upon Water Quality Standards**

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

Season		Concentration	Load
Summer	4 Day Avg. - Chronic	9.9 mg/l as N	164.7 lbs/day
	1 Hour Avg. - Acute	46.4 mg/l as N	773.5 lbs/day
Fall	4 Day Avg. - Chronic	17.5 mg/l as N	291.3 lbs/day
	1 Hour Avg. - Acute	38.0 mg/l as N	633.0 lbs/day
Winter	4 Day Avg. - Chronic	41.8 mg/l as N	697.8 lbs/day
	1 Hour Avg. - Acute	156.7 mg/l as N	2,612.7 lbs/day
Spring	4 Day Avg. - Chronic	14.0 mg/l as N	0.0 lbs/day
	1 Hour Avg. - Acute	37.9 mg/l as N	0.0 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	0.037	mg/l	0.62	lbs/day
	1 Hour Avg. - Acute	0.042	mg/l	0.69	lbs/day
Fall	4 Day Avg. - Chronic	0.057	mg/l	0.95	lbs/day
	1 Hour Avg. - Acute	0.059	mg/l	0.98	lbs/day
Winter	4 Day Avg. - Chronic	0.064	mg/l	1.07	lbs/day
	1 Hour Avg. - Acute	0.065	mg/l	1.09	lbs/day
Spring	4 Day Avg. - Chronic	0.077	mg/l	0.00	lbs/day
	1 Hour Avg. - Acute	0.076	mg/l	0.00	lbs/day

**Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards**

Season		Concentration		Load	
Summer	Maximum, Acute	3143.8	mg/l	26.21	tons/day
Fall	Maximum, Acute	3169.6	mg/l	26.43	tons/day
Winter	Maximum, Acute	2886.4	mg/l	24.07	tons/day
Spring	4 Day Avg. - Chronic	3130.4	mg/l	26.10	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 371.79 mg/l):

	4 Day Average		1 Hour Average		Load
	Concentration	Load	Concentration	Load	
Aluminum	N/A	N/A	1,644.0	ug/l	27.4 lbs/day
Arsenic	642.53 ug/l	6.9 lbs/day	745.6	ug/l	12.4 lbs/day
Cadmium	2.24 ug/l	0.0 lbs/day	17.7	ug/l	0.3 lbs/day
Chromium III	854.94 ug/l	9.2 lbs/day	11,605.2	ug/l	193.5 lbs/day
Chromium VI	27.80 ug/l	0.3 lbs/day	30.4	ug/l	0.5 lbs/day
Copper	95.28 ug/l	1.0 lbs/day	105.0	ug/l	1.8 lbs/day
Iron	N/A	N/A	2,194.4	ug/l	36.6 lbs/day
Lead	55.52 ug/l	0.6 lbs/day	953.0	ug/l	15.9 lbs/day
Mercury	0.04 ug/l	0.0 lbs/day	5.3	ug/l	0.1 lbs/day
Nickel	535.45 ug/l	5.8 lbs/day	3,128.1	ug/l	52.2 lbs/day
Selenium	11.80 ug/l	0.1 lbs/day	42.0	ug/l	0.7 lbs/day
Silver	N/A ug/l	N/A lbs/day	79.5	ug/l	1.3 lbs/day

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Zinc	1,236.19 ug/l	13.3 lbs/day	800.4	ug/l	13.3 lbs/day
Cyanide	17.64 ug/l	0.2 lbs/day	48.3	ug/l	0.8 lbs/day

