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

Date: **January 9, 2018**

Facility: **Price River Water Improvement District Wastewater Treatment Plant**
Wellington, UT
UPDES No. UT0021814

Receiving Water: **Price River (2B, 3C, 4)**

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge
Outfall 001: Price River

The maximum daily discharge projected to occur during the next 5 years is 3.0 MGD and the maximum mean monthly discharge is 2.2 MGD, as provided by the facility.

Receiving Water
The receiving water for Outfall 001 is the Price River, which is tributary to the Green River, and then the Colorado River.

Per UAC R317-2-13.1.b, the designated beneficial uses for the Price River from the confluence with the Green River to the Carbon Canal Diversion at Price City Golf Course are 2B, 3C, and 4.

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

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten year return frequency (7Q10). Due to a lack of flow records for the Price River downstream of the irrigation diversions, the 20th percentile of flow measurements from water quality monitoring conducted above the facility outfall was calculated

to estimate the annual critical flow in the receiving water. Insufficient flow data was available to estimate seasonal low flow. The annual critical low flow was estimated to be 13.25 cfs.

TMDL

A TMDL for total dissolved solids (TDS) was completed for this segment of the Price River (*Price River, San Rafael River, and Muddy Creek TMDLs for Total Dissolved Solids, West Colorado Watershed Management Unit, Utah;* EPA Approval Date August 4, 2004). A site specific standard was recommended for TDS. Per UAC R317-2-14 Table 2.14.1, a site specific standard of 1,700 mg/L applies to the Price River and tributaries from Soldier Creek to Carbon Canal Diversion.

According to the 303(d) list in the *2016 Utah Integrated Report*, the assessment unit Price River and tributaries (excluding Gordon Creek and Pinnacle Wash) from Coal Creek confluence to Carbon Canal Diversion was listed as impaired for total boron, dissolved selenium and total ammonia. However, the monitoring site immediately above the wastewater treatment plant, 4932390 Price River above Price WWTP at Wellington Bridge, was found to be meeting the criteria for total boron, dissolved selenium and total ammonia. Therefore, standard procedures were used to determine the WQBELs for these constituents.

Mixing Zone

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

Based on field observations of specific conductivity across the cross-section during the data collection for the synoptic survey, the discharge was fully mixed approximately 250 feet downstream of the discharge point. Therefore, the allowable mixing zone is 250 feet. The critical low flow was used for chronic conditions and 50% of the critical low flow was simulated for acute conditions.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), total dissolved solids (TDS), dissolved oxygen (DO), BOD_5, total phosphorus (TP), total nitrogen (TN), total ammonia (NH3), E. coli, pH, and total residual chlorine (TRC), as determined in consultation with the UPDES Permit Writer.

Water Quality Modeling

A QUAL2Kw model of the receiving water was built and calibrated under contract by Utah State University (USU). The model was calibrated to synoptic survey data collected in the summer of 2010 (8/30 to 9/1/2010) by USU and DWQ (Neilson et al., 2012). The model extends from immediately above the plant discharge to the crossing at Ridge Road (approximately 0.8 km). For the purposes of the WLA, the model was extended to the dam along Farnham Road (approximately 1.85 km).

Receiving water quality data was obtained from monitoring site 4992390 Price River above Price WWTP at Wellington Bridge. The average seasonal value was calculated for each constituent with available data in the receiving water. Data from 4932180 Soldier Creek at US50-6 Crossing and 4932200 Coal Creek at US50-6 Crossing were used to characterize the tributaries. Effluent nutrient data was obtained from the Discharge Monthly Reports.

The QUAL2Kw model was used for determining the WQBELs for parameters related to eutrophication and in-stream DO criteria, as well as ammonia toxicity. Effluent concentrations were adjusted so that water quality standards were not exceeded in the receiving water. Where WQBELs exceeded secondary standards or technology based effluent limits (TBEL), the concentration in the model was set at the secondary standard or TBEL.

The QUAL2Kw model was also used to determine the limits for ammonia. The water quality standard for chronic ammonia toxicity is dependent on temperature and pH, and the water quality standard for acute ammonia toxicity is dependent on pH. QUAL2Kw rates, input and output for DO and eutrophication related constituents are summarized in Appendix A.

