Utah Division of Water Quality
Statement of Basis
Wasteload Analysis for Jordan River POTWs

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Facility: **Jordan River Publicly Owned Treatment Works (POTW)**

Receiving water: **Jordan River and State Canal**

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.

Discharges

The following dischargers are considered in this combined wasteload analysis for discharge to the Jordan River:

1. Jordan Basin Water Reclamation Facility (WRF) - UT0025852
2. South Valley Water Reclamation Facility (WRF) - UT0024384
3. Central Valley Water Reclamation Facility (WRF) - UT0024392
4. South Davis Sewer District South Wastewater Treatment Plant (WWTP) - UT0021628
5. South Davis Sewer District North Wastewater Treatment Plant (WWTP) - UT0021636

The receiving water and the maximum monthly average discharges used in this wasteload allocation are summarized in Table 1. The projected 5-year monthly average discharge was estimated by multiplying the current average discharge (2016-2021) by 10% to account for growth in the service district. Jordan Basin WRF was assumed to operate at design capacity.

Table 1: Receiving waters and discharge rate

Facility	Receiving Water	Monthly Ave (MGD)	
		Design Capacity	Projected 5-YR
Jordan Basin WRF	Jordan River, from confluence with Little Cottonwood Creek to Narrows Diversion	15	15
South Valley WRF	Jordan River, from confluence with Little Cottonwood Creek to Narrows Diversion	50	21.7
Central Valley WRF	Jordan River, from North Temple Street to confluence with Little Cottonwood Creek	75	55.7
SDSD South WWTP	Jordan River, from Farmington Bay to North Temple Street	4	3.8
SDSD North WWTP	State Canal, from Farmington Bay to confluence with the Jordan River	12	8.1

Effluent water quality data were obtained from UDWQ monitoring, Jordan River/Farmington Bay Water Quality Council (JRFBWQC) monitoring, and Discharge Monitoring Reports (DMR) and Monthly Operating Reports (MOR) from each facility.

Receiving Waters

The receiving waters for this wasteload allocation are Jordan River and State Canal.

Per UAC R317-2-14, the designated beneficial uses for the Jordan River and State Canal are shown in Table 2.

Table 2: Beneficial uses for receiving waters

POTW	Assessment Unit	Assessment Unit Description	Assessment Unit ID	Beneficial Uses
SDSDN WWTP	State Canal[a]	State Canal from Farmington Bay to confluence with the Jordan River	UT16020204-034_00	2B, 3B*, 3D, 4
SDSDS WWTP	Jordan River-1[a]	Jordan River from Farmington Bay upstream contiguous with the Davis County line	UT16020204-001_00	2B, 3B*, 3D, 4
CVWRF	Jordan River-4	Jordan River from 2100 South to the confluence with Little Cottonwood Creek	UT16020204-004_00	2B, 3B*, 4
SVWRF	Jordan River-5	Jordan River from the confluence with Little Cottonwood Creek to 7800 South	UT16020204-005_00	2B, 3B, 4
JBWRF	Jordan River-6	Jordan River from 7800 South to Bluffdale at 14600 South	UT16020204-006_00	2B, 3B, 4
* Site specific criteria for dissolved oxygen. See UAC R317.2.14 Table 2.14.5.				

Per UAC R317-2-6, the following is the description for each beneficial use listed in Table 2.

- *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 3D - Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, 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. The critical low flows are summarized in Table 3.

Table 3: Critical low flows along Jordan River

QUAL2Kw Segment No(s)	Source/Diversion Name	7Q10			
		WINTER	SPRING	SUMMER	FALL
31	Jordan Narrows (Total)	3.2	7.7	222	6.4
31-32	Groundwater Segment	3	3	223	3
32	JVWCD Pumps	3	3	207	3
32	ULDC North & South	3	3	180	3
32	Utah & Salt Lake Canal	3	3	117	3
32	East Jordan Canal	2.9	2.8	76.7	3.4
32	Jordan River Station No 1	2.9	2.8	76.7	3.4
32-51	Groundwater Segment	23	24	82	17
37	Jordan & Salt Lake Canal	23	24	67	17
37	South Jordan Canal	23	24	27	17
47	Rose Creek	**23**	**24**	**27**	**17**
51	Jordan Basin WRF	35	36	37	28
51-76	Groundwater Segment	62	64	44	46
54	Corner Canyon Creek	62	65	44	46
59	Riverton 126th Pump Station	62	65	44	46
65	Midas Creek	62	65	44	47
66	Willow Creek	63	66	45	47
74	North Jordan Canal	27	32	27	23
74	Dry Creek	27	32	28	23
76	Jordan River at 9000 South	27	32	28	23
76-84	Groundwater Segment	39	40	43	36
76	9000 South Drain	39	40	43	36
81	Bingham Creek	**40**	**40**	**47**	**37**
84	South Valley WRF	71	71	80	68
84-111	Groundwater Segment	112	97	130	110
85	7200 South Drain	112	97	130	110
97	Little Cottonwood Creek	113	98	139	112
98	Brighton Canal	113	98	139	112
100	Big Cottonwood Creek	**119**	**106**	**161**	**123**
N/A	Mill Creek above Central Valley	3	10	21	10
111	Mill Creek at Jordan River	122	116	182	133

QUAL2Kw Segment No(s)	Source/Diversion Name	7Q10			
		WINTER	SPRING	SUMMER	FALL
111	Central Valley WRF	191	188	255	200
111-115	Groundwater Segment	197	192	263	206
112	Decker Lake Outfall	197	192	265	207
115	Jordan River above Surplus Canal	197	192	265	207
115-118	Groundwater Segment	200	195	267	210
116	Surplus Canal	25	11	26	89
118	Jordan River at 1700 South	25	11	26	89
118-133	Groundwater Segment	37	48	104	92
122	1300 South Conduits	39	50	121	93
130	City Creek/N Temple Conduit	40	52	123	93
133	Jordan River at 500 North	40	52	123	93
133-151	Groundwater Segment	**51**	**64**	**134**	**104**
151	South Davis South WRF	55	67	137	107
151-162	Groundwater Segment	62	74	144	114
162	State Canal	21	25	48	38
162-171	Groundwater Segment	26	31	54	44
162	A-1 Drain	**26**	**31**	**54**	**44**
169	South Davis North WRF	34	39	62	52
171	Mill Creek (Davis County)	34	38	62	51
171-172	Groundwater Segment	35	40	63	52
172	Stone Creek	36	41	63	53

Receiving and tributary water quality data were obtained from UDWQ and WFWQC monitoring sites. The average seasonal value was calculated for each constituent with available data in the receiving water for the period 2006 - 2021.

TMDL

The 303(d) list of impairments of the Jordan River, Mill Creek, and State Canal in *Utah's Final 2016 303(d) Water Quality Assessment Report dated December 7, 2016* (Utah DWQ 2016) is summarized in Table 4. The table also includes changes in the Utah *Combined 2018/2020 303(d) Water Quality Assessment Report dated February 9, 2021*, which has not been approved to date. The dissolved oxygen impairment in the lower Jordan River (below Surplus Canal) was addressed by the *Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus Ecological Solutions and Stantec Consultants 2013), which identified organic matter as the pollutant of concern and recommended additional studies to determine the sources and allocation [CS1]. 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.

