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

Date: **March 10, 2016**

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 takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

<u>Discharges</u>
The following dischargers are considered in this combined wasteload analysis:
1. Jordan Basin Water Reclamation Facility (WRF)
2. South Valley Water Reclamation Facility (WRF)
3. Central Valley Water Reclamation Facility (WRF)
4. South Davis Sewer District South Wastewater Treatment Plant (WWTP)
5. South Davis Sewer District North Wastewater Treatment Plant (WWTP)

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 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 design discharge

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	22.2
Central Valley WRF	Jordan River, from North Temple Street to confluence with Little Cottonwood Creek	75	56.2
SDSD South WWTP	Jordan River, from Farmington Bay to North Temple Street	4	3.4
SDSD North WWTP	State Canal, from Farmington Bay to confluence with the Jordan River	12	7.2

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 the 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

Receiving Water	Beneficial Uses
Jordan River, from Narrows Diversion to Utah Lake	1C, 2B, 3B, 4
Jordan River, from confluence with Little Cottonwood Creek to Narrows Diversion	2B, 3A, 4
Jordan River, from North Temple Street to confluence with Little Cottonwood Creek	2B, 3B*, 4
Jordan River, from Farmington Bay to North Temple Street	2B, 3B*,3D, 4
State Canal, from Farmington Bay to confluence with the Jordan River	2B, 3B*,3D, 4
* Site specific criteria for dissolved oxygen. See UAC R317.2.14 Table 2.14.5.	

Per UAC R317-2-6, 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 Flow Analysis* report (Borup and Haws, 1999) were used for the critical low flows for the tributaries and diversions along the Jordan River. The groundwater flow in each reach of the Jordan River was modified to match the seasonal averages from the USGS groundwater model (Stantec 2010, UDWQ 2010), which match the groundwater flows used for the TMDL. The projected 5-year average flows for each POTW was used to determine upstream conditions. The critical low flows are summarized in Table 3.

Table 3: Critical low flows

	POTWs at Projected 5-YR Average		Source/Diversion Flow (cfs)				Jordan River/State Canal Flow (cfs)			
#	Source/Diversion	River Mile	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
1	Headwater - Utah Lake	51.4	709.0	16.0	16.0	501.0	709.0	16.0	16.0	501.0
2	Groundwater Segment 8	51.4 - 41.9	0.0	0.0	0.0	0.0	709.0	16.0	16.0	501.0
3	Utah Lake Distribution Canal	41.9	-125.0	0.0	0.0	-81.0	584.0	16.0	16.0	420.0
4	Utah and Salt Lake Canal	41.8	-224.0	0.0	0.0	-145.0	360.0	16.0	16.0	275.0
5	East Jordan & Draper Canal	41.8	-222.0	0.0	0.0	-150.0	138.0	16.0	16.0	125.0
6	Jordan & Salt Lake Canal	64.7	-35.0	0.0	0.0	-30.0	103.0	16.0	16.0	95.0
7	South Jordan Canal	64.7	-63.0	0.0	0.0	-85.0	40.0	16.0	16.0	10.0
8	Groundwater Segment 7	41.9 - 37.6	22.6	22.0	17.3	20.9	62.6	38.0	33.3	30.9
9	**Jordan Basin WRF**	**36.5**	**23.2**	**23.2**	**23.2**	**23.2**	**85.8**	**61.2**	**56.5**	**54.1**
10	Corner Canyon Creek	35.5	2.0	0.0	0.0	3.0	87.8	61.2	56.5	57.1
11	Beckstead Ditch	33.2	-5.0	0.0	0.0	0.0	80.8	61.2	56.5	54.1
12	Butterfield/Midas Creek	31.5	1.0	1.0	1.0	2.0	81.8	62.2	57.5	56.1
13	Willow Creek	30.8	3.0	1.0	1.0	3.0	84.8	63.2	58.5	59.1
14	Groundwater Segment 6	37.6 - 26.4	85.5	83.2	65.4	79.1	170.3	146.4	123.9	138.3
15	North Jordan Canal	28.8	-61.0	-73.0	-63.0	-62.0	109.3	73.4	60.9	76.3
16	Gardner Mill Race	28.8	-3.0	0.0	0.0	0.0	106.3	73.4	60.9	76.3
17	Dry Creek	28.6	1.0	0.0	0.0	2.0	107.3	73.4	60.9	78.3
18	9000 South Conduit	28.1	1.0	0.0	0.0	1.0	108.3	73.4	60.9	79.3
19	Bingham Creek	27.2	2.0	0.0	1.0	2.0	110.3	73.4	61.9	81.3
20	**South Valley WRF**	**25.7**	**34.3**	**34.3**	**34.3**	**34.3**	**144.7**	**107.7**	**96.3**	**115.6**
21	Little Cottonwood Creek	21.6	7.0	2.0	2.0	7.0	151.7	109.7	98.3	122.6
22	Groundwater Segment 5	26.4 - 24.9	10.1	9.8	7.7	9.3	161.8	119.5	106.0	132.0
23	Brighton Canal	21.2	-30.0	0.0	0.0	-20.0	131.8	119.5	106.0	112.0
24	Big Cottonwood Creek	20.6	15.0	8.0	13.0	16.0	146.8	127.5	119.0	128.0
25	Mill Creek	17.2	19.0	17.0	18.0	24.0	165.8	144.5	137.0	152.0
26	**Central Valley WRF**	**17.2**	**86.9**	**86.9**	**86.9**	**86.9**	**252.7**	**231.5**	**223.9**	**238.9**
27	Decker Lake Outlet	17.0	1.0	1.0	1.0	1.0	253.7	232.5	224.9	239.9
28	Groundwater Segment 4	24.9 - 15.8	14.2	14.2	14.2	14.2	267.9	246.7	239.1	254.1
29	Surplus Canal	16.0	-173.9	-183.6	-184.1	-137.1	94.0	63.0	55.0	117.0
30	1300 South Conduit	14.2	8.0	7.0	4.0	6.0	102.0	70.0	59.0	123.0
31	North Temple Conduit	11.4	1.0	0.0	1.0	2.0	103.0	70.0	60.0	125.0
32	Groundwater Segment 3	15.8 - 11.5	17.3	16.8	13.2	16.0	120.3	86.9	73.2	141.0
33	Groundwater Segment 2	11.5 - 7.1	11.1	10.8	8.5	10.3	131.4	97.7	81.7	151.3
34	**South Davis South WWTP**	**4.8**	**5.3**	**5.3**	**5.3**	**5.3**	**136.6**	**102.9**	**87.0**	**156.5**
35	Groundwater Segment 1	7.1 - 0.0	7.5	7.3	5.8	7.0	144.2	110.3	92.7	163.5
36	Burnham Dam	JR 1.7/SC 3.5	-94.2	-60.3	-27.8	-98.5	50.0	50.0	65.0	65.0
37	**South Davis North WWTP**	**SC 0.6**	**11.1**	**11.1**	**11.1**	**11.1**	**61.2**	**61.1**	**76.1**	**76.2**

