

**Utah Division of Water Quality
Statement of Basis
ADDENDUM
Wasteload Analysis and Antidegradation Level I Review**

Date: December 6, 2021

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Watershed Protection Section

Facility: Riverton City Water Treatment Plant
UPDES No. UT-0026212

Receiving water: Jordan River (2B, 3B, 4)

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. 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 considers downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge

Outfall 001 Reverse osmosis reject water 1,000 gpm max. daily discharge

Receiving Water

The discharge for outfall 001 is the Jordan River. Per UAC R317-2-13.5(a), the designated beneficial uses of Jordan River from confluence with Little Cottonwood Creek to Narrows Diversion are 2B, 3B, 4.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*
- *Class 3B - Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten-year return frequency (7Q10). The 7Q10 flow was obtained from the *Jordan River Low Flow Analysis* (Hansen, Allen & Luce Inc. 2021). The critical low flow condition (7Q10) for the summer season at the discharge location is 44.0 cfs.

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Receiving water quality data were obtained from monitoring site 4994520 Jordan River at Bangerter Highway. The average seasonal value was calculated for each constituent with available data in the receiving water.

TMDL

According to [Utah's 2018-2020 303\(d\) Water Quality Assessment Report](#), the receiving water for the discharge, Jordan River from 7800 South to Bluffdale at 14600 South (AU UT16020204-006) is listed as impaired for TDS, temperature and O/E bioassessment. Additional impairments are listed in downstream segments as outlined in Table 1. In order not to cause or contribute to an impairment, the discharge must be below the water quality criterion for each listed water quality parameter.

Table 1. Jordan River Segments and Impairments Downstream of Discharge.

Segment (moving downstream)	Assessment Unit	Impairment Cause
Jordan River from the confluence with Little Cottonwood Creek to 7800 South	AU UT16020204-005	TDS, Temperature, E. coli
Jordan River from 2100 South to the confluence with Little Cottonwood Creek	AU UT16020204-004	TDS, E. coli, O/E bioassessment
Jordan River from North Temple to 2100 South	AU UT16020204-003	E. coli, O/E bioassessment, Dissolved Oxygen, Total Phosphorous
Jordan River from Davis County line upstream to North Temple Street	AU UT16020204-002	E. coli, O/E bioassessment, Dissolved Oxygen
Jordan River from Farmington Bay upstream contiguous with the Davis County line	AU UT16020204-001	TDS, E. coli, O/E bioassessment, Dissolved Oxygen

Mixing Zone

Per UAC R317-2-5, the maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and for chronic conditions. Water quality standards must be met at the end of the mixing zone. The mixing zone was not delineated, but was assumed to fall within the maximum allowable mixing zone.

Parameters of Concern

The potential parameters of concern identified for the discharge were TDS, temperature, and metals.

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a mass balance mixing analysis ([UDWQ 2019](#)). The mass balance analysis is summarized in Appendix A.

Models and supporting documentation are available for review upon request.

WET Limits

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The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC₅₀ (lethal concentration, 50%) percent effluent for acute toxicity and the IC₂₅ (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC₅₀ is typically 100% effluent and does not need to be determined by the WLA.

Table 2: WET Limits for IC₂₅

Season	Percent Effluent	Dilution Ratio
Annual	4.8%	19.7:1

Effluent Limits

As a result of the Jordan River impairments for TDS and DO, limits were applied to these parameters in order to prevent the discharge from causing or contributing to an impairment. The discharge is not anticipated to have elevated levels of biochemical oxygen demand (BOD) or ammonia, both of which exert oxygen demands on the receiving water.

Select WQBELs are summarized in Table 3. The complete list of WQBELs is attached in Appendix A.

Table 3: Water Quality Based Effluent Limits Summary for Select Parameters

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (gpm)		1000	1 day			
Dissolved Oxygen (mg/L)	4.0-4.5	5.0	Minimum			
Total Dissolved Solids (mg/L)	1,200	1,200	Maximum			

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is required for this facility, as the flow and pollutant loads are increasing to the receiving water as a result of this new discharge.

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Documents:

WLA Document: *RivertonWTPWLA_2021-12-06.docx*

Wasteload Analysis and Addendums: *RivertonWTPWLA_2021.xlsm*

References:

Hansen, Allen & Luce, Inc. 2021. *Jordan River Low Flow Analysis*. Wasatch Front Water Quality Council.

Utah Division of Water Quality. 2019. *Utah Wasteload Analysis Procedures Version 2.1*.