Table 4: List of impairments of Jordan River and State Canal

Assessment Unit	Assessment Unit Description	Assessment Unit ID	Impaired Parameter
State Canal	State Canal from Farmington Bay to confluence with the Jordan River	UT16020204-034_00	Total Ammonia as N Min Dissolved Oxygen Total Dissolved Solids
Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line	UT16020204-001_00	E. coli *DissolvedCopper Min Dissolved Oxygen Total Dissolved Solids Bioassessment/Macroinv
Jordan River 2	Jordan River from Davis County line upstream to North Temple Street	UT16020204-002_00	E. coli Min Dissolved Oxygen *Total Dissolved Solids Bioassessment/Macroinv
Jordan River-3	Jordan River from North Temple to 2100 South	UT16020204-003_00	E. coli Total Phosphorus as P Min Dissolved Oxygen Bioassessment/Macroinv
Jordan River-4	Jordan River from 2100 South to the confluence with Little Cottonwood Creek	UT16020204-004_00	E. coli Total Dissolved Solids Bioassessment/Macroinv
Jordan River-5	Jordan River from the confluence with Little Cottonwood Creek to 7800 South	UT16020204-005_00	E. coli Max Temperature Total Dissolved Solids
Jordan River-6	Jordan River from 7800 South to Bluffdale at 14600 South	UT16020204-006_00	*Dissolved Selenium Max Temperature Total Dissolved Solids Bioassessment/Macroinv
Jordan River-7	Jordan River from Bluffdale at 14600 South to Narrows	UT16020204-007_00	Max Temperature **Total Dissolved Solids Bioassessment/Macroinv
Jordan River-8	Jordan River from Narrows to Utah Lake	UT16020201-008_00	Arsenic Total Dissolved Solids
* impaired parameter in 2016 IR but not in 2018/2020 IR ** impaired as of 2018/2020 IR			

Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and 2,500 feet for chronic conditions, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone.

The mixing zone was presumed to remain within the maximum allowable mixing zone dimensions for each discharge. Acute limits were calculated using 50% of the seasonal critical low flow.

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 DO 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 model calibration.

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. 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 CVWRF and SDSD plants, where ELS were assumed to be present from March through October. Per UAC R317-2-14, Table 2.14.2, the site specific standard for ammonia for the Jordan River from Mill Creek to 900 South was applied.

A mass balance mixing analysis was used to calculate the seasonal WLA for conservative constituents such as metals. Each wastewater treatment plant was granted a full allocation at the point of discharge. Background condition in the Jordan River for each plant was characterized by either a single or combined, multiple monitoring location data.

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

WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in an incompletely 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 (Table 5). The WET limit for LC_{50} is typically 100% effluent and does not need to be determined by the WLA.

Table 5: WET Limits for IC_{25}

Season	Percent Effluent
Jordan Basin WRF	46%
South Valley WRF	62%
Central Valley WRF	39%
SDSD South WWTP	21%
SDSD North WWTP	63%

Effluent Limits

The water quality based effluent limits determined as part of this combined wasteload allocation are summarized in Table 6.

Since the DO impairment of the Jordan River is being addressed through the TMDL process, limits were not calculated for DO, BOD/CBOD, or nutrients. The permit limits for DO and BOD/CBOD were calculated in a previous permit issued prior to the impairment of the Jordan River and are carried forward in this WLA.

Table 6: Water Quality Based Effluent Limits Summary

Effluent Constituent	Averaging Period	Jordan Basin	South Valley	Central Valley	SDSD South WWTP	SDSD North WWTP
Flow (MGD)	Monthly	15	50	75	4	12
Ammonia Acute (mg/L)						
Summer (Jun-Aug)		6.0	6.0	13.1	30.0	24.0
Fall (Sep-Nov)	Daily	6.0	9.0	15.9	40.0	16.2
Winter (Dec-Feb)		9.0	9.4	12.3	17.0	13.0
Spring (Mar-May)		8.0	7.4	15.9	26.0	15.0
Ammonia Chronic (mg/L)						
Summer (Jun-Aug)		1.5	1.5	3.7	8.0	5.5
Fall (Sep-Nov)		2.5	3.0		20.0	7.5
(Sep-Oct)	Monthly			4.5		
(Nov)				5.9		
Winter (Dec-Feb)		3.0	4.0	5.8	14.0	6.5
Spring (Mar-May)		2.5	3.0	5.3	12.0	6.0
TRC Acute (mg/L)						
Summer (Jul-Sep)		N/A[b]	0.028	N/A[b]	0.321	0.066
Fall (Oct-Dec)	Daily	N/A[b]	0.022	N/A[b]	0.253	0.057
Winter (Jan-Mar)		N/A[b]	0.028	N/A[b]	0.134	0.045
Spring (Apr-Jun)		N/A[b]	0.023	N/A[b]	0.163	0.048
DO (mg/L)	Minimum	5.0	5.0	5.0	5.0	5.0
BOD_5/$CBOD_5$ (mg/L)		BOD_5	BOD_5	$CBOD_5$	BOD_5	BOD_5
Summer (Jul-Sep)		15.0	15.0	16.0	20.0	20.0
Fall (Oct-Dec)	Monthly	15.0	15.0	20.0	25.0	25.0
Winter (Jan-Mar)		15.0	15.0	20.0	25.0	25.0
Spring (Apr-Jun)		15.0	15.0	20.0	25.0	25.0
BOD_5/$CBOD_5$ (mg/L)		BOD_5	BOD_5	$CBOD_5$	BOD_5	BOD_5
Summer (Jul-Sep)		21.0	21.0	27.0	27.0	27.0
Fall (Oct-Dec)	Weekly	21.0	21.0	28.0	35.0	35.0
Winter (Jan-Mar)		21.0	21.0	28.0	35.0	35.0
Spring (Apr-Jun)		21.0	21.0	28.0	35.0	35.0

a: Limit due to impairment of receiving segment.
b: Ultraviolet disinfection utilized, hence no limit for TRC

QUAL2Kw rates, input and output are summarized in Appendix A. The WQBELs for conservative constituents are summarized in Appendix B. Per R317-2.14.2, cyanide numeric criteria for aquatic life is based on free cyanide, which is a portion of total cyanide. Models and supporting documentation are available for review upon request.

Files:
Wasteload Report: 211209-*JordanRiverPOTWWLA_2021.docx*
QUAL2Kw Calibration Model: *jordan_aug2009_q2kw_calib_2010-8-26.xls*
QUAL2Kw Validation Model: *jordan_q2kw_synoptic_2014-07-22.xlsm*
QUAL2Kw Wasteload Model: *jordan_potw_q2kw_wla_2021.xlsm*
JBWRF Metals Wasteload Model: *JBWRF_WLA_2021.xlsm*
SVWRF Metals Wasteload Model: *SVWRF_WLA_2021.xlsm*
CVWRF Metals Wasteload Model: *CVWRF_WLA_JR_2021.xlsm*
SDSWRF Metals Wasteload Model: *SDSDSWWTP_WLA_2021.xlsm*
SDNWRF Metals Wasteload Model: *SDSDNWWTP _WLA_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.

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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.

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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. 2016. *Utah's 2016 303(d) Water Quality Assessment Report*. December October 2016. 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.

WASTELOAD ANALYSIS [WLA] Date: 12/9/2021
Appendix A: QUAL2Kw Analysis for Ammonia

Discharging Facility: Jordan River POTWs
Receiving Water: Jordan River and State Canal

Fully Mixed: Yes
Acute River Width: 100%
Chronic River Width: 100%

Modeling Information

A QUAL2Kw model was used to determine these effluent limits.

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.

Model Inputs

The following were utilized as inputs for the analysis.