A mass balance mixing analysis was conducted for conservative constituents such as dissolved metals. The WQBELs for conservative constituents are summarized in Appendix B.

The limits for total residual chlorine were determined assuming a decay rate of 20 /day (at 20 ºC) and a travel time of 10 minutes in the outlet ditch prior to discharge to the Price River. The analysis for TRC is summarized in Appendix C.

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

Table 1: WET Limits for IC_{25}

Season	Percent Effluent
Annual	32%

Effluent Limits

The effect of the effluent on the DO in the receiving water was evaluated using the QUAL2Kw model. A DO sag downstream in the Price River resulting from the plant discharge was observed and predicted by the model due to decay of BOD in the effluent and benthic algal growth and decomposition resulting from nutrients in the effluent. However, the DO sag was not predicted

to exceed water quality criteria and recovery occurs within the model extents. The benthic algae growth appeared to be limited by light as a result of high turbidity due to suspended solids. Therefore, limits beyond secondary standards are not required for DO and BOD_5 (Table 2).

The acute limit for ammonia from the previous permit was verified to meet water quality criteria in the receiving water, but was not raised due to antidegradation considerations.

The complete list of WQBELs is listed in Appendices A, B, and C.

Table 2: Selected WQBELs

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)	N/A	3.0	1 day	N/A	2.2	30 days
Ammonia (mg/L)[1]						
Summer (Jul-Sep)					7.5	
Fall (Oct-Dec)	Varies[2]	16.0	1 hour	Varies[3]	9.0	30 days
Winter (Jan-Mar)					9.5	
Spring (Apr-Jun)					9.5	
Total Residual Chlorine (mg/L)	0.019	0.051	1 hour	0.011	0.060	4 days
Dissolved Oxygen Min. (mg/L)	3.0	5.0	Instantaneous	5.0	5.0	30 days
BOD_5 (mg/L)	N/A	35	7 days	N/A	25	30 days

1: Ammonia limit due to toxicity requirements.
2: Standard varies with pH.
3: Standard varies with pH and temperature.

Antidegradation Level I Review

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

A Level II Antidegradation Review (ADR) is not required for this discharge, as pollutant concentration and load are not proposed to increase under this permit renewal.

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Documents

- WLA Document: *price_potw_wla_projected_flow_2018-01-09.docx*
- QUAL2Kw Calibration Model: *Qual2kw Price Calibration 1.1.xls*
- QUAL2Kw Wasteload Model: *price_potw_wla_2017.xlsm*

References:

- *Using QUAL2K Modeling to Support Nutrient Criteria Development and Wasteload Analyses in Utah*. 2012. Neilson, B.T., A.J. Hobson, N. von Stackelberg, M. Shupryt, and J.D. Ostermiller.
- *Price River, San Rafael River, and Muddy Creek TMDLs for Total Dissolved Solids, West Colorado Watershed Management Unit, Utah.* 2004. Utah Division of Water Quality
- *Field Data Collection for QUAL2Kw Model Build and Calibration Standard Operating Procedures Version 1.0*. 2012. Utah Division of Water Quality.
- *Utah Wasteload Analysis Procedures Version 1.0*. 2012. Utah Division of Water Quality.
- *2016 Utah Integrated Report*. 2016. Utah Division of Water Quality.

WASTELOAD ANALYSIS [WLA] Date: 1/9/2018
Appendix A: QUAL2Kw Analysis Results

DiscRarging Facility:	Price Water Improvement District WWTP		
UPDES No:	UT-0021814		
Permit Flow [MGD]:	3.00	Maximum Daily Flow	
	2.20	Maximum Monthly Flow	
Receiving Water:	Price River		
Stream Classification:	2B, 3C, 4		
Stream Flows [cfs]:	13.25	Summer (July-Sept)	Critical Low Flow
	13.25	Fall (Oct-Dec)	
	13.25	Winter (Jan-Mar)	
	13.25	Spring (Apr-June)	
Acute River Width:	50%		
Chronic River Width:	100%		

Modeling Information

A QUAL2Kw model was used to determine these effluent limits.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis.

