Utah Division of Water Quality
Statement of Basis
Wasteload Analysis for Jordan River POTWs (Central Valley)

Date: **October 21, 2021**

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Facility: **Central Valley Water Reclamation Facility**
UPDES No. UT-0024392

Receiving water: **Mill Creek**

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 takes into account 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: Mill Creek → Jordan River
The design flow for Outfall 001 is 75.0 MGD maximum monthly average and 61.0 MGD daily maximum flow.

Effluent discharge water quality data was obtained from monitoring site 4992500 Central Valley WWTP. The seasonal average was calculated for temperature, pH and hardness.

Receiving Water
The receiving water for Outfall 001 is Mill Creek, which is tributary to the Jordan River.

Per UAC R317-2-13.10, the designated beneficial uses for Mill Creek from confluence with Jordan River to Interstate Highway 15 (AU: UT16020204-026_00) are: 2B, 3C, and 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 3C - Protected for nongame fish and other 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 seasonal 7Q10 flows calculated in the *Jordan River Low Flow Analysis* report (Hansen Allen and Luce, 2021) were used for the critical low flows for the POTWs, tributaries and diversions along the Jordan River. Upstream flow data from DWQ 4992505 MILL CK. AB CENTRAL VALLEY WWTP OUTFALL were used to evaluate ambient, background flow conditions.

Table 1: Mill Creek critical low flow (7Q10)

Season	Flow (cfs)
Summer	21.0
Fall	10.0
Winter	3.0
Spring	10.0
Annual	**15.6**

Receiving water quality data was obtained from monitoring site DWQ 4992505 MILL CK. AB CENTRAL VALLEY WWTP OUTFALL. The average seasonal value was calculated for background conditions.

Mixing Zone

Per UAC R317-2-5, since the discharge is more than twice the background receiving water flow, the discharge is considered instantaneously fully mixed. Therefore, no mixing zone is allowed.

Protection of Downstream Uses

Per UAC R317-2-8, *all actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses*. The effluent limits for the discharge to the Jordan River were determined as part of the Jordan River POTW WLA. Any WQBELs that are lower in the Jordan River POTW WLA will supersede those for the Mill Creek WLA.

TMDL

Mill Creek is listed as impaired for E. coli and benthic macroinvertebrates according to the 303(d) list in the 2016 Integrated Report. Downstream segments of the Jordan River are listed for dissolved oxygen (DO), total phosphorus (TP), dissolved copper, total dissolved solids (TDS), E coli, and benthic macroinvertebrates. Phase 1 of the Jordan River TMDL determined that total organic matter is the parameter of concern for the DO impairment in the Jordan River (Cirrus Ecological Solutions and Stantec Consulting, 2013).

The 303(d) list of impairments for the Jordan River, Mill Creek, and State Canal is summarized in the Utah *Combined 2018/2020 303(d) Water Quality Assessment Report dated February 9, 2021*. The impaired parameters for Mill Creek 1-SLCity, Mill Creek from confluence with Jordan River to Interstate 15 crossing (UT16020204-026_00) are E. coli and Bioassessment/Macroinvertebrates. The E. coli impairment in the Jordan River watershed is currently being identified and addressed through a Total Maximum Daily Load Study within Utah DWQ.

Parameters of Concern

The parameters of concern considered in this wasteload allocation are total ammonia (TAN) and total recoverable metals. Due to ongoing studies related to the TMDL, this wasteload allocation does not address parameters related to dissolved oxygen, including biochemical oxygen demand (BOD), dissolved oxygen (DO), total nitrogen (TN), and total phosphorus (TP).

Water Quality Modeling

A QUAL2Kw model of the Jordan River was populated and calibrated as part of the TMDL study (Stantec Consulting 2010, UDWQ 2010). The model was subsequently validated to a synoptic survey conducted by UDWQ and the Jordan River/Farmington Bay Water Quality Council (JRFBWQC) during July 2014 (UDWQ 2015). The model validation identified areas for future improvement of the model; however, the model was considered suitable for application to the wasteload allocation for ammonia.

The TMDL model of the Jordan River extends 52.4 miles from the outlet of Utah Lake to Burton Dam. For the purposes of the WLA, the model was split at Burnham Dam (approximately 1.7 miles upstream of Burton Dam) and extended down State Canal to the Farmington Bay Waterfowl Management Area (approximately 3.5 miles downstream from Burnham Dam). The following point sources were added to the State Canal: A-1 Drain, South Davis Sewer District North WWTP, and outlet channel from Bountiful Pond (Mill Creek and Stone Creek). In addition, the Jordan Basin WRF discharge was added to the Jordan River, as this discharge was not active at the time of the TMDL model development.