Headwater - Utah Lake	Summer	Fall	Winter	Spring
Flow (cfs)	222.0	6.4	3.2	7.7
Temperature, Mean (deg C)	22.3	13.9	2.7	11.4
Temperature, Diel Range (deg C)	3.0	2.5	2.0	2.5
Specific Conductance (µmhos)	1593	1689	1817	1513
Inorganic Suspended Solids (mg/L)	66.2	53.8	7.6	48.1
Dissolved Oxygen, Mean (mg/L)	6.9	8.5	23.2	14.2
Dissolved Oxygen, Diel Range (mg/L)	2.5	2.0	1.5	2.0
$CBOD_5$ (mg/L)	1.8	2.7	2.3	2.0
Organic Nitrogen (mg/L)	0.426	0.396	0.533	0.441
NH4-Nitrogen (mg/L)	0.056	0.176	0.232	0.073
NO3-Nitrogen (mg/L)	0.061	0.275	0.586	0.178
Organic Phosphorus (mg/L)	0.047	0.051	0.019	0.031
Inorganic Ortho-Phosphorus (mg/L)	0.038	0.040	0.039	0.035
Phytoplankton (µg/L)	20.3	22.0	15.6	10.2
Detritus [POM] (mg/L)	14.0	10.4	4.7	8.5
Alkalinity (mg/L)	200	191	220	200
pH	8.4	8.2	8.1	8.3

Discharge Information - Jordan Basin WRF

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	6.6	6.6	7.6	7.3
Temperature (deg C)	22.1	18.7	15.6	18.3
Specific Conductance (µmhos)	1791	1791	1791	1791
Inorganic Suspended Solids (mg/L)	1.7	1.7	1.7	1.7
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	15.0	15.0	15.0	15.0
Organic Nitrogen (mg/L)	0.383	0.791	0.719	0.913
NH4-Nitrogen (mg/L)	0.620	0.058	0.084	0.074
NO3-Nitrogen (mg/L)	9.886	9.796	9.204	9.143
Organic Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Inorganic Ortho-Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	0.5	0.5	0.5	0.5
Alkalinity (mg/L)	200	200	200	200
pH	7.6	7.5	7.4	7.4

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	6.6	6.6	7.6	7.3
pH	7.6	7.5	7.4	7.4

Discharge Information - South Valley WRF

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	21.2	20.5	19.8	19.8
Temperature (deg C)	21.6	20.0	14.7	16.7
Specific Conductance (µmhos)	1517	1444	1543	1459
Inorganic Suspended Solids (mg/L)	0.0	0.4	2.0	1.1
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	15.0	15.0	15.0	15.0
Organic Nitrogen (mg/L)	1.862	1.447	1.624	1.559
NH4-Nitrogen (mg/L)	0.108	0.103	0.340	0.188
NO3-Nitrogen (mg/L)	6.654	7.117	7.093	6.960
Organic Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Inorganic Ortho-Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	4.1	4.2	4.8	4.4
Alkalinity (mg/L)	189	184	170	173
pH	7.7	7.7	7.6	7.6

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	21.2	20.5	19.8	19.8
pH	7.7	7.7	7.6	7.6

Discharge Information - Central Valley WRF

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	47.4	43.5	44.1	46.5
Temperature (deg C)	21.2	18.4	12.7	14.8
Specific Conductance (µmhos)	1330	1271	1422	1422
Inorganic Suspended Solids (mg/L)	1.1	0.0	0.4	0.3
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	27.0	28.0	28.0	28.0
Organic Nitrogen (mg/L)	3.207	0.119	0.033	1.678
NH4-Nitrogen (mg/L)	0.681	1.297	1.842	1.794
NO3-Nitrogen (mg/L)	16.579	17.817	17.525	13.829
Organic Phosphorus (mg/L)	0.955	1.082	1.532	1.611
Inorganic Ortho-Phosphorus (mg/L)	3.045	2.918	2.468	2.389
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	4.5	6.7	5.6	4.1
Alkalinity (mg/L)	172	164	173	179
pH	7.4	7.4	7.3	7.2

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	75.0	75.0	75.0	75.0
pH	7.4	7.4	7.3	7.2

Discharge Information - South Davis Sewer District South WWTP

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	2.0	2.0	2.5	2.5
Temperature (deg C)	22.0	19.6	12.1	16.6
Specific Conductance (µmhos)	2658	2659	2913	2852
Inorganic Suspended Solids (mg/L)	6.8	6.6	5.9	6.7
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	20.0	25.0	25.0	25.0
Organic Nitrogen (mg/L)	5.174	3.692	1.908	1.114
NH4-Nitrogen (mg/L)	7.685	13.067	27.675	16.446
NO3-Nitrogen (mg/L)	7.685	13.067	27.675	16.446
Organic Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Inorganic Ortho-Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	4.9	4.5	7.0	6.4
Alkalinity (mg/L)	282	292	328	323
pH	7.7	7.6	7.7	7.7

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	2.0	2.0	2.5	2.5
pH	7.7	7.6	7.7	7.7

Discharge Information - South Davis Sewer District North WWTP

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	4.8	4.8	4.8	4.9
Temperature (deg C)	22.5	20.5	12.9	16.4
Specific Conductance (µmhos)	1986	2017	2258	1981
Inorganic Suspended Solids (mg/L)	6.0	6.0	6.9	6.6
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	20.0	25.0	25.0	25.0
Organic Nitrogen (mg/L)	2.108	1.267	0.908	3.754
NH4-Nitrogen (mg/L)	7.938	8.583	14.175	9.446
NO3-Nitrogen (mg/L)	10.351	10.170	9.671	10.839
Organic Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Inorganic Ortho-Phosphorus (mg/L)	0.500	0.500	0.500	0.500
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	4.9	7.8	9.2	8.9
Alkalinity (mg/L)	324	324	324	324
pH	7.2	7.2	7.4	7.4

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	4.8	4.8	4.8	4.9
pH	7.2	7.2	7.4	7.4

Tributary - Little Cottonwood Creek	Summer	Fall	Winter	Spring
Flow (cfs)	8.5	1.6	1.4	1.4
Temperature, Mean (deg C)	16.1	11.5	3.3	9.0
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1085	1214	2554	815
Inorganic Suspended Solids (mg/L)	33.9	15.1	9.6	12.9
Dissolved Oxygen, Mean (mg/L)	8.1	9.3	11.4	10.7
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	1.5	1.9	3.9	1.5
Organic Nitrogen (mg/L)	0.230	0.425	0.385	0.010
NH4-Nitrogen (mg/L)	0.022	0.032	0.098	0.058
NO3-Nitrogen (mg/L)	0.424	0.647	1.040	0.591
Organic Phosphorus (mg/L)	0.039	0.016	0.010	0.016
Inorganic Ortho-Phosphorus (mg/L)	0.032	0.029	0.021	0.025
Phytoplankton (µg/L)	17.2	17.6	6.0	16.1
Detritus [POM] (mg/L)	6.1	3.8	8.1	5.1
Alkalinity (mg/L)	118	238	232	165
pH	8.2	8.1	7.8	8.2

Tributary - Big Cottonwood Creek	Summer	Fall	Winter	Spring
Flow (cfs)	21.7	10.8	5.9	7.9
Temperature, Mean (deg C)	17.0	12.1	4.5	8.8
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1026	1088	1406	655
Inorganic Suspended Solids (mg/L)	23.9	12.9	8.7	19.3
Dissolved Oxygen, Mean (mg/L)	8.3	9.4	11.3	10.9
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	1.5	1.8	3.3	1.5
Organic Nitrogen (mg/L)	0.417	0.300	0.285	0.160
NH4-Nitrogen (mg/L)	0.023	0.023	0.050	0.036
NO3-Nitrogen (mg/L)	0.325	0.408	0.716	0.389
Organic Phosphorus (mg/L)	0.015	0.006	0.011	0.016
Inorganic Ortho-Phosphorus (mg/L)	0.036	0.027	0.022	0.024
Phytoplankton (µg/L)	14.7	13.2	6.5	10.3
Detritus [POM] (mg/L)	6.2	4.5	8.4	4.9
Alkalinity (mg/L)	142	211	221	155
pH	8.3	8.2	8.1	8.2

Tributary - Mill Creek above CVWRF	Summer	Fall	Winter	Spring
Flow (cfs)	21.4	10.1	3.0	10.1
Temperature, Mean (deg C)	17.9	11.9	6.7	11.0
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1103	1086	1068	1017
Inorganic Suspended Solids (mg/L)	14.4	14.6	21.6	11.8
Dissolved Oxygen, Mean (mg/L)	8.3	8.5	10.9	9.7
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	1.5	1.5	1.5	2.4
Organic Nitrogen (mg/L)	0.264	0.400	0.311	0.054
NH4-Nitrogen (mg/L)	0.025	0.027	0.030	0.030
NO3-Nitrogen (mg/L)	1.063	1.411	1.765	1.341
Organic Phosphorus (mg/L)	0.018	0.025	0.018	0.010
Inorganic Ortho-Phosphorus (mg/L)	0.035	0.028	0.032	0.036
Phytoplankton (µg/L)	4.1	5.4	5.2	2.7
Detritus [POM] (mg/L)	4.0	4.3	10.3	4.6
Alkalinity (mg/L)	207	237	245	213
pH	7.9	7.9	7.7	7.8