Receiving and tributary water quality data were obtained from UDWQ and JRFBWQC monitoring sites. The average seasonal value was calculated for each constituent with available data in the receiving water for the period 2004 - 2014.

<u>TMDL</u>

The 303(d) list of impairments of the Jordan River and State Canal in *Utah's 2014 Integrated Report* (Utah DWQ 2014) is summarized in Table 4. 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.

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

Assessment Unit	Assessment Unit Description	Parameter
State Canal	State Canal from Farmington Bay to confluence with the Jordan River	Dissolved Oxygen
Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line	Dissolved Oxygen Bioassessment
Jordan River 2	Jordan River from Davis County line upstream to North Temple Street	Dissolved Oxygen E. coli
Jordan River-3	Jordan River from North Temple to 2100 South	Dissolved Oxygen
Jordan River-4	Jordan River from 2100 South to the confluence with Little Cottonwood Creek	E. coli Bioassessment
Jordan River-5	Jordan River from the confluence with Little Cottonwood Creek to 7800 South	Temperature Total Dissolved Solids
Jordan River-6	Jordan River from 7800 South to Bluffdale at 14600 South	Dissolved Oxygen Selenium Temperature Total Dissolved Solids
Jordan River-7	Jordan River from Bluffdale at 14600 South to Narrows	Temperature
Jordan River-8	Jordan River from Narrows to Utah Lake	Arsenic Total Dissolved Solids

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 actual length of the mixing zone was not determined; however, it 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 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 broken at Burnham Dam (approximately 1.7

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

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

A simple mass balance spreadsheet tool was developed to calculate the WLA for conservative constituents such as metals. The limiting flow condition at each facility was the winter season, which was used for the allocation. Each plant was granted a full allocation at the point of discharge. Background condition for each plant was characterized by assuming each upstream plant was operating at the projected 5-year average flow rate with 80th percentile metal concentration in the effluent. Since in-stream and/or facility effluent concentrations were not available for chromium III, chromium VI, and cyanide, and the detection level was too high for mercury, effluent limits were not updated for these metals; therefore, the limits in the 2004 WLA are shown and monitoring should be required for these metals.

Since the critical low flows and design discharge remained the same as in the current WLA, the effluent limits for total residual chlorine (TRC) were not revised. TRC limits only apply to South Valley WRF, SDSD South WWTP and SDSD North WWTP.