Headwater/Upstream Information	**Summer**	**Fall**	**Winter**	**Spring**
Flow (cfs)	13.3	13.3	13.3	13.3
Temperature (deg C)	16.4	4.5	6.7	14.3
Specific Conductance (µmhos)	1546	2071	1365	1470
Inorganic Suspended Solids (mg/L)	170.2	86.1	301.2	284.9
Dissolved Oxygen (mg/L)	7.7	11.6	9.7	9.1
$CBOD_5$ (mg/L)	3.7	3.7	3.7	3.7
Organic Nitrogen (mg/L)	0.510	0.420	0.216	0.235
NH4-Nitrogen (mg/L)	0.150	0.025	0.050	0.050
NO3-Nitrogen (mg/L)	1.200	0.825	0.561	0.320
Organic Phosphorus (mg/L)	0.300	0.601	0.522	0.428
Inorganic Ortho-Phosphorus (mg/L)	0.136	0.064	0.031	0.029
Phytoplankton (µg/L)	7.000	7.000	7.000	7.000
Detritus [POM] (mg/L)	9.0	4.5	15.9	15.0
Alkalinity (mg/L)	197	348	272	271
pH	8.3	8.3	8.3	8.3

Tributary Information - Coal Creek	**Summer**	**Fall**	**Winter**	**Spring**
Flow (cfs)	2.2	2.2	2.2	2.2
Temperature (deg C)	12.9	4.4	3.5	14.3
Specific Conductance (µmhos)	3934	3934	3934	3934
Inorganic Suspended Solids (mg/L)	896.4	896.4	896.4	896.4
Dissolved Oxygen (mg/L)	8.8	8.8	8.8	8.8
$CBOD_5$ (mg/L)	2.0	2.0	2.0	2.0
Organic Nitrogen (mg/L)	0.505	0.505	0.505	0.505
NH4-Nitrogen (mg/L)	0.068	0.068	0.068	0.068
NO3-Nitrogen (mg/L)	0.833	0.833	0.833	0.833
Organic Phosphorus (mg/L)	0.095	0.095	0.095	0.095
Inorganic Ortho-Phosphorus (mg/L)	0.100	0.100	0.100	0.100
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	47.2	47.2	47.2	47.2
Alkalinity (mg/L)	200	200	200	200
pH	8.2	8.2	8.2	8.2

Tributary Information - Soldier Creek	Summer	Fall	Winter	Spring
Flow (cfs)	0.8	0.8	0.8	0.8
Temperature (deg C)	19.4	10.7	4.3	13.4
Specific Conductance (µmhos)	3003	3003	3003	3003
Inorganic Suspended Solids (mg/L)	629.1	629.1	629.1	629.1
Dissolved Oxygen (mg/L)	9.1	9.1	9.1	9.1
$CBOD_5$ (mg/L)	2.0	2.0	2.0	2.0
Organic Nitrogen (mg/L)	0.410	0.410	0.410	0.410
NH4-Nitrogen (mg/L)	0.076	0.076	0.076	0.076
NO3-Nitrogen (mg/L)	0.446	0.446	0.446	0.446
Organic Phosphorus (mg/L)	0.096	0.096	0.096	0.096
Inorganic Ortho-Phosphorus (mg/L)	0.100	0.100	0.100	0.100
Phytoplankton (µg/L)	0.000	0.000	0.000	0.000
Detritus [POM] (mg/L)	33.1	33.1	33.1	33.1
Alkalinity (mg/L)	200	200	200	200
pH	7.9	7.9	7.9	7.9