Tributary - Decker Lake Outlet	Summer	Fall	Winter	Spring
Flow (cfs)	1.9	0.4	0.3	0.3
Temperature, Mean (deg C)	21.3	10.0	2.8	12.7
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1711	1908	2660	1798
Inorganic Suspended Solids (mg/L)	52.5	41.8	19.6	26.0
Dissolved Oxygen, Mean (mg/L)	5.9	9.6	12.3	10.6
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.9	1.9	2.0	3.8
Organic Nitrogen (mg/L)	0.682	0.408	0.389	0.511
NH4-Nitrogen (mg/L)	0.180	0.107	0.131	0.139
NO3-Nitrogen (mg/L)	0.568	1.085	1.444	0.580
Organic Phosphorus (mg/L)	0.022	0.023	0.024	0.037
Inorganic Ortho-Phosphorus (mg/L)	0.061	0.054	0.042	0.050
Phytoplankton (µg/L)	19.2	16.8	14.1	25.4
Detritus [POM] (mg/L)	7.6	7.1	9.1	6.9
Alkalinity (mg/L)	230	246	258	218
pH	8.1	8.3	8.3	8.2

Tributary - 1300 South Drain	Summer	Fall	Winter	Spring
Flow (cfs)	17.6	0.6	2.3	2.3
Temperature, Mean (deg C)	19.9	13.5	8.7	13.3
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1928	2223	2275	1968
Inorganic Suspended Solids (mg/L)	54.6	42.7	39.0	48.4
Dissolved Oxygen, Mean (mg/L)	7.9	9.1	10.2	10.2
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.3	2.5	1.6	1.6
Organic Nitrogen (mg/L)	0.346	0.322	0.000	-0.081
NH4-Nitrogen (mg/L)	0.029	0.031	0.065	0.038
NO3-Nitrogen (mg/L)	1.237	2.153	3.486	2.444
Organic Phosphorus (mg/L)	0.050	0.041	0.038	0.050
Inorganic Ortho-Phosphorus (mg/L)	0.076	0.056	0.046	0.043
Phytoplankton (µg/L)	0.0	0.0	0.0	0.0
Detritus [POM] (mg/L)	7.1	6.2	5.3	6.2
Alkalinity (mg/L)	251	296	343	286
pH	8.0	8.1	8.0	8.2

Tributary - North Temple Drain	Summer	Fall	Winter	Spring
Flow (cfs)	1.6	0.1	0.2	2.1
Temperature, Mean (deg C)	18.6	12.1	7.9	10.1
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	946	1031	1680	680
Inorganic Suspended Solids (mg/L)	5.9	0.2	3.9	10.7
Dissolved Oxygen, Mean (mg/L)	7.7	7.7	9.8	9.5
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.1	2.4	1.5	1.7
Organic Nitrogen (mg/L)	0.161	0.000	0.058	0.184
NH4-Nitrogen (mg/L)	0.026	0.038	0.031	0.054
NO3-Nitrogen (mg/L)	2.280	2.645	2.148	0.920
Organic Phosphorus (mg/L)	0.005	0.000	0.000	0.020
Inorganic Ortho-Phosphorus (mg/L)	0.030	0.022	0.020	0.033
Phytoplankton (µg/L)	2.4	2.4	0.8	0.4
Detritus [POM] (mg/L)	2.5	2.5	2.5	2.5
Alkalinity (mg/L)	237	237	257	221
pH	8.1	8.5	8.2	8.2

Minor Tributaries - Quality	Summer	Fall	Winter	Spring
Temperature, Mean (deg C)	19.9	13.5	8.7	13.3
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (µmhos)	1928	2223	2275	1968
Inorganic Suspended Solids (mg/L)	54.6	42.7	39.0	48.4
Dissolved Oxygen, Mean (mg/L)	7.9	9.1	10.2	10.2
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.3	2.5	1.6	1.6
Organic Nitrogen (mg/L)	0.346	0.322	0.000	-0.081
NH4-Nitrogen (mg/L)	0.029	0.031	0.065	0.038
NO3-Nitrogen (mg/L)	1.237	2.153	3.486	2.444
Organic Phosphorus (mg/L)	0.050	0.041	0.038	0.050
Inorganic Ortho-Phosphorus (mg/L)	0.076	0.056	0.046	0.043
Phytoplankton (µg/L)	0.0	0.0	0.0	0.0
Detritus [POM] (mg/L)	7.1	6.2	5.3	6.2
Alkalinity (mg/L)	251	296	343	286
pH	8.0	8.1	8.0	8.2

Minor Tributaries - Flow (MGD)	Summer	Fall	Winter	Spring
Corner Canyon Creek	0.0	0.0	0.0	0.0
Midas Creek (Butterfield)	0.0	0.3	0.3	0.2
Willow Creek	0.6	0.4	0.5	0.8
Dry Creek	0.2	0.1	0.2	0.3
9000 South Conduit	0.0	0.0	0.0	0.0
Bingham Creek	4.7	1.0	0.9	0.4

Diversions - Flow (cfs)	Summer	Fall	Winter	Spring
Jordan Valley Pump Station	15.6	3.0	0.0	0.0
Utah Lake Distribution Canal	27.2	0.0	0.0	0.0
Utah & Salt Lake Canal	62.3	0.0	0.0	0.0
East Jordan & Draper Canal	40.8	0.0	0.0	0.0
South Jordan Canal	15.1	0.0	0.0	0.0
Jordan & Salt Lake Canal	39.6	0.0	0.0	0.0
Beckstead Ditch	0.0	0.0	0.0	0.0
North Jordan Canal	17.1	23.9	35.8	38.6
Gardner Mill Race	0.0	0.0	0.0	0.0
Brighton Canal	0.0	0.0	0.0	0.0
Surplus Canal	241.4	120.5	175.2	183.9
Jordan River at Burnham Dam	96.0	76.0	41.0	49.0

Groundwater - Quality	Summer	Fall	Winter	Spring
Temperature, Mean (deg C)	16.0	16.0	16.0	16.0
Specific Conductance (μmhos)	2000	2000	2000	2000
Inorganic Suspended Solids (mg/L)	0.0	0.0	0.0	0.0
Dissolved Oxygen, Mean (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.0	2.0	2.0	2.0
Organic Nitrogen (mg/L)	0.500	0.500	0.500	0.500
NH4-Nitrogen (mg/L)	0.500	0.500	0.500	0.500
NO3-Nitrogen (mg/L)	2.000	2.000	2.000	2.000
Organic Phosphorus (mg/L)	0.050	0.050	0.050	0.050
Inorganic Ortho-Phosphorus (mg/L)	0.100	0.100	0.100	0.100
Phytoplankton (μg/L)	0.0	0.0	0.0	0.0
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	300	300	300	300
pH	8.0	8.0	8.0	8.0

Groundwater - Flow (cfs)	Summer	Fall	Winter	Spring
Segment 1-32	0.5	0.0	0.0	0.0
Segment 32-51	4.9	14.1	20.3	21.6
Segment 51-76	6.5	18.5	26.7	28.5
Segment 76-84	14.9	12.5	12.2	7.6
Segment 84-111	50.3	42.0	41.3	25.7
Segment 111-115	7.5	6.2	6.1	3.8
Segment 115-118	2.8	2.8	2.8	2.8
Segment 118-133	77.8	3.0	12.5	37.0
Segment 133-151	11.2	11.2	11.2	11.2
Segment 151-162	6.8	6.8	6.8	6.8
State Canal 162-171	5.6	5.6	5.6	5.6
State Canal 171-172	0.6	0.6	0.6	0.6

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

Effluent Limitations

Effluent Limitations based upon Water Quality Standards for Ammonia

In-stream criteria of downstream segments for Ammonia will be met with an effluent limitation as follows:

Chronic	Summer Jun-Aug	Fall Sep-Oct	Fall Nov	Winter Dec-Feb	Spring Mar-May
Flow (MGD)					
Jordan Basin WRF	15.0	15.0	15.0	15.0	15.0
South Valley WRF	50.0	50.0	50.0	50.0	50.0
Central Valley WRF	75.0	75.0	75.0	75.0	75.0
SDSD South WWTP	4.0	4.0	4.0	4.0	4.0
SDSD North WWTP	12.0	12.0	12.0	12.0	12.0
NH4-Nitrogen (mg/L)					
Jordan Basin WRF	1.5	2.5	2.5	3.0	2.5
South Valley WRF	1.5	3.0	3.0	4.0	3.0
Central Valley WRF	3.7	4.5	5.9	5.8	5.3
SDSD South WWTP	8.0	20.0	20.0	14.0	12.0
SDSD North WWTP	5.5	7.5	7.5	6.5	6.0

Acute	Summer	Fall		Winter	Spring
Flow (MGD)	Jun-Aug	Sep-Nov		Dec-Feb	Mar-May
Jordan Basin WRF	15.0	15.0		15.0	15.0
South Valley WRF	50.0	50.0		50.0	50.0
Central Valley WRF	75.0	75.0		75.0	75.0
SDSD South WWTP	4.0	4.0		4.0	4.0
SDSD North WWTP	12.0	12.0		12.0	12.0
NH4-Nitrogen (mg/L)					
Jordan Basin WRF	6.0	6.0		9.0	8.0
South Valley WRF	6.0	9.0		9.4	7.4
Central Valley WRF	13.1	15.9		12.3	15.9
SDSD South WWTP	30.0	40.0		17.0	26.0
SDSD North WWTP	24.0	16.2		13.0	15.0

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.

Coefficients and Other Model Information

Parameter	*Value*	*Units*
Stoichiometry:		
Carbon	40	gC
Nitrogen	7.2	gN
Phosphorus	1	gP
Dry weight	100	gD
Chlorophyll	1	gA
Inorganic suspended solids:		
Settling velocity	0.001	m/d
Oxygen:		
Reaeration model	Internal	
Temp correction	1.024	
Reaeration wind effect	None	
O2 for carbon oxidation	2.69	gO2/gC
O2 for NH4 nitrification	4.57	gO2/gN
Oxygen inhib model CBOD oxidation	Exponential	
Oxygen inhib parameter CBOD oxidation	0.60	L/mgO2
Oxygen inhib model nitrification	Exponential	
Oxygen inhib parameter nitrification	0.60	L/mgO2
Oxygen enhance model denitrification	Exponential	
Oxygen enhance parameter denitrification	0.60	L/mgO2
Oxygen inhib model phyto resp	Exponential	
Oxygen inhib parameter phyto resp	0.60	L/mgO2
Oxygen enhance model bot alg resp	Exponential	
Oxygen enhance parameter bot alg resp	0.60	L/mgO2
Slow CBOD:		
Hydrolysis rate	0	/d
Temp correction	1.047	
Oxidation rate	0.2	/d
Temp correction	1.047	
Fast CBOD:		
Oxidation rate	10	/d
Temp correction	1.047	
Organic N:		
Hydrolysis	0.4	/d
Temp correction	1.07	
Settling velocity	0.05	m/d
Ammonium:		
Nitrification	2	/d
Temp correction	1.07	
Nitrate:		
Denitrification	0.05	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.05	m/d
Temp correction	1.07	
Organic P:		
Hydrolysis	0.05	/d
Temp correction	1.07	
Settling velocity	0.05	m/d
Inorganic P:		
Settling velocity	0.5	m/d
Sed P oxygen attenuation half sat constant	0.05	mgO2/L

Phytoplankton:		
Max Growth rate	2	/d
Temp correction	1.07	
Respiration rate	0.1	/d
Temp correction	1.07	
Death rate	0.1	/d
Temp correction	1	
Nitrogen half sat constant	15	ugN/L
Phosphorus half sat constant	2	ugP/L
Inorganic carbon half sat constant	1.30E-05	moles/L
Phytoplankton use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	57.6	langleys/d
Ammonia preference	25	ugN/L
Settling velocity	0.05	m/d
Bottom Plants:		
Growth model	Zero-order	
Max Growth rate	50	gD/m2/d or /d
Temp correction	1.07	
First-order model carrying capacity	50	gD/m2
Basal respiration rate	0.042	/d
Photo-respiration rate parameter	0.389	unitless
Temp correction	1.07	
Excretion rate	0.1	/d
Temp correction	1.05	
Death rate	0.1	/d
Temp correction	1.07	
External nitrogen half sat constant	163	ugN/L
External phosphorus half sat constant	48	ugP/L
Inorganic carbon half sat constant	1.30E-05	moles/L
Bottom algae use HCO3- as substrate	Yes	
Light model	Half saturation	
Light constant	50	langleys/d
Ammonia preference	1	ugN/L
Subsistence quota for nitrogen	30	mgN/gD
Subsistence quota for phosphorus	0.4	mgP/gD
Maximum uptake rate for nitrogen	447	mgN/gD/d
Maximum uptake rate for phosphorus	114	mgP/gD/d
Internal nitrogen half sat ratio	2.9	
Internal phosphorus half sat ratio	1.8	
Nitrogen uptake water column fraction	1	
Phosphorus uptake water column fraction	1	
Detritus (POM):		
Dissolution rate	0.1	/d
Temp correction	1.07	
Settling velocity	0.1	m/d
pH:		
Partial pressure of carbon dioxide	347	ppm
TRC:		
Decay rate	0.8	/d

Atmospheric Inputs:	Summer	Fall	Winter	Spring
Min. Air Temperature, F	63.4	40.4	20.4	38.3
Max. Air Temperature, F	92.8	65.7	37.3	61.4
Dew Point, Temp., F	60.2	43.6	26.8	41.6
Wind, ft./sec. @ 21 ft.	9.5	8.2	6.9	9.8
Cloud Cover, %	10%	10%	10%	10%

Utah Division of Water Quality
Salt Lake City, Utah

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

8-Oct-21
4:00 PM

Facilities: **Jordan Basin Water Reclamation Facility** **UPDES No: UT-0025852**
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**	13.070 lbs/day	750.00 ug/l	112.673 lbs/day
Arsenic	150.00 ug/l	22.535 lbs/day	340.00 ug/l	51.079 lbs/day
Cadmium	2.18 ug/l	0.327 lbs/day	6.59 ug/l	0.989 lbs/day
Chromium III	243.79 ug/l	36.624 lbs/day	5100.48 ug/l	766.250 lbs/day
ChromiumVI	11.00 ug/l	1.653 lbs/day	16.00 ug/l	2.404 lbs/day
Copper	27.61 ug/l	4.147 lbs/day	46.31 ug/l	6.957 lbs/day
Iron			1000.00 ug/l	150.231 lbs/day
Lead	16.02 ug/l	2.406 lbs/day	411.03 ug/l	61.750 lbs/day
Mercury	0.0120 ug/l	0.002 lbs/day	2.40 ug/l	0.361 lbs/day
Nickel	152.71 ug/l	22.941 lbs/day	1373.49 ug/l	206.341 lbs/day
Selenium	4.60 ug/l	0.691 lbs/day	20.00 ug/l	3.005 lbs/day
Silver	N/A ug/l	N/A lbs/day	33.61 ug/l	5.049 lbs/day
Zinc	351.34 ug/l	52.782 lbs/day	351.34 ug/l	52.782 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 355.97 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	0.75 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	90.14 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	1163.60 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	59533.09 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.04 lbs/day
Nickel			4600.00 ug/l	1244.78 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	1.70 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)	27.0	19.3	8.1	0.03	3.56	7.05	0.001	1067.5
Fall	17.0	8.9	8.1	0.05	2.06	---	0.001	1054.6
Winter	23.0	4.8	7.9	0.04	1.91	---	0.001	1054.6
Spring	24.0	14.8	8.7	0.04	2.06	---	0.001	1054.6

	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	124.00	12.10	0.06	1.35	2.65*	1.12	0.0	0.12