The Jordan River WLA QUAL2Kw model was used for determining the WQBEL for ammonia. Effluent concentrations were adjusted up to the current permit limits so that water quality criteria were not exceeded in the receiving water. The current permit limits for DO and CBOD were used in the model and not modified due to the ongoing TMDL. Background conditions for each plant were characterized by assuming each upstream plant was operating at the low flow rate with average ammonia concentration in the effluent. For calculating the chronic ammonia criterion, fish early life stages (ELS) were assumed to be present during all seasons except downstream of the SDSD plants, which ELS were assumed to be present from March through October.

A mass balance spreadsheet tool was developed to calculate the WLA for conservative constituents such as metals. The limiting flow condition at each facility was typically the winter season; however, seasonal averages were used for the allocations. Each wastewater treatment plant was granted a full allocation at the point of discharge. Background condition for each plant was characterized by either a single or combined, multiple monitoring location data. The WQBEL limits are shown in Table 2.

The calibration, validation and wasteload models are available for review by request.

Table 2: Water Quality Based Effluent Limits Summary

Effluent Constituent	Averaging Period	Central Valley
Flow (MGD)	Monthly	75
Ammonia Acute (mg/L)	Daily	
Summer (Jun-Aug)		4.7
Fall (Sep-Nov)		5.4
Winter (Dec-Feb)		6.4
Spring (Mar-May)		5.4
Ammonia Chronic (mg/L)	Monthly	
Summer (Jun-Aug)		3.6
Fall (Sep-Nov)		3.8
Winter (Dec-Feb)		3.7
Spring (Mar-May)		3.8
a: Limit due to impairment of receiving segment. b: Ultraviolet disinfection utilized, hence no limit for TRC		

WET Limits

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 LC_{50} (lethal concentration, 50%) percent effluent for acute toxicity and the IC_{25} (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 LC_{50} is typically 100% effluent and does not need to be determined by the WLA.

Table 4: WET Limits for IC_{25}

Receiving Water	Percent Effluent
Central Valley WRF – Mill Creek	96.9%

Effluent Limits

The water quality based effluent limits determined as part of this combined wasteload allocation are summarized in Table 2.

For parameters without a WQBEL, permit limits should be set according to rules found in R317-1-3 and categorical UPDES discharge requirements.

Documents:

WLA Document: *CVWRF_WLA_MC_2021.docx*
Mill Creek Wasteload Analysis: *CVWRF_WLA_MC_2021.xlsm*
Jordan River Wasteload Analysis: *CVWRF_WLA_JR_2021.xlsm*

References:

Cirrus Ecological Solutions and Stantec Consulting. 2013. Jordan River Total Maximum Daily Load Water Quality Study – Phase 1. Prepared for State of Utah, Department of Environmental Quality, Division of Water Quality.

Hansen, Allen and Luce Inc. 2021. Jordan River Low Flow Analysis. Wasatch Front Water Quality Council and South Davis Sewer District.

Neilson, B.T., A.J. Hobson, N. von Stackelberg, M. Shupryt, and J.D. Ostermiller. 2012. Using QUAL2K Modeling to Support Nutrient Criteria Development and Wasteload Analyses in Utah. Prepared for State of Utah, Department of Environmental Quality, Division of Water Quality.

Stantec Consulting. 2010. Jordan River TMDL: 2010 QUAL2Kw Model Calibration Technical Memo Public Draft. Prepared for State of Utah, Department of Environmental Quality, Division of Water Quality. February 22, 2010. 18 pp.

Utah DWQ. 2010. Jordan River TMDL QUAL2Kw model refinement. Prepared by N. Von Stackelberg P.E., State of Utah, Department of Environmental Quality, Division of Water Quality.

Utah DWQ. 2021. Utah Wasteload Analysis Procedures Version 2.0. State of Utah, Department of Environmental Quality, Division of Water Quality.

Utah DWQ 2012. Field Data Collection for QUAL2Kw Model Build and Calibration Standard Operating Procedures Version 1.0. State of Utah, Department of Environmental Quality, Division of Water Quality.

Utah DWQ. 2015. Jordan River Summer 2014 Synoptic Survey and QUAL2Kw Model Validation Report. Prepared by N. Von Stackelberg P.E., State of Utah, Department of Environmental Quality, Division of Water Quality.