WASTELOAD ANALYSIS [WLA]

Date: 10/13/2021

Appendix A: Mass Balance Mixing Analysis

Discharging Facility: Riverton City Water Treatment Plant
 UPDES No: Not Assigned
 Permit Flow [gpm]: 1000.0 Max. Daily

Downstream Receiving Water: Jordan River
 Beneficial Uses: 2B, 3A, 4
 Stream Flows [cfs]: 44.00 Jordan River 7Q10 - Summer Season - Jordan River Low Flow Analysis (HAL 2021)

Modeling Information

A mass balance mixing analysis was used to determine the effluent limits.

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

Model Inputs

Mixing Information

Fully Mixed: No
 Acute River Width: 50%
 Chronic River Width: 100%

	Chronic Flow cfs	Acute Flow cfs	Mean Temp. Deg. C	Max Temp. Deg. C	Mean pH	Max pH
Summer Critical Season						
Receiving Water	44.0	22.0	12.2	24.1	7.60	7.60
Discharge	2.2	2.2	20.0	20.0	8.20	8.50
Mixed	46.2	24.2	12.6	23.7	8.18	8.46

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 reflect the environmental conditions expected at low stream flows.

Effluent Limitations for Whole Effluent Toxicity (WET)

WET Test	Percent Effluent	Dilution Ratio
Chronic IC ₂₅	4.8%	19.7 :1

Effluent Limitations for Protection of Recreation (Class 2B Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0

Bacteriological

E. coli (30 Day Geometric Mean)	206 (#/100 mL)
E. coli (Maximum)	668 (#/100 mL)

Effluent Limitations for Protection of Aquatic Wildlife (Class 3A Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Temperature (deg C)		20.0

Inorganics

Parameter	Acute Standard (1 Hour Average)		
	Standard	Background	Conc. Limit
Phenol (mg/L)	0.010		0.010
Hydrogen Sulfide (Undissociated) [mg/L]	0.002		0.002

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Metals-Total Recoverable

Parameter	Chronic (4-day ave)				Acute (1-hour ave)			
	Standard ¹	Background	Conc. Limit	Load Limit	Standard ¹	Background	Conc. Limit	Load Limit
			(µg/L)	(lbs/day)			(µg/L)	(lbs/day)
Aluminum	N/A ²		N/A ²	N/A ²	750	17	7,986	96
Arsenic	150	12.0	2,875	35	340	12.0	3,579	43
Cadmium	0.7	0.1	12.7	0.15	8.3	0.1	90	1.1
Chromium VI	11.0	1.9	191	2.3	16.0	1.9	155	1.9
Chromium III	259	1.9	5,330	64	5,413	1.9	58,839	707
Copper	29.4	4.7	516.6	6.21	49.6	4.7	492.7	5.92
Cyanide	5.2	3.5	39.1	0.5	22.0	3.5	205	2.5
Iron					1,000	32	10,554	127
Lead	17.6	0.45	356	4.3	451	0.5	4897	59
Mercury ²	0.012	0.008	0.090	0.001	2.4	0.008	26.0	0.31
Nickel	162	5.0	3,270	39	1,460	5.0	15,831	190
Selenium	4.6	1.4	67.8	0.815	18.4	1.4	186.3	2.24
Silver					38.1	0.5	409	4.9
Tributyltin ²	0.072	0.048	0.541	0.007	0.46	0.0	4.5	0.05
Zinc	374	23.6	7,286	88	374	23.6	3,830	46

1: Based upon a Hardness of 382.7 mg/l as CaCO3

2: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCQ in the receiving water after mixing, the 87 ug/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/L acute aluminum criterion (expressed as total recoverable).

Organics [Pesticides]

Parameter	Chronic (4-day ave)				Acute (1-hour ave)			
	Standard	Background	Conc. Limit	Load Limit	Standard	Background	Conc. Limit	Load Limit
			(µg/L)	(lbs/day)			(µg/L)	(lbs/day)
Aldrin					1.5		1.5	
Chlordane	0.0043		0.0043		1.2		1.2	
DDT, DDE	0.001		0.001		0.55		0.55	
Diazinon	0.17		0.17		0.17		0.17	
Dieldrin	0.0056		0.0056		0.24		0.24	
Endosulfan, a & b	0.056		0.056		0.11		0.11	
Endrin	0.036		0.036		0.086		0.086	
Heptachlor & H. epoxide	0.0038		0.0038		0.26		0.26	
Lindane	0.08		0.08		1.0		1.0	
Methoxychlor					0.03		0.03	
Mirex					0.001		0.001	
Nonylphenol	6.6		6.6		28.0		28.0	
Parathion	0.0130		0.0130		0.066		0.066	
PCB's	0.014		0.014					
Pentachlorophenol	15.0		15.0		19.0		19.0	
Toxephene	0.0002		0.0002		0.73		0.73	