	Hg	Ni	Se	Ag	Zn	Boron
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
All Seasons	0.0000	2.50	1.09	0.25	8.62	10.0

* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	15.00000	23.5	982.67	61.45349
Fall	15.00000	20.2		
Winter	15.00000	17.1		
Spring	15.00000	20.2		

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	15.000 MGD	23.205 cfs
Fall	15.000 MGD	23.205 cfs
Winter	15.000 MGD	23.205 cfs
Spring	15.000 MGD	23.205 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 15 MGD. If the discharger is allowed to have a flow greater than 15 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 >	46.2% 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 355.97 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum	N/A		N/A		1,114.2	ug/l	167.4	lbs/day
Arsenic	310.45	ug/l	25.1	lbs/day	530.8	ug/l	79.7	lbs/day
Cadmium	4.64	ug/l	0.4	lbs/day	10.4	ug/l	1.6	lbs/day
Chromium III	525.87	ug/l	42.5	lbs/day	8,067.0	ug/l	1211.9	lbs/day
Chromium VI	19.17	ug/l	1.6	lbs/day	23.0	ug/l	3.5	lbs/day
Copper	58.42	ug/l	4.7	lbs/day	72.6	ug/l	10.9	lbs/day
Iron	N/A		N/A		1,581.8	ug/l	237.6	lbs/day
Lead	34.51	ug/l	2.8	lbs/day	650.1	ug/l	97.7	lbs/day

Mercury	0.03	ug/l	0.0	lbs/day	3.8	ug/l	0.6 lbs/day
Nickel	327.48	ug/l	26.5	lbs/day	2,171.1	ug/l	326.2 lbs/day
Selenium	8.68	ug/l	0.7	lbs/day	31.0	ug/l	4.7 lbs/day
Silver	N/A	ug/l	N/A	lbs/day	53.0	ug/l	8.0 lbs/day
Zinc	750.11	ug/l	60.6	lbs/day	550.7	ug/l	82.7 lbs/day
Cyanide	11.25	ug/l	0.9	lbs/day	34.8	ug/l	5.2 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	25.6	Deg. C.	78.1	Deg. F
Fall	14.3	Deg. C.	57.8	Deg. F
Winter	10.8	Deg. C.	51.4	Deg. F
Spring	20.9	Deg. C.	69.6	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	751.2	lbs/day
Nitrates as N	4.0	mg/l	600.9	lbs/day
Total Phosphorus as P	0.05	mg/l	7.5	lbs/day
Total Suspended Solids	90.0	mg/l	13520.8	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		1114.2				1114.2	N/A
Antimony				9303.2		9303.2	
Arsenic	216.4	530.8			0.0	216.4	310.5
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	21.6	10.4			0.0	10.4	4.6
Chromium (III)		8067.0			0.0	8067.0	525.9
Chromium (VI)	214.8	23.0			0.0	23.00	19.17
Copper	431.4	72.6				72.6	58.4
Cyanide		34.8	475979.3			34.8	11.3
Iron		1581.8				1581.8	
Lead	216.2	650.1			0.0	216.2	34.5
Mercury		3.80		0.32	0.0	0.32	0.026
Nickel		2171.1		9952.3		2171.1	327.5
Selenium	106.9	31.0			0.0	31.0	8.7
Silver		53.0			0.0	53.0	
Thallium				13.6		13.6	
Zinc		550.7				550.7	750.1
Boron	1622.3					1622.3	

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	1114.2	N/A	
Antimony	9303.23		
Arsenic	216.4	310.5	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	10.4	4.6	
Chromium (III)	8067.0	526	
Chromium (VI)	23.0	19.2	
Copper	72.6	58.4	
Cyanide	34.8	11.3	
Iron	1581.8		
Lead	216.2	34.5	
Mercury	0.325	0.026	
Nickel	2171.1	327	
Selenium	31.0	8.7	
Silver	53.0	N/A	
Thallium	13.6		
Zinc	550.7	750.1	Acute Controls
Boron	1622.31		

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: JBWRF_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	1.937	20.892	0.000	20.552	0.250	0.237

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	3.875	0.000	0.000	32.000	30.735

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.957

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

8-Oct-21
4:00 PM

Facilities: **South Valley Water Reclamation Facility** **UPDES No: UT-0024384**
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**	43.567 lbs/day	750.00	ug/l	375.577 lbs/day
Arsenic	150.00	ug/l	75.115 lbs/day	340.00	ug/l	170.262 lbs/day
Cadmium	2.30	ug/l	1.151 lbs/day	7.04	ug/l	3.527 lbs/day
Chromium III	257.90	ug/l	129.150 lbs/day	5395.84	ug/l	2,702.072 lbs/day
ChromiumVI	11.00	ug/l	5.508 lbs/day	16.00	ug/l	8.012 lbs/day
Copper	29.28	ug/l	14.661 lbs/day	49.40	ug/l	24.740 lbs/day
Iron				1000.00	ug/l	500.770 lbs/day
Lead	17.48	ug/l	8.754 lbs/day	448.62	ug/l	224.653 lbs/day
Mercury	0.0120	ug/l	0.006 lbs/day	2.40	ug/l	1.202 lbs/day
Nickel	161.85	ug/l	81.049 lbs/day	1455.73	ug/l	728.984 lbs/day
Selenium	4.60	ug/l	2.304 lbs/day	20.00	ug/l	10.015 lbs/day
Silver	N/A	ug/l	N/A lbs/day	37.82	ug/l	18.941 lbs/day
Zinc	372.41	ug/l	186.490 lbs/day	372.41	ug/l	186.490 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 381.3 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	2.50 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	300.46 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	2882.06 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	147454.23 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.10 lbs/day
Nickel			4600.00 ug/l	3083.13 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	4.22 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).

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(2) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

VIII. Modeling Information

The required information for the model may include the following information for both the upstream conditions at low flow and the effluent conditions:

Flow, Q, (cfs or MGD)	D.O. mg/l
Temperature, Deg. C.	Total Residual Chlorine (TRC), mg/l
pH	Total NH3-N, mg/l
BOD5, mg/l	Total Dissolved Solids (TDS), mg/l
Metals, ug/l	Toxic Organics of Concern, ug/l

Other Conditions

In addition to the upstream and effluent conditions, the models require a variety of physical and biological coefficients and other technical information. In the process of actually establishing the permit limits for an effluent, values are used based upon the available data, model calibration, literature values, site visits and best professional judgement.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Current Upstream Information

	Stream Critical Low Flow 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)	47.0	19.1	8.0	0.14	3.41	7.10	0.000	1194.4
Fall	37.0	10.3	7.9	0.15	3.18	---	0.010	1277.4
Winter	40.0	6.8	9.5	0.15	2.58	---	0.000	1277.4
Spring	40.0	14.9	8.6	0.15	3.02	---	0.025	1277.4

	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	23.80	10.24	0.33	2.58	3.33	4.46	0.0	1.42

	Hg	Ni	Se	Ag	Zn	Boron	
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	3.14	2.37	0.80	14.71	10.0	* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	50.00000	23.9	738.67	153.98116
Fall	50.00000	19.7		
Winter	50.00000	16.3		
Spring	50.00000	19.8		

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	50.000 MGD	77.350 cfs
Fall	50.000 MGD	77.350 cfs
Winter	50.000 MGD	77.350 cfs
Spring	50.000 MGD	77.350 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 50 MGD. If the discharger is allowed to have a flow greater than 50 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 >	62.2% 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 381.3 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum	N/A		N/A		970.6	ug/l	486.1	lbs/day
Arsenic	234.92	ug/l	63.3	lbs/day	440.2	ug/l	220.4	lbs/day
Cadmium	3.50	ug/l	0.9	lbs/day	9.1	ug/l	4.5	lbs/day
Chromium III	413.04	ug/l	111.3	lbs/day	7,034.4	ug/l	3522.6	lbs/day
Chromium VI	15.66	ug/l	4.2	lbs/day	19.8	ug/l	9.9	lbs/day
Copper	44.35	ug/l	12.0	lbs/day	63.1	ug/l	31.6	lbs/day
Iron	N/A		N/A		1,303.8	ug/l	652.9	lbs/day
Lead	27.24	ug/l	7.3	lbs/day	584.5	ug/l	292.7	lbs/day