Utah DWQ. 2021. Utah's Combined 2018/2020 303(d) Water Quality Assessment Report. August 2021. State of Utah, Department of Environmental Quality, Division of Water Quality.

Lower Mill Creek and Jordan River Early Life Stage Review. Memorandum from Ben Holcomb dated May 20, 2016. Utah Division of Water Quality.

Criteria Support Document: Site-specific criteria for recalculation of the USEPA 2013 aquatic life ammonia water quality criteria for a segment of Mill Creek and the Jordan River, Salt Lake County, Utah. November 21, 2018 Review Draft. Utah Division of Water Quality.

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA] = not included in the WLA
Addendum: Statement of Basis

21-Oct-21
4:00 PM

Facilities: **Central Valley Water Reclamation Facility** **UPDES No: UT-0024392**
Discharging to: **Mill 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

Mill Creek:	2B,3A,4
Antidegradation Review:	Level I review completed. Level II review is not required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	6.5 mg/l (30 Day Average) 5.0 mg/l (7Day Average) 4.0 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

Acute and Chronic Heavy Metals (Dissolved)

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Parameter	**Concentration**	**Load***	**Concentration**	**Load***
Aluminum	87.00 ug/l**	54.415 lbs/day	750.00 ug/l	469.092 lbs/day
Arsenic	150.00 ug/l	93.818 lbs/day	340.00 ug/l	212.655 lbs/day
Cadmium	1.95 ug/l	1.221 lbs/day	5.77 ug/l	3.606 lbs/day
Chromium III	218.12 ug/l	136.422 lbs/day	4563.40 ug/l	2,854.205 lbs/day
ChromiumVI	11.00 ug/l	6.880 lbs/day	16.00 ug/l	10.007 lbs/day
Copper	24.58 ug/l	15.374 lbs/day	40.74 ug/l	25.483 lbs/day
Iron			1000.00 ug/l	625.456 lbs/day
Lead	13.47 ug/l	8.427 lbs/day	345.75 ug/l	216.253 lbs/day
Mercury	0.0120 ug/l	0.008 lbs/day	2.40 ug/l	1.501 lbs/day
Nickel	136.13 ug/l	85.141 lbs/day	1224.36 ug/l	765.785 lbs/day
Selenium	4.60 ug/l	2.877 lbs/day	20.00 ug/l	12.509 lbs/day
Silver	N/A ug/l	N/A lbs/day	26.60 ug/l	16.639 lbs/day
Zinc	313.14 ug/l	195.853 lbs/day	313.14 ug/l	195.853 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 310.75 mg/l as CaCO3

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	3.13 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	375.27 tons/day

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

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Metals	**Concentration**	**Load***	**Concentration**	**Load***
Arsenic			ug/l	lbs/day
Barium			ug/l	lbs/day
Cadmium			ug/l	lbs/day
Chromium			ug/l	lbs/day
Lead			ug/l	lbs/day
Mercury			ug/l	lbs/day
Selenium			ug/l	lbs/day
Silver			ug/l	lbs/day
Fluoride (3)			ug/l	lbs/day
to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day

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**	
Metals				
Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	3175.83 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	162484.25 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.11 lbs/day
Nickel			4600.00 ug/l	3397.40 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	4.65 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)	21.0	18.9	7.9	0.03	1.50	7.15	0.03	822.4
Fall	10.0	7.9	7.8	0.03	1.50	---	0.00	639.0
Winter	3.0	8.2	7.8	0.02	1.50	---	0.00	639.0
Spring	10.0	12.7	7.9	0.03	2.20	---	0.07	639.0

Dissolved Metals	Al ug/l	As ug/l	Cd ug/l	CrIII ug/l	CrVI ug/l	Copper ug/l	Fe ug/l	Pb ug/l
All Seasons	238.00	3.16	0.07	1.31	2.65*	1.28	0.0	0.15

Dissolved Metals	Hg	Ni	Se	Ag	Zn	Boron	
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	2.50	1.08	0.25	8.22	10.0	* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	75.00000	NA	982.67	307.26746
Fall	75.00000	NA		
Winter	75.00000	NA		
Spring	75.00000	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	75.000 MGD	116.025 cfs
Fall	75.000 MGD	116.025 cfs
Winter	75.000 MGD	116.025 cfs
Spring	75.000 MGD	116.025 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 75 MGD. If the discharger is allowed to have a flow greater than 75 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.