Radiological

Parameter	Standard	Maximum Concentration
Gross Alpha (pCi/L)	15	

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Numeric Criteria for the Protection of Human Health from Consumption of Water and Fish
Class 1C (Water and Organism)

Class 3 (Organism Only)

Toxic Organics	Class 1C (Water and Organism)				Class 3 (Organism Only)			
	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Antimony	5.6		N/A	N/A	640		640	
Copper	1300		N/A	N/A				
Nickel	610		N/A	N/A	4600		4600	
Selenium	170		N/A	N/A	4200		4200	
Thallium	0.24		N/A	N/A	0.47		0.47	
Zinc	7400		N/A	N/A	26000		26000	
Cyanide	4		N/A	N/A	400		400	
Asbestos (million fibers/L)	7		N/A	N/A				
2,3,7,8-TCDD Dioxin	5.00E-09		N/A	N/A	5.1E-09		5.1E-09	
Acrolein	3		N/A	N/A	400		400	
Acrylonitrile	0.061		N/A	N/A	7		7.0	
Benzene	2.1		N/A	N/A	51		51	
Bromoform	7		N/A	N/A	120		120	
Carbon Tetrachloride	0.4		N/A	N/A	5		5.0	
Chlorobenzene	100		N/A	N/A	800		800	
Chlorodibromomethane	0.8		N/A	N/A	21		21	
Chloroform	60		N/A	N/A	2000		2000	
Dalapon	200		N/A	N/A				
Dichlorobromomethane	0.95		N/A	N/A	27		27	
1,2-Dichloroethane	9.9		N/A	N/A	2000		2000	
1,1-Dichloroethylene	300		N/A	N/A	20000		20000	
1,2-Dichloropropane	0.9		N/A	N/A	31		31	
1,3-Dichloropropene	0.27		N/A	N/A	12		12	
Ethylbenzene	68		N/A	N/A	130		130	
Ethylene Dibromide	0.05		N/A	N/A				
Methyl Bromide	100		N/A	N/A	10000		10000	
Methylene Chloride	20		N/A	N/A	1000		1000	
1,1,2,2-Tetrachloroethane	0.2		N/A	N/A	3		3.0	
Tetrachloroethylene	10		N/A	N/A	29		29	
Toluene	57		N/A	N/A	520		520	
1,2 -Trans-Dichloroethyle	100		N/A	N/A	4000		4000	
1,1,1-Trichloroethane	10000		N/A	N/A	200000		200000	
1,1,2-Trichloroethane	0.55		N/A	N/A	8.9		8.9	
Trichloroethylene	0.6		N/A	N/A	7		7.0	
Vinyl Chloride	0.022		N/A	N/A	1.6		1.6	
2-Chlorophenol	30		N/A	N/A	800		800	
2,4-Dichlorophenol	10		N/A	N/A	60		60	
2,4-Dimethylphenol	100		N/A	N/A	3000		3000	
2-Methyl-4,6-Dinitrophenol	2		N/A	N/A	30		30	
2,4-Dinitrophenol	10		N/A	N/A	300		300	
3-Methyl-4-Chlorophenol	500		N/A	N/A	2000		2000	
Penetachlorophenol	0.03		N/A	N/A	0.04		0.04	
Phenol	4000		N/A	N/A	300000		300000	
2,4,5-Trichlorophenol	300		N/A	N/A	600		600	
2,4,6-Trichlorophenol	1.5		N/A	N/A	2.8		2.8	
Acenaphthene	70		N/A	N/A	90		90	
Anthracene	300		N/A	N/A	400		400	
Benzidine	0.00014		N/A	N/A	0.011		0.011	
BenzoaAnthracene	0.0012		N/A	N/A	0.0013		0.0013	
BenzoaPyrene	0.00012		N/A	N/A	0.00013		0.00013	
BenzobFluoranthene	0.0012		N/A	N/A	0.0013		0.0013	
BenzokFluoranthene	0.012		N/A	N/A	0.013		0.013	