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

<u>WET Limits</u>
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. 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 WRFr	41%
South Valley WRF	53%
Central Valley WRF	40%
SDSD South WWTP	7%
SDSD North WWTP	22%

Effluent Limits

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

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)	Daily					
Summer (Jul-Sep)		13.0	10.8	13.1	30.0	31.7
Fall (Oct-Dec)		12.6	9.0	16.4	40.0	16.2
Winter (Jan-Mar)		13.0	9.4	13.3	40.0	23.4
Spring (Apr-Jun)		10.9	7.4	25.1	30.0	26.8
Ammonia Chronic (mg/L)	Monthly					
Summer (Jul-Sep)		3.7	4.0	5.8	8.0[b]	8.0[b]
Fall (Oct-Dec)		5.6	4.0	7.2	7.5[b]	7.5[b]
Winter (Jan-Mar)		4.4	4.0	5.8	7.0[b]	7.0[b]
Spring (Apr-Jun)		4.8	4.5	8.5	12.0[b]	12.0[b]
TRC Acute (mg/L)	Daily					
Summer (Jul-Sep)		N/A	0.030	N/A	0.310	0.090
Fall (Oct-Dec)		N/A	0.027	N/A	0.180	0.060
Winter (Jan-Mar)		N/A	0.028	N/A	0.170	0.070
Spring (Apr-Jun)		N/A	0.027	N/A	0.070	0.060
DO (mg/L)	Minimum	5.0	5.0	5.0	5.0	5.0
BOD_5/$CBOD_5$ (mg/L)	Monthly	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)		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)	Weekly	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)		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
TDS (mg/L)[1]	Daily	1,200	1,200	---	---	---
Temperature (deg C)[a]	Maximum	20.0	20.0	---	---	---

a: Limit due to impairment of receiving segment.
b: Chronic ammonia allocation for SDSD plants to be superseded by wasteload analysis with revised assumptions.

QUAL2Kw rates, input and output are summarized in Appendix A. The WQBELs for conservative constituents are summarized in Appendix B. Models and supporting documentation are available for review upon request.

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Files:
WLA Document: *jordan_river_potw_wla_2015_final_2016-01-27.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_2015.xlsm*
Metals Wasteload Model: *jordan_potw_metals_wla_2015.xlsx*

References:

Borup, B. and N. Haws. 1999. *Jordan River Flow Analysis*. Brigham Young University, Civil and Environmental Engineering Department, Provo, Utah. Prepared for State of Utah, Department of Environmental Quality, Division of Water Quality.

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.

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. 2012. *Utah Wasteload Analysis Procedures Version 1.0*. State of Utah, Department of Environmental Quality, Division of Water Quality.

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

Utah DWQ. 2014. *Utah's 2014 Integrated Report*. October 2014 Draft. State of Utah, Department of Environmental Quality, Division of Water Quality.

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WASTELOAD ANALYSIS [WLA]
Appendix A: QUAL2Kw Analysis for Ammonia

Date: 1/27/2016

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

Fully Mixed:	No
Acute River Width:	50%
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)	709.0	16.0	16.0	501.0
Temperature, Mean (deg C)	21.5	9.7	4.2	15.2
Temperature, Diel Range (deg C)	3.0	2.5	2.0	2.5
Specific Conductance (μmhos)	1635	1750	1729	1374
Inorganic Suspended Solids (mg/L)	73.5	21.7	17.1	40.4
Dissolved Oxygen, Mean (mg/L)	6.1	9.0	11.7	8.0
Dissolved Oxygen, Diel Range (mg/L)	2.5	2.0	1.5	2.0
$CBOD_5$ (mg/L)	3.0	3.0	3.0	3.0
Organic Nitrogen (mg/L)	0.900	0.900	0.900	0.900
NH4-Nitrogen (mg/L)	0.297	0.290	0.165	0.104
NO3-Nitrogen (mg/L)	0.800	0.800	0.800	0.800
Organic Phosphorus (mg/L)	0.052	0.012	0.018	0.017
Inorganic Ortho-Phosphorus (mg/L)	0.045	0.035	0.040	0.040
Phytoplankton (μg/L)	27.3	9.0	15.0	8.1
Detritus [POM] (mg/L)	17.9	6.3	7.9	9.3
Alkalinity (mg/L)	188	192	213	200
pH	8.4	8.0	8.1	8.4

Discharge Information - Jordan Basin WRF

Chronic	**Summer**	**Fall**	**Winter**	**Spring**
Flow (MGD)	10.1	10.5	9.9	9.3
Temperature (deg C)	22.1	18.7	15.6	18.3
Specific Conductance (μmhos)	1791	1791	1791	1791
Inorganic Suspended Solids (mg/L)	1.5	1.5	1.5	1.5
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)	0.500	0.500	0.500	0.500
NH4-Nitrogen (mg/L)	0.158	0.158	0.158	0.158
NO3-Nitrogen (mg/L)	7.800	7.800	7.800	7.800
Organic Phosphorus (mg/L)	0.080	0.080	0.080	0.080
Inorganic Ortho-Phosphorus (mg/L)	0.320	0.320	0.320	0.320
Phytoplankton (μg/L)	0.400	0.400	0.400	0.400
Detritus [POM] (mg/L)	0.5	0.5	0.5	0.5
Alkalinity (mg/L)	200	200	200	200
pH	7.5	7.5	7.5	7.5