**Effluent Limitations for Heat/Temperature based upon  
Water Quality Standards**

Summer	30.7 Deg. C.	87.2 Deg. F
Fall	30.5 Deg. C.	87.0 Deg. F
Winter	30.9 Deg. C.	87.7 Deg. F
Spring	40.3 Deg. C.	104.5 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		Load
	Concentration	Load	Concentration	Load	
Aldrin			1.5E+00	ug/l	3.87E-02 lbs/day
Chlordane	4.30E-03 ug/l	7.17E-02 lbs/day	1.2E+00	ug/l	3.10E-02 lbs/day
DDT, DDE	1.00E-03 ug/l	1.67E-02 lbs/day	5.5E-01	ug/l	1.42E-02 lbs/day
Dieldrin	1.90E-03 ug/l	3.17E-02 lbs/day	1.3E+00	ug/l	3.22E-02 lbs/day
Endosulfan	5.60E-02 ug/l	9.34E-01 lbs/day	1.1E-01	ug/l	2.84E-03 lbs/day
Endrin	2.30E-03 ug/l	3.84E-02 lbs/day	9.0E-02	ug/l	2.32E-03 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	2.58E-04 lbs/day
Heptachlor	3.80E-03 ug/l	6.34E-02 lbs/day	2.6E-01	ug/l	6.71E-03 lbs/day
Lindane	8.00E-02 ug/l	1.33E+00 lbs/day	1.0E+00	ug/l	2.58E-02 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	7.74E-04 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	2.58E-04 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	1.03E-03 lbs/day
PCB's	1.40E-02 ug/l	2.33E-01 lbs/day	2.0E+00	ug/l	5.16E-02 lbs/day
Pentachlorophenol	1.30E+01 ug/l	2.17E+02 lbs/day	2.0E+01	ug/l	5.16E-01 lbs/day
Toxephene	2.00E-04 ug/l	3.34E-03 lbs/day	7.3E-01	ug/l	1.88E-02 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:

	<b>1 Hour Average</b>	
	Concentration	Loading
Gross Beta (pCi/l)	50.0 pCi/L	
BOD (mg/l)	5.0 mg/l	83.4 lbs/day
Nitrates as N	4.0 mg/l	66.7 lbs/day
Total Phosphorus as P	0.05 mg/l	0.8 lbs/day
Total Suspended Solids	90.0 mg/l	1500.9 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:

	<b>Maximum Concentration</b>	
	Concentration	Load
<b>Toxic Organics</b>		
Acenaphthene	9.16E+03 ug/l	1.53E+02 lbs/day
Acrolein	2.65E+03 ug/l	4.41E+01 lbs/day
Acrylonitrile	2.24E+00 ug/l	3.73E-02 lbs/day
Benzene	2.41E+02 ug/l	4.02E+00 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	1.49E+01 ug/l	2.49E-01 lbs/day
Chlorobenzene	7.12E+04 ug/l	1.19E+03 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	2.61E-03 ug/l	4.36E-05 lbs/day
1,2-Dichloroethane	3.36E+02 ug/l	5.60E+00 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	3.02E+01 ug/l	5.03E-01 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	1.42E+02 ug/l	2.38E+00 lbs/day
1,1,2,2-Tetrachloroethane	3.73E+01 ug/l	6.22E-01 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	4.75E+00 ug/l	7.92E-02 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	1.46E+04 ug/l	2.43E+02 lbs/day
2,4,6-Trichlorophenol	2.20E+01 ug/l	3.68E-01 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	1.59E+03 ug/l	2.66E+01 lbs/day
2-Chlorophenol	1.36E+03 ug/l	2.26E+01 lbs/day
1,2-Dichlorobenzene	5.77E+04 ug/l	9.62E+02 lbs/day
1,3-Dichlorobenzene	8.82E+03 ug/l	1.47E+02 lbs/day