Season	Receiving Water Flow (cfs)	Effluent Flow (MGD)	Effluent Flow (cfs)	Combined Flow (cfs)	Totally Mixed	Chronic IC25 % Effluent	Acute LC50 % Effluent
Summer	21.00	75.0	116.0	137.0	YES	84.7%	EOP
Fall	10.00	75.0	116.0	126.0	YES	92.1%	EOP
Winter	3.00	75.0	116.0	119.0	YES	97.5%	EOP
Spring	10.00	75.0	116.0	126.0	YES	92.1%	EOP

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	2.9	mg/l as N	1,813.6	lbs/day
	1 Hour Avg. - Acute	10.3	mg/l as N	6,426.7	lbs/day
Fall	4 Day Avg. - Chronic	3.4	mg/l as N	2,103.5	lbs/day
	1 Hour Avg. - Acute	12.5	mg/l as N	7,791.6	lbs/day
Winter	4 Day Avg. - Chronic	3.5	mg/l as N	2,173.9	lbs/day
	1 Hour Avg. - Acute	13.0	mg/l as N	8,153.0	lbs/day
Spring	4 Day Avg. - Chronic	3.2	mg/l as N	1,990.7	lbs/day
	1 Hour Avg. - Acute	11.6	mg/l as N	7,232.7	lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100.%.

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 310.75 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum	N/A		N/A		796.3	ug/l	498.1	lbs/day
Arsenic	176.58	ug/l	71.4	lbs/day	370.5	ug/l	231.7	lbs/day
Cadmium	2.29	ug/l	0.9	lbs/day	6.3	ug/l	3.9	lbs/day
Chromium III	257.36	ug/l	104.0	lbs/day	4,976.3	ug/l	3112.4	lbs/day
Chromium VI	12.27	ug/l	5.0	lbs/day	17.1	ug/l	10.7	lbs/day
Copper	28.80	ug/l	11.6	lbs/day	44.3	ug/l	27.7	lbs/day
Iron	N/A		N/A		1,090.5	ug/l	682.1	lbs/day
Lead	15.89	ug/l	6.4	lbs/day	377.0	ug/l	235.8	lbs/day
Mercury	0.01	ug/l	0.0	lbs/day	2.6	ug/l	1.6	lbs/day
Nickel	160.31	ug/l	64.8	lbs/day	1,334.9	ug/l	834.9	lbs/day
Selenium	5.24	ug/l	2.1	lbs/day	21.7	ug/l	13.6	lbs/day
Silver	N/A	ug/l	N/A	lbs/day	29.0	ug/l	18.1	lbs/day
Zinc	368.32	ug/l	148.9	lbs/day	340.7	ug/l	213.1	lbs/day
Cyanide	6.14	ug/l	2.5	lbs/day	24.0	ug/l	15.0	lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	21.1 Deg. C.	69.9 Deg. F
Fall	10.0 Deg. C.	50.0 Deg. F
Winter	10.2 Deg. C.	50.4 Deg. F
Spring	14.8 Deg. C.	58.6 Deg. F

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	3127.3	lbs/day
Nitrates as N	4.0	mg/l	2501.8	lbs/day
Total Phosphorus as P	0.05	mg/l	31.3	lbs/day
Total Suspended Solids	90.0	mg/l	56291.0	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**	
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				

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		796.3				796.3	N/A
Antimony				5078.3		5078.3	
Arsenic	118.1	370.5			0.0	118.1	176.6
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	11.8	6.3			0.0	6.3	2.3
Chromium (III)		4976.3			0.0	4976.3	257.4
Chromium (VI)	117.9	17.1			0.0	17.09	12.27
Copper	236.0	44.3				44.3	28.8
Cyanide		24.0	259819.0			24.0	6.1
Iron		1090.5				1090.5	
Lead	118.1	377.0			0.0	118.1	15.9
Mercury		2.62		0.18	0.0	0.18	0.014
Nickel		1334.9		5432.6		1334.9	160.3
Selenium	58.9	21.7			0.0	21.7	5.2
Silver		29.0			0.0	29.0	
Thallium				7.4		7.4	
Zinc		340.7				340.7	368.3
Boron	885.7					885.7	

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	796.3	N/A	
Antimony	5078.28		
Arsenic	118.1	176.6	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	6.3	2.3	
Chromium (III)	4976.3	257	
Chromium (VI)	17.1	12.3	
Copper	44.3	28.8	
Cyanide	24.0	6.1	
Iron	1090.5		
Lead	118.1	15.9	
Mercury	0.177	0.014	
Nickel	1334.9	160	
Selenium	21.7	5.2	
Silver	29.0	N/A	
Thallium	7.4		
Zinc	340.7	368.3	Acute Controls
Boron	885.72		

X. Antidegradation Considerations

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

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

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

XI. Colorado River Salinity Forum Considerations

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value.
This doesn't apply to facilities that do not discharge to the Colorado River Basin.