Mercury	0.02	ug/l	0.0	lbs/day	3.1	ug/l	1.6 lbs/day
Nickel	258.28	ug/l	69.6	lbs/day	1,897.0	ug/l	950.0 lbs/day
Selenium	5.96	ug/l	1.6	lbs/day	25.4	ug/l	12.7 lbs/day
Silver	N/A	ug/l	N/A	lbs/day	49.1	ug/l	24.6 lbs/day
Zinc	589.75	ug/l	158.9	lbs/day	481.1	ug/l	240.9 lbs/day
Cyanide	8.36	ug/l	2.3	lbs/day	28.7	ug/l	14.4 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	24.3	Deg. C.	75.8	Deg. F
Fall	15.2	Deg. C.	59.4	Deg. F
Winter	11.9	Deg. C.	53.4	Deg. F
Spring	20.0	Deg. C.	67.9	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	2503.8 lbs/day
Nitrates as N	4.0	mg/l	2003.1 lbs/day
Total Phosphorus as P	0.05	mg/l	25.0 lbs/day
Total Suspended Solids	90.0	mg/l	45069.3 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		970.6				970.6	N/A
Antimony				6912.8		6912.8	
Arsenic	160.8	440.2			0.0	160.8	234.9
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	15.9	9.1			0.0	9.1	3.5
Chromium (III)		7034.4			0.0	7034.4	413.0
Chromium (VI)	159.2	19.8			0.0	19.85	15.66
Copper	318.8	63.1				63.1	44.4
Cyanide		28.7	353678.1			28.7	8.4
Iron		1303.8				1303.8	
Lead	159.9	584.5			0.0	159.9	27.2
Mercury		3.13		0.24	0.0	0.24	0.019
Nickel		1897.0		7395.1		1897.0	258.3
Selenium	78.9	25.4			0.0	25.4	6.0
Silver		49.1			0.0	49.1	
Thallium				10.1		10.1	
Zinc		481.1				481.1	589.8
Boron	1205.2					1205.2	

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	970.6	N/A	
Antimony	6912.80		
Arsenic	160.8	234.9	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	9.1	3.5	
Chromium (III)	7034.4	413	
Chromium (VI)	19.8	15.7	
Copper	63.1	44.4	
Cyanide	28.7	8.4	
Iron	1303.8		
Lead	159.9	27.2	
Mercury	0.241	0.019	
Nickel	1897.0	258	
Selenium	25.4	6.0	
Silver	49.1	N/A	
Thallium	10.1		
Zinc	481.1	589.8	Acute Controls
Boron	1205.23		

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: SVWRF_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	1.920	15.113	0.000	14.797	0.250	0.233

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	3.840	0.000	0.000	32.000	30.384

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.946

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

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_JR_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
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.

Utah Division of Water Quality
Salt Lake City, Utah

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

8-Oct-21
4:00 PM

Facilities: **South Davis Sewer District South Wastewater Treatment Plant** **UPDES No: UT-0021628**
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**	3.485 lbs/day	750.00	ug/l	30.046 lbs/day
Arsenic	150.00	ug/l	6.009 lbs/day	340.00	ug/l	13.621 lbs/day
Cadmium	2.37	ug/l	0.095 lbs/day	7.32	ug/l	0.293 lbs/day
Chromium III	266.44	ug/l	10.674 lbs/day	5574.36	ug/l	223.318 lbs/day
ChromiumVI	11.00	ug/l	0.441 lbs/day	16.00	ug/l	0.641 lbs/day
Copper	30.29	ug/l	1.213 lbs/day	51.29	ug/l	2.055 lbs/day
Iron				1000.00	ug/l	40.062 lbs/day
Lead	18.39	ug/l	0.737 lbs/day	471.90	ug/l	18.905 lbs/day
Mercury	0.0120	ug/l	0.000 lbs/day	2.40	ug/l	0.096 lbs/day
Nickel	167.38	ug/l	6.706 lbs/day	1505.50	ug/l	60.313 lbs/day
Selenium	4.60	ug/l	0.184 lbs/day	20.00	ug/l	0.801 lbs/day
Silver	N/A	ug/l	N/A lbs/day	40.50	ug/l	1.623 lbs/day
Zinc	385.16	ug/l	15.430 lbs/day	385.16	ug/l	15.430 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 396.76 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	0.20 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	24.04 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	3249.14 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	166234.93 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.11 lbs/day
Nickel			4600.00 ug/l	3475.82 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	4.76 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)	134.0	20.6	7.9	0.71	6.03	6.91	0.00	796.7
Fall	104.0	9.9	7.9	0.74	5.24	---	0.00	782.4
Winter	51.0	6.8	7.9	0.87	6.15	---	0.00	782.4
Spring	64.0	13.9	7.9	0.46	4.26	---	0.00	782.4

	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	232.00	8.03	0.39	2.58	3.31	5.01	0.0	1.53

	Hg	Ni	Se	Ag	Zn	Boron	
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	2.70	1.61	0.63	19.46	10.0	* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	4.00000	5.0	845.39	14.09829
Fall	4.00000	5.0		
Winter	4.00000	5.0		
Spring	4.00000	5.0		

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	4.000 MGD	6.188 cfs
Fall	4.000 MGD	6.188 cfs
Winter	4.000 MGD	6.188 cfs
Spring	4.000 MGD	6.188 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 4 MGD. If the discharger is allowed to have a flow greater than 4 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 >	98.5% Effluent	[Acute]
	IC25 >	20.9% 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 396.76 mg/l):

	4 Day Average Concentration		4 Day Average Load	1 Hour Average Concentration		1 Hour Average Load
Aluminum	N/A		N/A	6,358.6	ug/l	254.7 lbs/day
Arsenic	3,224.33	ug/l	69.5 lbs/day	3,934.4	ug/l	157.6 lbs/day
Cadmium	45.39	ug/l	1.0 lbs/day	82.4	ug/l	3.3 lbs/day
Chromium III	5,980.15	ug/l	128.9 lbs/day	65,902.3	ug/l	2640.1 lbs/day
Chromium VI	177.46	ug/l	3.8 lbs/day	153.4	ug/l	6.1 lbs/day
Copper	577.78	ug/l	12.5 lbs/day	552.4	ug/l	22.1 lbs/day
Iron	N/A		N/A	11,827.2	ug/l	473.8 lbs/day
Lead	383.39	ug/l	8.3 lbs/day	5,564.7	ug/l	222.9 lbs/day

Mercury	0.27	ug/l	0.0	lbs/day	28.4	ug/l	1.1 lbs/day
Nickel	3,733.48	ug/l	80.5	lbs/day	17,776.9	ug/l	712.2 lbs/day
Selenium	69.26	ug/l	1.5	lbs/day	219.1	ug/l	8.8 lbs/day
Silver	N/A	ug/l	N/A	lbs/day	472.2	ug/l	18.9 lbs/day
Zinc	8,304.47	ug/l	179.0	lbs/day	4,344.8	ug/l	174.1 lbs/day
Cyanide	117.81	ug/l	2.5	lbs/day	260.2	ug/l	10.4 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	60.6	Deg. C.	141.2	Deg. F
Fall	41.9	Deg. C.	107.4	Deg. F
Winter	24.6	Deg. C.	76.2	Deg. F
Spring	35.2	Deg. C.	95.3	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	200.3	lbs/day
Nitrates as N	4.0	mg/l	160.2	lbs/day
Total Phosphorus as P	0.05	mg/l	2.0	lbs/day
Total Suspended Solids	90.0	mg/l	3605.5	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		6358.6				6358.6	N/A
Antimony				97415.7		97415.7	
Arsenic	2265.5	3934.4			0.0	2265.5	3224.3
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	218.2	82.4			0.0	82.4	45.4
Chromium (III)		65902.3			0.0	65902.3	5980.2
Chromium (VI)	2209.6	153.4			0.0	153.37	177.46
Copper	4422.6	552.4				552.4	577.8
Cyanide		260.2	4984059.5			260.2	117.8
Iron		11827.2				11827.2	
Lead	2232.3	5564.7			0.0	2232.3	383.4
Mercury		28.39		3.40	0.0	3.40	0.272
Nickel		17776.9		104212.2		17776.9	3733.5
Selenium	1097.8	219.1			0.0	219.1	69.3
Silver		472.2			0.0	472.2	
Thallium				142.7		142.7	
Zinc		4344.8				4344.8	8304.5
Boron	16985.8					16985.8	

Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]
[If Acute is more stringent than Chronic, then the Chronic takes on the Acute value.]