Acute	**Summer**	**Fall**	**Winter**	**Spring**
Flow (MGD)	15.0	15.0	15.0	15.0
pH	8.8	7.6	7.6	7.8

Discharge Information - South Valley WRF

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	21.7	20.7	20.2	20.3
Temperature (deg C)	22.0	18.1	14.4	18.0
Specific Conductance (μmhos)	1557	1487	1605	1517
Inorganic Suspended Solids (mg/L)	6.0	6.0	6.0	6.0
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)	1.250	1.250	1.250	1.250
NH4-Nitrogen (mg/L)	0.086	0.113	0.135	0.113
NO3-Nitrogen (mg/L)	17.000	17.000	17.000	17.000
Organic Phosphorus (mg/L)	0.400	0.200	0.300	0.500
Inorganic Ortho-Phosphorus (mg/L)	2.700	3.100	2.800	2.700
Phytoplankton (μg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	191	169	169	180
pH	7.5	7.5	7.5	7.5

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	50.0	50.0	50.0	50.0
pH	7.9	7.9	7.9	8.2

Discharge Information - Central Valley WRF

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	51.8	49.7	51.1	56.9
Temperature (deg C)	21.8	16.1	12.8	16.9
Specific Conductance (μmhos)	1335	1314	1403	1403
Inorganic Suspended Solids (mg/L)	5.5	5.5	5.5	5.5
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)	2.000	2.000	2.000	2.000
NH4-Nitrogen (mg/L)	1.247	1.269	2.266	0.990
NO3-Nitrogen (mg/L)	12.500	12.500	12.500	12.500
Organic Phosphorus (mg/L)	0.200	0.200	0.400	0.300
Inorganic Ortho-Phosphorus (mg/L)	2.900	2.800	2.600	2.700
Phytoplankton (μg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	168	169	177	179
pH	7.3	7.4	7.2	7.2

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	75.0	75.0	75.0	75.0
pH	7.5	7.6	7.6	7.7

Discharge Information - South Davis Sewer District South WWTP

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	4.0	4.0	4.0	4.0
Temperature (deg C)	23.0	16.7	12.6	18.7
Specific Conductance (μmhos)	2733	2722	2923	2808
Inorganic Suspended Solids (mg/L)	12.0	12.0	12.0	12.0
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)	2.000	2.000	2.000	2.000
NH4-Nitrogen (mg/L)	8.000	7.500	7.000	12.000
NO3-Nitrogen (mg/L)	10.000	10.000	10.000	10.000
Organic Phosphorus (mg/L)	0.500	0.400	0.800	0.500
Inorganic Ortho-Phosphorus (mg/L)	1.100	1.000	1.000	1.200
Phytoplankton (μg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	296	294	334	300
pH	7.5	7.4	7.5	7.6

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	4.0	4.0	4.0	4.0
pH	7.8	7.7	7.7	7.9

Discharge Information - South Davis Sewer District North WWTP

Chronic	Summer	Fall	Winter	Spring
Flow (MGD)	12.0	12.0	12.0	12.0
Temperature (deg C)	23.4	18.2	12.4	17.4
Specific Conductance (μmhos)	1856	2047	2032	1908
Inorganic Suspended Solids (mg/L)	4.0	4.0	4.0	4.0
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)	3.500	3.500	3.500	3.500
NH4-Nitrogen (mg/L)	8.000	7.500	7.000	12.000
NO3-Nitrogen (mg/L)	8.000	8.000	8.000	8.000
Organic Phosphorus (mg/L)	0.822	2.007	1.607	0.666
Inorganic Ortho-Phosphorus (mg/L)	1.169	1.702	1.698	1.386
Phytoplankton (μg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	14.0	14.0	14.0	14.0
Alkalinity (mg/L)	300	300	300	300
pH	7.1	7.2	7.2	7.3

Acute	Summer	Fall	Winter	Spring
Flow (MGD)	12.0	12.0	12.0	12.0
pH	7.5	7.5	7.4	7.5

Tributary - Little Cottonwood Creek	Summer	Fall	Winter	Spring
Flow (cfs)	7.0	2.0	2.0	7.0
Temperature, Mean (deg C)	17.9	6.4	4.4	9.2
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1399	1348	1944	504
Inorganic Suspended Solids (mg/L)	27.1	8.4	6.6	25.1
Dissolved Oxygen, Mean (mg/L)	8.1	9.9	11.5	10.6
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.2	3.2	4.5	3.0
Organic Nitrogen (mg/L)	0.650	0.650	0.650	0.650
NH4-Nitrogen (mg/L)	0.100	0.100	0.100	0.100
NO3-Nitrogen (mg/L)	0.700	0.700	0.700	0.700
Organic Phosphorus (mg/L)	0.020	0.010	0.010	0.020
Inorganic Ortho-Phosphorus (mg/L)	0.040	0.030	0.030	0.030
Phytoplankton (μg/L)	25.0	4.7	11.5	11.1
Detritus [POM] (mg/L)	8.3	7.8	10.3	7.8
Alkalinity (mg/L)	173	239	218	123
pH	8.3	8.0	7.9	8.2