Discharge Information - Chronic	Summer	Fall	Winter	Spring
Flow (mgd)	2.2	2.2	2.2	2.2
Temperature (deg C)	20.9	15.3	10.3	14.9
Specific Conductance (µmhos)	1778	1762	1716	1916
Inorganic Suspended Solids (mg/L)	4.4	4.1	2.3	4.2
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	25.0	25.0	25.0	25.0
Organic Nitrogen (mg/L)	1.850	1.850	1.850	1.850
NH4-Nitrogen (mg/L)	7.500	9.000	9.500	9.500
NO3-Nitrogen (mg/L)	14.540	14.540	14.540	14.540
Organic Phosphorus (mg/L)	0.340	0.340	0.340	0.340
Inorganic Ortho-Phosphorus (mg/L)	2.880	2.880	2.880	2.880
Phytoplankton (µg/L)	11.000	11.000	11.000	11.000
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	208	208	208	208
pH	7.4	7.4	7.4	7.4

Discharge Information - Acute	Summer	Fall	Winter	Spring
Flow (mgd)	3.0	3.0	3.0	3.0
Temperature (deg C)	22.0	17.5	12.0	17.4
Specific Conductance (µmhos)	1778	1762	1716	1916
Inorganic Suspended Solids (mg/L)	4.4	4.1	2.3	4.2
Dissolved Oxygen (mg/L)	5.0	5.0	5.0	5.0
$CBOD_5$ (mg/L)	35.0	35.0	35.0	35.0
Organic Nitrogen (mg/L)	1.850	1.850	1.850	1.850
NH4-Nitrogen (mg/L)	16.000	16.000	16.000	16.000
NO3-Nitrogen (mg/L)	14.540	14.540	14.540	14.540
Organic Phosphorus (mg/L)	0.340	0.340	0.340	0.340
Inorganic Ortho-Phosphorus (mg/L)	2.880	2.880	2.880	2.880
Phytoplankton (µg/L)	11.000	11.000	11.000	11.000
Detritus [POM] (mg/L)	0.0	0.0	0.0	0.0
Alkalinity (mg/L)	208	208	208	208
pH	7.4	7.4	7.4	7.4

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

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

Effluent Limitations based upon Water Quality Standards for DO and Ammonia Toxicity

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

Chronic	**Standard**	**Summer**	**Fall**	**Winter**	**Spring**
Flow (MGD)	N/A	2.2	2.2	2.2	2.2
NH4-Nitrogen (mg/L)	Varies	7.5	9.0	9.5	9.5
$CBOD_5$ (mg/L)	N/A	25.0	25.0	25.0	25.0
Dissolved Oxygen [30-day Ave] (mg/L)	5.0	5.0	5.0	5.0	5.0

Acute	**Standard**	**Summer**	**Fall**	**Winter**	**Spring**
Flow (cfs)	N/A	3.0	3.0	3.0	3.0
NH4-Nitrogen (mg/L)	Varies	16.0	16.0	16.0	16.0
$CBOD_5$ (mg/L)	N/A	35.0	35.0	35.0	35.0
Dissolved Oxygen [Minimum] (mg/L)	3.0	5.0	5.0	5.0	5.0

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	0.2	m/d
Oxygen:		
Reaeration model	USGS(pool-riffle)	
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	0.103	/d
Temp correction	1.047	
Fast CBOD:		
Oxidation rate	10	/d
Temp correction	1.047	
Organic N:		
Hydrolysis	0.2532525	/d
Temp correction	1.07	
Settling velocity	0.186698	m/d
Ammonium:		
Nitrification	0.052449	/d
Temp correction	1.07	
Nitrate:		
Denitrification	0.3067175	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.74405	m/d
Temp correction	1.07	
Organic P:		
Hydrolysis	0.1347925	/d
Temp correction	1.07	
Settling velocity	0.132374	m/d
Inorganic P:		
Settling velocity	1.9476	m/d
Sed P oxygen attenuation half sat constant	0.10486	mgO2/L