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1,4-Dichlorobenzene	8.82E+03 ug/l	1.47E+02 lbs/day
3,3'-Dichlorobenzidine	2.61E-01 ug/l	4.36E-03 lbs/day
1,1-Dichloroethylene	1.09E+01 ug/l	1.81E-01 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	2.68E+03 ug/l	4.47E+01 lbs/day
1,2-Dichloropropane	1.32E+02 ug/l	2.21E+00 lbs/day
1,3-Dichloropropylene	5.77E+03 ug/l	9.62E+01 lbs/day
2,4-Dimethylphenol	7.80E+03 ug/l	1.30E+02 lbs/day
2,4-Dinitrotoluene	3.09E+01 ug/l	5.15E-01 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	1.83E+00 ug/l	3.05E-02 lbs/day
Ethylbenzene	9.84E+04 ug/l	1.64E+03 lbs/day
Fluoranthene	1.25E+03 ug/l	2.09E+01 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	5.77E+05 ug/l	9.62E+03 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	5.43E+03 ug/l	9.05E+01 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	1.22E+03 ug/l	2.04E+01 lbs/day
Dichlorobromomethane(HM)	7.46E+01 ug/l	1.24E+00 lbs/day
Chlorodibromomethane (HM)	1.15E+02 ug/l	1.92E+00 lbs/day
Hexachlorocyclopentadiene	5.77E+04 ug/l	9.62E+02 lbs/day
Isophorone	2.04E+03 ug/l	3.39E+01 lbs/day
Naphthalene		
Nitrobenzene	6.44E+03 ug/l	1.07E+02 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	4.75E+04 ug/l	7.92E+02 lbs/day
4,6-Dinitro-o-cresol	2.59E+03 ug/l	4.33E+01 lbs/day
N-Nitrosodimethylamine	2.75E+01 ug/l	4.58E-01 lbs/day
N-Nitrosodiphenylamine	5.43E+01 ug/l	9.05E-01 lbs/day
N-Nitrosodi-n-propylamine	4.75E+00 ug/l	7.92E-02 lbs/day
Pentachlorophenol	2.78E+01 ug/l	4.64E-01 lbs/day
Phenol	1.56E+07 ug/l	2.60E+05 lbs/day
Bis(2-ethylhexyl)phthalate	2.00E+01 ug/l	3.34E-01 lbs/day
Butyl benzyl phthalate	1.76E+04 ug/l	2.94E+02 lbs/day
Di-n-butyl phthalate	4.07E+04 ug/l	6.79E+02 lbs/day
Di-n-octyl phthlate		
Diethyl phthalate	4.07E+05 ug/l	6.79E+03 lbs/day
Dimethyl phthlate	9.84E+06 ug/l	1.64E+05 lbs/day
Benzo(a)anthracene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Benzo(a)pyrene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Benzo(b)fluoranthene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Benzo(k)fluoranthene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Chrysene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	1.05E-01 ug/l	1.75E-03 lbs/day

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Pyrene (PAH)	3.73E+04 ug/l	6.22E+02 lbs/day
Tetrachloroethylene	3.02E+01 ug/l	5.03E-01 lbs/day
Toluene	6.78E+05 ug/l	1.13E+04 lbs/day
Trichloroethylene	2.75E+02 ug/l	4.58E+00 lbs/day
Vinyl chloride	1.78E+03 ug/l	2.97E+01 lbs/day

**Pesticides**

Aldrin	4.75E-04 ug/l	7.92E-06 lbs/day
Dieldrin	4.75E-04 ug/l	7.92E-06 lbs/day
Chlordane	2.00E-03 ug/l	3.34E-05 lbs/day
4,4'-DDT	2.00E-03 ug/l	3.34E-05 lbs/day
4,4'-DDE	2.00E-03 ug/l	3.34E-05 lbs/day
4,4'-DDD	2.85E-03 ug/l	4.75E-05 lbs/day
alpha-Endosulfan	6.78E+00 ug/l	1.13E-01 lbs/day
beta-Endosulfan	6.78E+00 ug/l	1.13E-01 lbs/day
Endosulfan sulfate	6.78E+00 ug/l	1.13E-01 lbs/day
Endrin	2.75E+00 ug/l	4.58E-02 lbs/day
Endrin aldehyde	2.75E+00 ug/l	4.58E-02 lbs/day
Heptachlor	7.12E-04 ug/l	1.19E-05 lbs/day
Heptachlor epoxide		

**PCB's**

PCB 1242 (Arochlor 1242)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1254 (Arochlor 1254)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1221 (Arochlor 1221)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1232 (Arochlor 1232)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1248 (Arochlor 1248)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1260 (Arochlor 1260)	1.53E-04 ug/l	2.55E-06 lbs/day
PCB-1016 (Arochlor 1016)	1.53E-04 ug/l	2.55E-06 lbs/day

**Pesticide**

Toxaphene	2.54E-03 ug/l	4.24E-05 lbs/day
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**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		





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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.

Utah Division of Water Quality  
801-538-6052  
File Name: LakeSidePower\_WLA\_Interim\_2-01-11.xls

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**APPENDIX - Coefficients and Other Model Information**

CBOD Coeff. (Kd)20 1/day 2.000	CBOD Coeff. FORCED (Kd)/day 0.000	CBOD Coeff. (Ka)T 1/day 1.751	REAER. Coeff. (Ka)20 (Ka)/day 16.046	REAER. Coeff. FORCED 1/day 0.000	REAER. Coeff. (Ka)T 1/day 14.979	NBOD Coeff. (Kn)20 1/day 0.600	NBOD Coeff. (Kn)T 1/day 0.480
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 3.501	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 27.025
BENTHIC DEMAND (SOD)20 gm/m2/day 1.000	BENTHIC DEMAND (SOD)T gm/m2/day 0.833						
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

**Antidegradation Review**