Tributary - Big Cottonwood Creek	Summer	Fall	Winter	Spring
Flow (cfs)	15.0	8.0	13.0	16.0
Temperature, Mean (deg C)	18.1	7.7	5.7	9.4
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1241	1083	1554	449
Inorganic Suspended Solids (mg/L)	20.7	7.0	8.3	21.5
Dissolved Oxygen, Mean (mg/L)	8.7	10.2	11.1	10.3
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.0	3.0	4.0	3.0
Organic Nitrogen (mg/L)	0.600	0.600	0.600	0.600
NH4-Nitrogen (mg/L)	0.060	0.060	0.060	0.060
NO3-Nitrogen (mg/L)	0.500	0.500	0.500	0.500
Organic Phosphorus (mg/L)	0.010	0.005	0.010	0.010
Inorganic Ortho-Phosphorus (mg/L)	0.040	0.025	0.030	0.030
Phytoplankton (μg/L)	19.4	5.6	9.1	7.5
Detritus [POM] (mg/L)	7.8	9.1	10.3	7.6
Alkalinity (mg/L)	186	197	224	121
pH	8.4	8.1	8.1	8.2

Tributary - Mill Creek above CVWRF	Summer	Fall	Winter	Spring
Flow (cfs)	9.5	6.4	7.6	14.0
Temperature, Mean (deg C)	18.2	7.9	8.2	12.1
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1128	1049	1028	902
Inorganic Suspended Solids (mg/L)	13.6	16.7	12.9	11.9
Dissolved Oxygen, Mean (mg/L)	8.0	9.7	11.9	9.4
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.0	3.0	3.0	3.7
Organic Nitrogen (mg/L)	0.600	0.600	0.600	0.600
NH4-Nitrogen (mg/L)	0.050	0.050	0.050	0.050
NO3-Nitrogen (mg/L)	1.500	1.500	1.500	1.500
Organic Phosphorus (mg/L)	0.020	0.025	0.015	0.005
Inorganic Ortho-Phosphorus (mg/L)	0.040	0.025	0.030	0.045
Phytoplankton (μg/L)	8.0	2.2	4.4	3.1
Detritus [POM] (mg/L)	7.5	5.7	12.2	8.4
Alkalinity (mg/L)	218	244	238	200
pH	7.9	7.9	7.8	7.9

Tributary - Decker Lake Outlet	Summer	Fall	Winter	Spring
Flow (cfs)	8.5	8.5	8.5	8.5
Temperature, Mean (deg C)	20.2	6.8	5.0	16.1
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1777	2248	2387	1661
Inorganic Suspended Solids (mg/L)	48.1	36.0	14.6	38.1
Dissolved Oxygen, Mean (mg/L)	6.5	10.7	13.7	8.0
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	4.6	3.1	3.2	4.4
Organic Nitrogen (mg/L)	0.930	0.930	0.930	0.930
NH4-Nitrogen (mg/L)	0.140	0.140	0.140	0.140
NO3-Nitrogen (mg/L)	1.200	1.200	1.200	1.200
Organic Phosphorus (mg/L)	0.030	0.020	0.025	0.040
Inorganic Ortho-Phosphorus (mg/L)	0.070	0.050	0.040	0.050
Phytoplankton (μg/L)	19.0	19.0	19.0	19.0
Detritus [POM] (mg/L)	10.4	5.5	11.7	8.2
Alkalinity (mg/L)	235	255	252	214
pH	8.2	8.3	8.3	8.2

Tributary - 1300 South Drain	Summer	Fall	Winter	Spring
Flow (cfs)	2.0	1.5	1.0	1.5
Temperature, Mean (deg C)	19.5	12.3	9.0	12.3
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1106	1061	1632	605
Inorganic Suspended Solids (mg/L)	11.0	11.0	11.0	11.0
Dissolved Oxygen, Mean (mg/L)	6.9	6.9	6.9	6.9
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.3	2.3	2.3	2.3
Organic Nitrogen (mg/L)	0.370	0.370	0.370	0.370
NH4-Nitrogen (mg/L)	0.020	0.020	0.020	0.020
NO3-Nitrogen (mg/L)	0.850	0.850	0.850	0.850
Organic Phosphorus (mg/L)	0.050	0.050	0.050	0.050
Inorganic Ortho-Phosphorus (mg/L)	0.000	0.000	0.000	0.000
Phytoplankton (μg/L)	2.5	0.9	0.8	0.7
Detritus [POM] (mg/L)	3.4	3.4	3.4	3.4
Alkalinity (mg/L)	210	210	210	210
pH	8.1	8.1	8.1	8.1