Phytoplankton:		
Max Growth rate	2.424195	/d
Temp correction	1.07	
Respiration rate	0.2453945	/d
Temp correction	1.07	
Death rate	0.07159	/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	16.82115	ugN/L
Settling velocity	0.098591	m/d
Bottom Plants:		
Growth model	Zero-order	
Max Growth rate	15.75627	gD/m2/d or /d
Temp correction	1.07	
First-order model carrying capacity	100	gD/m2
Basal respiration rate	0.0691094	/d
Photo-respiration rate parameter	0.01	unitless
Temp correction	1.07	
Excretion rate	0.3327	/d
Temp correction	1.07	
Death rate	1.66875	/d
Temp correction	1.07	
External nitrogen half sat constant	350.448	ugN/L
External phosphorus half sat constant	67.2535	ugP/L
Inorganic carbon half sat constant	7.41E-05	moles/L
Bottom algae use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	68.6698	mgO^2/L
Ammonia preference	17.5728	ugN/L
Subsistence quota for nitrogen	0.8808192	mgN/gD
Subsistence quota for phosphorus	0.0874835	mgP/gD
Maximum uptake rate for nitrogen	743.668	mgN/gD/d
Maximum uptake rate for phosphorus	144.8225	mgP/gD/d
Internal nitrogen half sat ratio	1.597312	
Internal phosphorus half sat ratio	4.9713625	
Nitrogen uptake water column fraction	1	
Phosphorus uptake water column fraction	1	
Detritus (POM):		
Dissolution rate	0.279779	/d
Temp correction	1.07	
Settling velocity	0.0739985	m/d
pH:		
Partial pressure of carbon dioxide	370	ppm

Atmospheric Inputs:	Summer	Fall	Winter	Spring
Max. Air Temperature, F	88.2	51.8	42.9	72.4
Min. Air Temperature, F	50.5	17.7	14.1	36.2
Dew Point, Temp., F	54.5	29.9	26.0	44.3
Wind, ft./sec. @ 21 ft.	6.6	5.8	5.8	8.4
Cloud Cover, %	0.1	0.1	0.1	0.1

Other Inputs:	
Bottom Algae Coverage	100.0%
Bottom SOD Coverage	100.0%
Prescribed SOD (mg O_2/m^2/day)	0.1

WASTELOAD ANALYSIS [WLA] Date: 1/9/2018

Appendix B: Mass Balance Mixing Analysis Results

Discharging Facility:	Price Water Improvement District WWTP	
UPDES No:	UT-0021814	
Permit Flow [MGD]:	3.00	Maximum Daily Flow
	2.20	Maximum Monthly Flow
Receiving Water:	Price River	
Stream Classification:	2B, 3C, 4	
Stream Flows [cfs]:	13.25	Annual Critical Low Flow
Acute River Width:	50%	
Acute Combined Flow [cfs]	11.27	
Chronic River Width:	100%	
Chronic Combined Flow [cfs]	16.65	

Modeling Information

A simple mixing analysis was used to determine these effluent limits.

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

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

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

Parameter	Limit	
pH		
Minimum	6.5	
Maximum	9.0	
Bacteriological		
E. coli (30 Day Geometric Mean)	206	(#/100 mL)
E. coli (Maximum)	668	(#/100 mL)

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

Parameter	Limit	
Temperature (deg C)		
Maximum	27.0	
Maximum Change	4.0	
pH		
Minimum	6.5	
Maximum	9.0	

Inorganics	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
	Standard	Limit	Unit	Standard	Limit	Unit
Phenol				0.010	0.015	mg/L
Hydrogen Sulfide (Undissociated)				0.002	0.003	mg/L

Dissolved Metals [µg/L]

	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
Parameter	**Standard[1]**	**Background**	**Limit**	**Standard**	**Background**	**Limit**
Aluminum	NA[3]	NA	NONE	750	13.0	1,802
Arsenic	150	1.1	730	340	1.1	824
Cadmium	0.6	0.06	2.9	7.7	0.06	18.7
Chromium VI	11.0	2.7	43.3	16.0	2.7	35.0
Chromium III	231	2.7	1118	1,773	2.7	4,301
Copper	29.3	3.0	131.7	49.6	3.0	116.2
Cyanide[2]	5.2	3.5	11.9	22.0	3.5	48.5
Iron				1,000	28.65	2,387
Lead	10.9	0.19	52.8	281	0.19	681
Mercury[2]	0.012	0.008	0.028	2.4	0.008	5.8
Nickel	168	4.7	804	1,513	4.7	3,666
Selenium	4.6	2.0	14.7	18.4	2.0	41.8
Silver				34.9	0.25	84.4
Tributylin[2]	0.072	0.048	0.165	0.46	0.048	1.05
Zinc	382	14.1	1,816	379	14.1	901

1: Based upon a Hardness of 400 mg/l as CaCO3

2: Ambient concentration assumed 2/3 of water quality standard

3: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaC0_3$ in the receiving water after mixing, the 87 ug/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/L acute aluminum criterion (expressed as total recoverable).