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	Class 1C (Water and Organism)				Class 3 (Organism Only)			
	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Toxic Organics								
Bis2-Chloro1methylether	0.00015		N/A	N/A	0.017		0.017	
Bis2-Chloro1methylethylether	200		N/A	N/A	4000		4000	
Bis2-ChloroethylEther	0.03		N/A	N/A	2.2		2.2	
Bis2-Chloroisopropy1Ether	1400		N/A	N/A	65000		65000	
Bis2-EthylhexylPhthalate	0.32		N/A	N/A	0.37		0.37	
Butylbenzyl Phthalate	0.1		N/A	N/A	0.1		0.1	
2-Chloronaphthalene	800		N/A	N/A	1000		1000	
Chrysene	0.12		N/A	N/A	0.13		0.13	
Dibenzoa, (h)Anthracene	0.00012		N/A	N/A	0.00013		0.00013	
1,2-Dichlorobenzene	1000		N/A	N/A	3000		3000	
1,3-Dichlorobenzene	7		N/A	N/A	10		10.0	
1,4-Dichlorobenzene	300		N/A	N/A	900		900	
3,3-Dichlorobenzidine	0.049		N/A	N/A	0.15		0.15	
Diethyl Phthalate	600		N/A	N/A	600		600	
Dimethyl Phthalate	2000		N/A	N/A	2000		2000	
Di-n-Butyl Phthalate	20		N/A	N/A	30		30	
2,4-Dinitrotoluene	0.049		N/A	N/A	1.7		1.7	
Dinitrophenols	10		N/A	N/A	1000		1000	
1,2-Diphenylhydrazine	0.03		N/A	N/A	0.2		0.2	
Fluoranthene	20		N/A	N/A	20		20	
Fluorene	50		N/A	N/A	70		70	
Hexachlorobenzene	0.000079		N/A	N/A	0.000079		0.000079	
Hexachlorobutidine	0.01		N/A	N/A	0.01		0.01	
Hexachloroethane	0.1		N/A	N/A	0.1		0.1	
Hexachlorocyclopentadiene	4		N/A	N/A	4		4.0	
Ideno 1,2,3-cdPyrene	0.0012		N/A	N/A	0.0013		0.0013	
Isophorone	34		N/A	N/A	1800		1800	
Nitrobenzene	10		N/A	N/A	600		600	
N-Nitrosodiethylamine	0.0008		N/A	N/A	1.24		1.2	
N-Nitrosodimethylamine	0.00069		N/A	N/A	3		3	
N-Nitrosodi-n-Propylamine	0.005		N/A	N/A	0.51		0.5	
N-Nitrosodiphenylamine	3.3		N/A	N/A	6		6	
N-Nitrosopyrrolidine	0.016		N/A	N/A	34		34	
Pentachlorobenzene	0.1		N/A	N/A	0.1		0.1	
Pyrene	20		N/A	N/A	30		30	
1,2,4-Trichlorobenzene	0.071		N/A	N/A	0.076		0.076	
Aldrin	0.0000077		N/A	N/A	0.0000077		0.0000077	
alpha-BHC	0.00036		N/A	N/A	0.00039		0.00039	
beta-BHC	0.008		N/A	N/A	0.014		0.014	
gamma-BHC (Lindane)	4.2		N/A	N/A	4.4		4.4	
Hexachlorocyclohexane (HCH)	0.0066		N/A	N/A	0.01		0.01	
Chlordane	0.00031		N/A	N/A	0.00032		0.00032	
4,4-DDT	0.00003		N/A	N/A	0.00003		0.00003	
4,4-DDE	0.000018		N/A	N/A	0.000018		0.000018	
4,4-DDD	0.00012		N/A	N/A	0.00012		0.00012	
Dieldrin	0.0000012		N/A	N/A	0.0000012		0.0000012	
alpha-Endosulfan	20		N/A	N/A	30		30	
beta-Endosulfan	20		N/A	N/A	40		40	
Endosulfan Sulfate	20		N/A	N/A	40		40	
Endrin	0.03		N/A	N/A	0.03		0.03	
Endrin Aldehyde	1		N/A	N/A	1		1.0	
Heptachlor	0.0000059		N/A	N/A	0.0000059		0.0000059	
Heptachlor Epoxide	0.000032		N/A	N/A	0.000032		0.000032	
Methoxychlor	0.02		N/A	N/A	0.02		0.02	
Polychlorinated Biphenyls (PCB)	0.000064		N/A	N/A	0.000064		0.000064	
Toxaphene	0.0007		N/A	N/A	0.00071		0.00071	

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Maximum Concentration

Parameter	Standard	Background	Conc. Limit	Load Limit	Impaired
				(lbs/day)	
Total Dissolved Solids (mg/L)	1,200		1,200	14,421	
Boron (µg/L)	750	305	5,148	62	
Arsenic, Dissolved (µg/L)	100	12.0	969	12	
Cadmium, Dissolved (µg/L)	10	0.1	107	1.3	
Chromium, Dissolved (µg/L)	100	1.9	1,069	13	
Copper, Dissolved (µg/L)	200	4.7	2,128	26	
Lead, Dissolved (µg/L)	100	0.5	1,083	13	
Selenium, Dissolved (µg/L)	50	1.4	530	6	
Gross Alpha (pCi/L)	15		15		