Tributary - 900 South Drain	Summer	Fall	Winter	Spring
Flow (cfs)	6.0	5.5	3.0	4.5
Temperature, Mean (deg C)	20.9	12.6	9.0	12.6
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1106	1061	1632	605
Inorganic Suspended Solids (mg/L)	31.7	31.7	31.7	31.7
Dissolved Oxygen, Mean (mg/L)	7.5	7.5	7.5	7.5
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	2.1	2.1	2.1	2.1
Organic Nitrogen (mg/L)	0.600	0.600	0.600	0.600
NH4-Nitrogen (mg/L)	0.090	0.090	0.090	0.090
NO3-Nitrogen (mg/L)	1.750	1.750	1.750	1.750
Organic Phosphorus (mg/L)	0.110	-0.890	-1.890	-2.890
Inorganic Ortho-Phosphorus (mg/L)	0.150	1.150	2.150	3.150
Phytoplankton (μg/L)	2.5	0.9	0.8	0.7
Detritus [POM] (mg/L)	8.1	8.1	8.1	8.1
Alkalinity (mg/L)	250	250	250	250
pH	7.9	7.9	7.9	7.9

Tributary - North Temple Drain	Summer	Fall	Winter	Spring
Flow (cfs)	1.0	0.0	1.0	2.0
Temperature, Mean (deg C)	19.3	9.1	9.6	10.7
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1106	1061	1632	605
Inorganic Suspended Solids (mg/L)	4.8	1.9	5.5	12.8
Dissolved Oxygen, Mean (mg/L)	7.9	9.0	8.9	9.5
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.0	3.3	3.0	3.2
Organic Nitrogen (mg/L)	0.700	0.700	0.700	0.700
NH4-Nitrogen (mg/L)	0.050	0.050	0.050	0.050
NO3-Nitrogen (mg/L)	1.200	1.200	1.200	1.200
Organic Phosphorus (mg/L)	0.010	0.005	0.000	0.010
Inorganic Ortho-Phosphorus (mg/L)	0.030	0.025	0.020	0.040
Phytoplankton (μg/L)	2.5	0.9	0.8	0.7
Detritus [POM] (mg/L)	2.5	2.5	2.5	2.5
Alkalinity (mg/L)	238	239	252	222
pH	8.0	8.5	8.1	8.3

Minor Tributaries - Quality	Summer	Fall	Winter	Spring
Temperature, Mean (deg C)	19.6	12.9	12.3	14.8
Temperature, Diel Range (deg C)	0.0	0.0	0.0	0.0
Specific Conductance (μmhos)	1671	2022	2281	1614
Inorganic Suspended Solids (mg/L)	63.3	31.2	18.8	86.8
Dissolved Oxygen, Mean (mg/L)	7.6	8.9	9.7	9.4
Dissolved Oxygen, Diel Range (mg/L)	0.0	0.0	0.0	0.0
$CBOD_5$ (mg/L)	3.0	3.0	3.0	3.0
Organic Nitrogen (mg/L)	0.930	0.930	0.930	0.930
NH4-Nitrogen (mg/L)	0.070	0.070	0.070	0.070
NO3-Nitrogen (mg/L)	3.200	3.200	3.200	3.200
Organic Phosphorus (mg/L)	0.045	0.020	0.020	0.085
Inorganic Ortho-Phosphorus (mg/L)	0.055	0.050	0.040	0.050
Phytoplankton (μg/L)	0.0	0.0	0.0	0.0
Detritus [POM] (mg/L)	10.9	5.0	7.2	10.6
Alkalinity (mg/L)	252	325	362	277
pH	8.1	8.1	8.0	7.9

Minor Tributaries - Flow (MGD)	Summer	Fall	Winter	Spring
Corner Canyon Creek	2.0	0.0	0.0	3.0
Midas Creek (Butterfield)	1.0	1.0	1.0	2.0
Willow Creek	3.0	1.0	1.0	3.0
Dry Creek	1.0	0.0	0.0	2.0
9000 South Conduit	1.0	0.0	0.0	1.0
Bingham Creek	2.0	0.0	0.0	2.0

Diversions - Flow (cfs)	Summer	Fall	Winter	Spring
Jordan Valley Pump Station	-14.5	-13.0	-13.0	-14.5
Utah Lake Distribution Canal	-125.0	0.0	0.0	-81.0
Utah & Salt Lake Canal	-224.0	0.0	0.0	-145.0
East Jordan & Draper Canal	-222.0	0.0	0.0	-150.0
South Jordan Canal	-63.0	0.0	0.0	-85.0
Jordan & Salt Lake Canal	-35.0	0.0	0.0	-30.0
Beckstead Ditch	-5.0	0.0	0.0	0.0
North Jordan Canal	-61.0	-73.0	-63.0	-62.0
Gardner Mill Race	-3.0	0.0	0.0	0.0
Brighton Canal	-30.0	0.0	0.0	-20.0
Surplus Canal	-239.2	-249.7	-274.2	-207.7
Jordan River at Burnham Dam	-76.0	-43.0	-17.5	-83.0