Organics [Pesticides] [µg/L]

	Chronic Standard (4 Day Average)			Acute Standard (1 Hour Average)		
Parameter	**Standard**	**Background[1]**	**Limit**	**Standard**	**Background**	**Limit**
Aldrin				1.5	1.0	2.2
Chlordane	0.0043	0.0029	0.0099	1.2	0.0029	2.9
DDT, DDE	0.001	0.0007	0.0023	0.55	0.0007	1.33
Diazinon	0.17	0.11	0.39	0.17	0.11	0.25
Dieldrin	0.0056	0.0037	0.0129	0.24	0.0037	0.58
Endosulfan, a & b	0.056	0.037	0.129	0.11	0.037	0.21
Endrin	0.036	0.024	0.083	0.086	0.024	0.175
Heptachlor & H. epoxide	0.0038	0.0025	0.0087	0.26	0.0025	0.63
Lindane	0.08	0.05	0.18	1.0	0.05	2.4
Methoxychlor				0.03	0.02	0.04
Mirex				0.001	0.0007	0.001
Nonylphenol	6.6	4.4	15.2	28.0	4.4	61.7
Parathion	0.013	0.009	0.030	0.066	0.009	0.148
PCB's	0.014	0.009	0.032			
Pentachlorophenol	15.0	10.0	34.5	19.0	10.0	31.8
Toxephene	0.0002	0.0001	0.0005	0.73	0.0001	1.77

1: Ambient concentration assumed 2/3 of water quality standard

Radiological

Parameter	**Maximum Concentration**
Gross Alpha	15 pCi/L

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	**Maximum Concentration**			
	Standard	**Background**	**Limit**	
Total Dissolved Solids (mg/L)	1,700		1,700	Site specific standard
Arsenic (µg/L)	100	1.1	485	
Boron (µg/L)	750	201	2,889	
Cadmium (µg/L)	10	0.06	49	
Chromium (µg/L)	100	2.7	479	
Copper (µg/L)	200	3.0	967	
Lead (µg/L)	100	0.19	489	
Selenium (µg/L)	50	2.0	237	
Gross Alpha (pCi/L)	15		15	

WASTELOAD ANALYSIS [WLA] Date: 1/9/2018
Appendix C: Total Residual Chlorine

Discharging Facility: Price Water Improvement District WWTP
UPDES No: UT-0021814

CHRONIC

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 deg C	Decay Rate (/day) @ T deg C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	13.3		3.4	16.7							
	Fall	13.3		3.4	16.7							
	Winter	13.3		3.4	16.7							
	Spring	13.3		3.4	16.7							
TRC (mg/L)	Summer	0.000	0.011			0.054	20.9	20	20.8	10	0.8652	0.062
	Fall	0.000	0.011			0.054	15.3	20	16.1	10	0.8943	0.060
	Winter	0.000	0.011			0.054	10.3	20	12.8	10	0.9147	0.059
	Spring	0.000	0.011			0.054	14.9	20	15.8	10	0.8961	0.060

ACUTE

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day) @ 20 °C	Decay Rate (/day) @ T °C	Travel Time (min)	Decay Coefficient	Effluent Limit
Discharge (cfs)	Summer	6.6		4.6	11.3							
	Fall	6.6		4.6	11.3							
	Winter	6.6		4.6	11.3							
	Spring	6.6		4.6	11.3							
TRC (mg/L)	Summer	0.000	0.019			0.046	22.0	20	22.0	10	0.8586	0.054
	Fall	0.000	0.019			0.046	17.5	20	17.8	10	0.8837	0.052
	Winter	0.000	0.019			0.046	12.0	20	13.9	10	0.9083	0.051
	Spring	0.000	0.019			0.046	17.4	20	17.7	10	0.8842	0.052