XII. Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

XIII. Notice of UPDES Requirement

This Addendum to the Statement of Basis does not authorize any entity or party to discharge to the waters of the State of Utah. That authority is granted through a UPDES permit issued by the Utah Division of Water Quality. The numbers presented here may be changed as a function of other factors. Dischargers are strongly urged to contact the Permits Section for further information. Permit writers may utilize other information to adjust these limits and/or to determine other limits based upon best available technology and other considerations provided that the values in this wasteload analysis [TMDL] are not compromised. See special provisions in Utah Water Quality Standards for adjustments in the Total Dissolved Solids values based upon background concentration.

Utah Division of Water Quality
801-538-6052
File Name: CVWRF_WLA_2021.xlsm

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
2.000	0.000	1.899	17.714	0.000	17.248	0.250	0.229

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	3.799	0.000	0.000	32.000	29.974

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.932

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 a Level II antidegradation Review is not required.

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA] = not included in the WLA
Addendum: Statement of Basis

20-Oct-21
4:00 PM

Facilities: **Central Valley Water Reclamation Facility** **UPDES No: UT-0024392**
Discharging to: **Jordan River**

I. Introduction

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

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

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

II. Receiving Water and Stream Classification

Jordan River:	2B,3B,4
Antidegradation Review:	Level I review completed. Level II review is not required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards
Chronic Total Residual Chlorine (TRC)	0.011 mg/l (4 Day Average) 0.019 mg/l (1 Hour Average)
Chronic Dissolved Oxygen (DO)	5.5 mg/l (30 Day Average) 4.0 mg/l (7Day Average) 3.0 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**	65.350 lbs/day	750.00	ug/l	563.366 lbs/day
Arsenic	150.00	ug/l	112.673 lbs/day	340.00	ug/l	255.393 lbs/day
Cadmium	2.41	ug/l	1.808 lbs/day	7.45	ug/l	5.599 lbs/day
Chromium III	270.40	ug/l	203.113 lbs/day	5657.30	ug/l	4,249.508 lbs/day
ChromiumVI	11.00	ug/l	8.263 lbs/day	16.00	ug/l	12.018 lbs/day
Copper	30.76	ug/l	23.104 lbs/day	52.17	ug/l	39.186 lbs/day
Iron				1000.00	ug/l	751.155 lbs/day
Lead	18.82	ug/l	14.134 lbs/day	482.86	ug/l	362.699 lbs/day
Mercury	0.0120	ug/l	0.009 lbs/day	2.40	ug/l	1.803 lbs/day
Nickel	169.96	ug/l	127.663 lbs/day	1528.65	ug/l	1,148.252 lbs/day
Selenium	4.60	ug/l	3.455 lbs/day	20.00	ug/l	15.023 lbs/day
Silver	N/A	ug/l	N/A lbs/day	41.78	ug/l	31.380 lbs/day
Zinc	391.09	ug/l	293.770 lbs/day	391.09	ug/l	293.770 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 403.97 mg/l as CaCO3

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	3.76 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	450.69 tons/day

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

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Metals	**Concentration**	**Load***	**Concentration**	**Load***
Arsenic			ug/l	lbs/day
Barium			ug/l	lbs/day
Cadmium			ug/l	lbs/day
Chromium			ug/l	lbs/day
Lead			ug/l	lbs/day
Mercury			ug/l	lbs/day
Selenium			ug/l	lbs/day
Silver			ug/l	lbs/day
Fluoride (3)			ug/l	lbs/day
to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day

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**	
Metals				
Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	6907.33 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	353398.05 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.24 lbs/day
Nickel			4600.00 ug/l	7389.23 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	10.12 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)	182.0	18.7	8.0	0.22	4.92	7.18	0.00	1248.8
Fall	133.0	10.9	8.0	0.34	3.44	---	0.00	1158.0
Winter	122.0	6.3	8.0	0.44	3.94	---	0.00	1158.0
Spring	116.0	12.5	8.0	0.24	3.25	---	0.00	1158.0

	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	221.00	42.77	0.34	4.45	2.65*	5.36	0.0	2.74

	Hg	Ni	Se	Ag	Zn	Boron
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
All Seasons	0.0000	3.38	2.47	1.17	19.93	10.0

* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	75.00000	NA	982.67	307.26746
Fall	75.00000	NA		
Winter	75.00000	NA		
Spring	75.00000	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	75.000 MGD	116.025 cfs
Fall	75.000 MGD	116.025 cfs
Winter	75.000 MGD	116.025 cfs
Spring	75.000 MGD	116.025 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 75 MGD. If the discharger is allowed to have a flow greater than 75 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 >	EOP Effluent	[Acute]
	IC25 >	38.9% Effluent	[Chronic]

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 403.97 mg/l):

	4 Day Average Concentration		4 Day Average Load		1 Hour Average Concentration		1 Hour Average Load	
Aluminum	N/A		N/A		1,164.9	ug/l	875.0	lbs/day
Arsenic	318.21	ug/l	128.6	lbs/day	573.1	ug/l	430.5	lbs/day
Cadmium	5.64	ug/l	2.3	lbs/day	13.0	ug/l	9.8	lbs/day
Chromium III	687.58	ug/l	278.0	lbs/day	10,090.9	ug/l	7579.8	lbs/day
Chromium VI	22.02	ug/l	8.9	lbs/day	25.4	ug/l	19.1	lbs/day
Copper	70.60	ug/l	28.5	lbs/day	88.9	ug/l	66.8	lbs/day
Iron	N/A		N/A		1,784.3	ug/l	1340.3	lbs/day
Lead	44.04	ug/l	17.8	lbs/day	859.4	ug/l	645.6	lbs/day

Mercury	0.03	ug/l	0.0	lbs/day	4.3	ug/l	3.2 lbs/day
Nickel	431.26	ug/l	174.3	lbs/day	2,724.9	ug/l	2046.9 lbs/day
Selenium	7.95	ug/l	3.2	lbs/day	33.8	ug/l	25.4 lbs/day
Silver	N/A	ug/l	N/A	lbs/day	73.6	ug/l	55.3 lbs/day
Zinc	973.31	ug/l	393.5	lbs/day	682.2	ug/l	512.4 lbs/day
Cyanide	13.36	ug/l	5.4	lbs/day	39.3	ug/l	29.5 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	24.9	Deg. C.	76.9	Deg. F
Fall	16.6	Deg. C.	61.8	Deg. F
Winter	11.8	Deg. C.	53.3	Deg. F
Spring	18.0	Deg. C.	64.4	Deg. F

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	3755.8	lbs/day
Nitrates as N	4.0	mg/l	3004.6	lbs/day
Total Phosphorus as P	0.05	mg/l	37.6	lbs/day
Total Suspended Solids	90.0	mg/l	67603.9	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**
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			

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		1164.9				1164.9	N/A
Antimony				11045.1		11045.1	
Arsenic	256.9	573.1			0.0	256.9	318.2
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	25.1	13.0			0.0	13.0	5.6
Chromium (III)		10090.9			0.0	10090.9	687.6
Chromium (VI)	249.9	25.4			0.0	25.43	22.02
Copper	505.3	88.9				88.9	70.6
Cyanide		39.3	565098.0			39.3	13.4
Iron		1784.3				1784.3	
Lead	252.6	859.4			0.0	252.6	44.0
Mercury		4.28		0.39	0.0	0.39	0.031
Nickel		2724.9		11815.7		2724.9	431.3
Selenium	124.6	33.8			0.0	33.8	7.9
Silver		73.6			0.0	73.6	
Thallium				16.2		16.2	
Zinc		682.2				682.2	973.3
Boron	1925.9					1925.9	

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	1164.9	N/A	
Antimony	11045.10		
Arsenic	256.9	318.2	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	13.0	5.6	
Chromium (III)	10090.9	688	
Chromium (VI)	25.4	22.0	
Copper	88.9	70.6	
Cyanide	39.3	13.4	
Iron	1784.3		
Lead	252.6	44.0	
Mercury	0.385	0.031	
Nickel	2724.9	431	
Selenium	33.8	7.9	
Silver	73.6	N/A	
Thallium	16.2		
Zinc	682.2	973.3	Acute Controls
Boron	1925.92		

X. Antidegradation Considerations

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strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

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

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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.
This doesn't apply to facilities that do not discharge to the Colorado River Basin.

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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.

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Utah Division of Water Quality
801-538-6052
File Name: CVWRF_WLA_JR_2021.xlsm

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0.520	0.000	0.490	2.040	0.000	1.978	0.250	0.226

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	3.766	0.000	0.000	32.000	29.647

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.921

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 a Level II antidegradation Review is not required.