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 8	12.9	12.9	12.9	12.9
Segment 7	21.5	21.5	21.5	21.5
Segment 6	81.2	81.2	81.2	81.2
Segment 5	9.6	9.6	9.6	9.6
Segment 4	14.2	14.2	14.2	14.2
Segment 3	16.4	16.4	16.4	16.4
Segment 2	0.0	0.0	0.0	0.0
Segment 1	0.0	0.0	0.0	0.0

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	Standard	Summer	Fall	Winter	Spring
Flow (MGD)	N/A				
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)	Varies				
Jordan Basin WRF		3.7	5.6	4.4	4.8
South Valley WRF		4.0	4.0	4.0	4.5
Central Valley WRF		5.8	7.2	5.8	8.5
SDSD South WWTP		8.0	7.5	7.0	12.0
SDSD North WWTP		8.0	7.5	7.0	12.0

Acute	Standard	Summer	Fall	Winter	Spring
Flow (MGD)	N/A				
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)	Varies				
Jordan Basin WRF		13.0	12.6	13.0	10.9
South Valley WRF		10.6	8.9	9.4	7.2
Central Valley WRF		13.1	16.4	13.3	25.1
SDSD South WWTP		30.0	40.0	40.0	30.0
SDSD North WWTP		31.7	16.2	23.4	26.8

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

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	61.9	29.9	24.9	46.3
Max. Air Temperature, F	90.4	50.0	43.4	72.0
Dew Point, Temp., F	58.6	35.0	30.3	48.5
Wind, ft./sec. @ 21 ft.	9.8	7.5	7.6	9.2
Cloud Cover, %	10%	10%	10%	10%

WASTELOAD ANALYSIS [WLA] Date: 3/10/2016

Appendix B: Mass Balance Mixing Analysis for Conservative Constituents

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

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

Modeling Information

A mass balance 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.

Winter season was considered limiting conditions.

Model Inputs

The following were utilized as inputs for the analysis.

Discharge (MGD)	Design	Projected 5-YR Ave
Jordan Basin WRF	15	15
South Valley WRF	50	22.2
Central Valley WRF	75	56.2
SDSD South WWTP	4	3.4
SDSD North WWTP	12	7.2

Flow and Hardness		Jordan River/State Canal Flow (cfs)				Hardness (mg/L)	
Source	Type	Summer	Fall	Winter	Spring	Source	River
Headwater - Utah Lake	Source	709.0	16.0	16.0	501.0	381.3	381.3
Groundwater Segment 8	Source	709.0	16.0	16.0	501.0	300.0	381.3
Utah Lake Distribution Canal	Diversion	584.0	16.0	16.0	420.0		381.3
Utah and Salt Lake Canal	Diversion	360.0	16.0	16.0	275.0		381.3
East Jordan & Draper Canal	Diversion	138.0	16.0	16.0	125.0		381.3
Jordan & Salt Lake Canal	Diversion	103.0	16.0	16.0	95.0		381.3
South Jordan Canal	Diversion	40.0	16.0	16.0	10.0		381.3
Groundwater Segment 7	Source	62.6	38.0	33.3	30.9	300.0	339.1
Jordan Basin WRF	Source	85.8	61.2	56.5	54.1	294.2	345.6
Corner Canyon Creek	Source	87.8	61.2	56.5	57.1	300.0	381.3
Beckstead Ditch	Diversion	80.8	61.2	56.5	54.1		345.6
Butterfield/Midas Creek	Source	81.8	62.2	57.5	56.1	743.0	352.5
Willow Creek	Source	84.8	63.2	58.5	59.1	300.0	351.6
Groundwater Segment 6	Source	170.3	146.4	123.9	138.3	300.0	324.3
North Jordan Canal	Diversion	109.3	73.4	60.9	76.3		351.6
Gardner Mill Race	Diversion	106.3	73.4	60.9	76.3		351.6
Dry Creek	Source	107.3	73.4	60.9	78.3	300.0	351.6
9000 South Conduit	Source	108.3	73.4	60.9	79.3	300.0	351.6
Bingham Creek	Source	110.3	73.4	61.9	81.3	617.9	355.9
South Valley WRF	Source	144.7	107.7	96.3	115.6	294.2	333.9
Little Cottonwood Creek	Source	151.7	109.7	98.3	122.6	296.4	333.1
Groundwater Segment 5	Source	161.8	119.5	106.0	132.0	300.0	330.7
Brighton Canal	Diversion	131.8	119.5	106.0	112.0		330.7
Big Cottonwood Creek	Source	146.8	127.5	119.0	128.0	270.5	324.1
Mill Creek	Source	165.8	144.5	137.0	152.0	367.5	329.8
Central Valley WRF	Source	252.7	231.5	223.9	238.9	290.8	314.7
Decker Lake Outlet	Source	253.7	232.5	224.9	239.9	408.4	315.1
Groundwater Segment 4	Source	267.9	246.7	239.1	254.1	300.0	314.2
Surplus Canal	Diversion	94.0	63.0	55.0	117.0		314.2
1300 South Conduit	Source	102.0	70.0	59.0	123.0	300.0	313.2
North Temple Conduit	Source	103.0	70.0	60.0	125.0	344.1	313.8
Groundwater Segment 3	Source	120.3	86.9	73.2	141.0	300.0	311.3
Groundwater Segment 2	Source	131.4	97.7	81.7	151.3	300.0	310.1
South Davis South WWTP	Source	136.6	102.9	87.0	156.5	355.5	312.8
Groundwater Segment 1	Source	144.2	110.3	92.7	163.5	300.0	312.0
Burnham Dam	Diversion	50.0	50.0	65.0	65.0		312.0
South Davis North WWTP	Source	61.2	61.1	76.1	76.2	355.5	318.4