	WLA Acute ug/l	WLA Chronic ug/l	
Aluminum	6358.6	N/A	
Antimony	97415.71		
Arsenic	2265.5	3224.3	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	82.4	45.4	
Chromium (III)	65902.3	5980	
Chromium (VI)	153.4	177.5	Acute Controls
Copper	552.4	577.8	Acute Controls
Cyanide	260.2	117.8	
Iron	11827.2		
Lead	2232.3	383.4	
Mercury	3.398	0.272	
Nickel	17776.9	3733	
Selenium	219.1	69.3	
Silver	472.2	N/A	
Thallium	142.7		
Zinc	4344.8	8304.5	Acute Controls
Boron	16985.78		

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: SDSWRF_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
0.830	0.000	0.852	3.450	0.000	3.498	0.250	0.261

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	4.108	0.000	0.000	32.000	33.103

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	1.037

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

8-Oct-21
4:00 PM

Facilities: **South Davis Sewer District North Wastewater Treatment Plant** **UPDES No: UT-0021636**
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**	10.456 lbs/day	750.00	ug/l	90.139 lbs/day
Arsenic	150.00	ug/l	18.028 lbs/day	340.00	ug/l	40.863 lbs/day
Cadmium	2.29	ug/l	0.275 lbs/day	7.00	ug/l	0.841 lbs/day
Chromium III	256.58	ug/l	30.837 lbs/day	5368.13	ug/l	645.167 lbs/day
ChromiumVI	11.00	ug/l	1.322 lbs/day	16.00	ug/l	1.923 lbs/day
Copper	29.12	ug/l	3.500 lbs/day	49.11	ug/l	5.903 lbs/day
Iron				1000.00	ug/l	120.185 lbs/day
Lead	17.34	ug/l	2.084 lbs/day	445.04	ug/l	53.487 lbs/day
Mercury	0.0120	ug/l	0.001 lbs/day	2.40	ug/l	0.288 lbs/day
Nickel	160.99	ug/l	19.349 lbs/day	1448.00	ug/l	174.028 lbs/day
Selenium	4.60	ug/l	0.553 lbs/day	20.00	ug/l	2.404 lbs/day
Silver	N/A	ug/l	N/A lbs/day	37.42	ug/l	4.497 lbs/day
Zinc	370.43	ug/l	44.520 lbs/day	370.43	ug/l	44.520 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 378.91 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	0.60 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	72.11 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	1681.82 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	86046.39 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.06 lbs/day
Nickel			4600.00 ug/l	1799.15 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	2.46 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)	54.0	21.2	7.9	0.36	6.03	6.82	0.00	880.9
Fall	44.0	10.1	7.9	0.57	4.80	---	0.00	954.4
Winter	26.0	5.8	8.0	0.64	5.73	---	0.00	954.4
Spring	31.0	13.5	8.0	0.26	63.16	---	0.00	954.4

	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	24.30	8.89	0.47	2.78	4.75	5.91	0.0	2.15

	Hg	Ni	Se	Ag	Zn	Boron	
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
All Seasons	0.0000	4.90	1.62	0.75	18.84	10.0	* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	12.00000	NA	982.67	49.16279
Fall	12.00000	NA		
Winter	12.00000	NA		
Spring	12.00000	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	12.000 MGD	18.564 cfs
Fall	12.000 MGD	18.564 cfs
Winter	12.000 MGD	18.564 cfs
Spring	12.000 MGD	18.564 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 12 MGD. If the discharger is allowed to have a flow greater than 12 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 >	66.3% 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 378.91 mg/l):

	4 Day Average Concentration		Load		1 Hour Average Concentration		Load	
Aluminum	N/A		N/A		1,805.5	ug/l	217.0	lbs/day
Arsenic	560.47	ug/l	36.3	lbs/day	821.6	ug/l	98.7	lbs/day
Cadmium	7.57	ug/l	0.5	lbs/day	16.5	ug/l	2.0	lbs/day
Chromium III	994.84	ug/l	64.3	lbs/day	13,171.6	ug/l	1583.0	lbs/day
Chromium VI	29.18	ug/l	1.9	lbs/day	32.4	ug/l	3.9	lbs/day
Copper	96.63	ug/l	6.3	lbs/day	111.9	ug/l	13.5	lbs/day
Iron	N/A		N/A		2,454.4	ug/l	295.0	lbs/day
Lead	61.54	ug/l	4.0	lbs/day	1,089.2	ug/l	130.9	lbs/day

Mercury	0.05	ug/l	0.0	lbs/day	5.9	ug/l	0.7 lbs/day
Nickel	615.03	ug/l	39.8	lbs/day	3,546.9	ug/l	426.3 lbs/day
Selenium	13.27	ug/l	0.9	lbs/day	46.7	ug/l	5.6 lbs/day
Silver	N/A	ug/l	N/A	lbs/day	90.7	ug/l	10.9 lbs/day
Zinc	1,393.15	ug/l	90.1	lbs/day	881.8	ug/l	106.0 lbs/day
Cyanide	20.33	ug/l	1.3	lbs/day	54.0	ug/l	6.5 lbs/day

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	31.1	Deg. C.	87.9	Deg. F
Fall	18.9	Deg. C.	66.0	Deg. F
Winter	12.6	Deg. C.	54.6	Deg. F
Spring	20.9	Deg. C.	69.6	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	600.9	lbs/day
Nitrates as N	4.0	mg/l	480.7	lbs/day
Total Phosphorus as P	0.05	mg/l	6.0	lbs/day
Total Suspended Solids	90.0	mg/l	10816.6	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		1805.5				1805.5	N/A
Antimony				16808.1		16808.1	
Arsenic	390.9	821.6			0.0	390.9	560.5
Asbestos						0.00E+00	
Barium						0.0	
Beryllium						0.0	
Cadmium	37.7	16.5			0.0	16.5	7.6
Chromium (III)		13171.6			0.0	13171.6	994.8
Chromium (VI)	382.8	32.4			0.0	32.36	29.18
Copper	764.6	111.9				111.9	96.6
Cyanide		54.0	859948.3			54.0	20.3
Iron		2454.4				2454.4	
Lead	384.6	1089.2			0.0	384.6	61.5
Mercury		5.89		0.59	0.0	0.59	0.047
Nickel		3546.9		17980.7		3546.9	615.0
Selenium	190.7	46.7			0.0	46.7	13.3
Silver		90.7			0.0	90.7	
Thallium				24.6		24.6	
Zinc		881.8				881.8	1393.2
Boron	2930.9					2930.9	

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	1805.5	N/A	
Antimony	16808.08		
Arsenic	390.9	560.5	Acute Controls
Asbestos	0.00E+00		
Barium			
Beryllium			
Cadmium	16.5	7.6	
Chromium (III)	13171.6	995	
Chromium (VI)	32.4	29.2	
Copper	111.9	96.6	
Cyanide	54.0	20.3	
Iron	2454.4		
Lead	384.6	61.5	
Mercury	0.586	0.047	
Nickel	3546.9	615	
Selenium	46.7	13.3	
Silver	90.7	N/A	
Thallium	24.6		
Zinc	881.8	1393.2	Acute Controls
Boron	2930.85		

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: SDNWRF_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
1.000	0.000	1.059	6.012	0.000	6.191	0.250	0.275

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	4.235	0.000	0.000	32.000	34.401

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	1.081

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.