Effluent Limitations

Total Recoverable Metals (ug/L)

Facility	Metal	Chronic	Acute	Metal	Chronic	Acute
Jordan Basin	Aluminum	N/A	1,276	Iron	N/A	1,709
South Valley	Aluminum	N/A	1,045	Iron	N/A	1,395
Central Valley	Aluminum	N/A	1,184	Iron	N/A	1,575
South Davis South Plant	Aluminum	N/A	5,597	Iron	N/A	7,399
South Davis North Plant	Aluminum	N/A	2,035	Iron	N/A	2,691
Jordan Basin	Arsenic[a]	356	167	Lead	36.1	617
South Valley	Arsenic[a]	268	139	Lead	24.5	470
Central Valley	Arsenic[a]	323	157	Lead	28.6	531
South Davis South Plant	Arsenic[a]	2,096	743	Lead	183.9	2,586
South Davis North Plant	Arsenic[a]	661	268	Lead	60.4	970
Jordan Basin	Cadmium	1.5	11.9	Mercury[b]	0.035	0.405
South Valley	Cadmium	1.1	9.2	Mercury[b]	0.026	0.328
Central Valley	Cadmium	1.3	10.4	Mercury[b]	0.028	0.400
South Davis South Plant	Cadmium	7.8	50.1	Mercury[b]	0.361	4.685
South Davis North Plant	Cadmium	2.5	18.8	Mercury[b]	0.099	1.249
Jordan Basin	Chromium III[b]	651	9,178	Nickel	359	2,153
South Valley	Chromium III[b]	462	7,060	Nickel	250	1,685
Central Valley	Chromium III[b]	494	8,123	Nickel	294	1,902
South Davis South Plant	Chromium III[b]	6,406	71,450	Nickel	1,912	9,179
South Davis North Plant	Chromium III[b]	1,759	20,672	Nickel	621	3,420
Jordan Basin	Chromium VI[b]	24.3	27.4	Selenium	9.7	30.7
South Valley	Chromium VI[b]	19.3	23.1	Selenium	7.6	25.3
Central Valley	Chromium VI[b]	20.4	26.0	Selenium	8.7	28.4
South Davis South Plant	Chromium VI[b]	217.1	197.8	Selenium	52.0	132.5
South Davis North Plant	Chromium VI[b]	62.5	60.0	Selenium	16.8	48.4
Jordan Basin	Chromium[a]	N/A	170.3	Silver	N/A	48.0
South Valley	Chromium[a]	N/A	139.1	Silver	N/A	35.9
Central Valley	Chromium[a]	N/A	157.7	Silver	N/A	40.2
South Davis South Plant	Chromium[a]	N/A	746.7	Silver	N/A	195.2
South Davis North Plant	Chromium[a]	N/A	270.9	Silver	N/A	75.1
Jordan Basin	Copper	63.5	70.7	Zinc	816	543
South Valley	Copper	43.6	55.0	Zinc	569	425
Central Valley	Copper	49.7	61.0	Zinc	651	470
South Davis South Plant	Copper	309.6	285.0	Zinc	4,149	2,190
South Davis North Plant	Copper	102.0	108.2	Zinc	1,364	832
Jordan Basin	Cyanide[b]	15.1	42.9			
South Valley	Cyanide[b]	11.4	35.0			
Central Valley	Cyanide[b]	12.2	40.3			
South Davis South Plant	Cyanide[b]	354.6	354.6			
South Davis North Plant	Cyanide[b]	43.3	102.6			

a: Acute limit is to meet agricultural beneficial use

b: Limits are from 2004 WLA; monitoring required to update.