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

Date: **May 21, 2020**

Facility: **Logan Wastewater Treatment Plant**
Logan, UT
UPDES No. UT0021920

Receiving Water: **Swift Slough (2B, 3B, 3D, 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: Irrigation Ditch
Outfall 002: Swift Slough

The maximum design flow for the discharge is summarized in Table 1, per the previous permit.

Table 1: Seasonal maximum daily discharge

Season	Flow (MGD)
Summer	22
Fall	21
Winter	16
Spring	21

Receiving Water
The receiving water for Outfall 001 is an irrigation ditch that conveys the effluent from the lagoons to the polishing wetlands. The polishing wetlands discharge via Outfall 002. The beneficial uses for the irrigation ditch are presumed 2B, 3E, and 4 per UAC R317-2-13.9. The irrigation ditch has no background flow during critical conditions.

The receiving water for Outfall 002 is the Swift Slough. Swift Slough is tributary to Cutler Reservoir and the Bear River. Per UAC 317.2.13.3(a), the designated beneficial uses for the Bear River and tributaries, from the Great Salt Lake to the Utah-Idaho border are 2B, 3B, 3D, 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 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). Flow records from Swift Slough immediately upstream of Outfall 002 were provided by Logan City for the years 2004-2007. Since this is not a long enough flow record to compute the 7Q10 flow, the lowest 7-day average flow for each season in the record was used.

Table 2: Seasonal critical low flow

Season	Flow (cfs)
Summer	4.0
Fall	8.4
Winter	8.8
Spring	2.9

<u>TMDL</u>
Cutler Reservoir has an approved TMDL for dissolved oxygen (DO) and total phosphorus (TP), *Middle Bear River and Cutler Reservoir TMDLs* (SWCA 2010). The TMDL allocated load for TP from Logan City Wastewater Treatment Plant is 4,405 kg for May through October and 11,831 kg for November through April.

<u>Mixing Zone</u>
Per UAC 317-2-5, the discharge is considered instantaneously fully mixed since the discharge is more than twice the background receiving water flow. Therefore, no mixing zone is allowed.

<u>Parameters of Concern</u>
The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), dissolved oxygen (DO), BOD5, total phosphorus (TP), total nitrogen (TN), total ammonia (NH3), E. coli, pH, total copper, and total lead as determined in consultation with the UPDES Permit Writer.

<u>Water Quality Modeling</u>
A QUAL2Kw model of the receiving water was built and calibrated to synoptic survey data collected in September of 2011 by DWQ staff. The model of Swift Slough extends 1.2 kilometers downstream from the treatment facility outfall to Cutler Reservoir.

Receiving water quality data was primarily obtained from the synoptic survey conducted for the model calibration from 9/15 to 9/19/2011. The sampling site was on the Swift Slough immediately above the plant discharge. Limited water quality data was obtained from monitoring location 4905050 Swift Slough below confluence with Logan Lagoons Effluent and monitoring location 4905070 Swift Slough at 1300 West. The average value was calculated for each constituent in the receiving water.

The QUAL2Kw model was used for determining the WQBELs for parameters related to eutrophication and in-stream DO criteria. 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 calibration model and the wasteload model are available for review by request.

Whole Effluent Toxicity (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 3: WET Limits

Season	Percent Effluent	Dilution Ratio
Summer	90%	0.12:1
Fall	79%	0.26:1
Winter	74%	0.36:1
Spring	92%	0.09:1

Effluent Limits

Selected Water Quality Based Effluent Limits for Outfall 002 are presented in Table 4. The complete list of effluent limits is attached in the appendices.

Table 4: Selected Water Quality Based Effluent Limits for Outfall 002

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)						
Summer (Jul-Sep)		22.0			22.0	
Fall (Oct-Dec)	N/A	21.0	1 day	N/A	21.0	30 days
Winter (Jan-Mar)		16.0			16.0	
Spring (Apr-Jun)		21.0			21.0	
Ammonia (mg/L)						
Summer (Jul-Sep)		10.0			2.0	
Fall (Oct-Dec)	Varies	12.0	1 hour	Varies	3.5	30 days
Winter (Jan-Mar)		11.0			3.0	
Spring (Apr-Jun)		5.8			2.0	
Min. Dissolved Oxygen (mg/L)						
Summer (Jul-Sep)		4.0			5.0	
Fall (Oct-Dec)	3.0	4.0	Instantaneous	5.5	4.5	30 days
Winter (Jan-Mar)		4.0			4.0	
Spring (Apr-Jun)		4.0			5.0	
BOD_5 (mg/L)	N/A	35.0	7 days	N/A	25.0	30 days
Total Recoverable Copper (µg/L)		35	1 hour		21	4 days
Total Recoverable Lead (µg/L)		285	1 hour		11	4 days

QUAL2Kw rates, input and output for DO and nutrient related constituents are summarized in Appendix A.

Mass balance mixing analysis input and output for conservative constituents are summarized in Appendix B.

WQBELs for Outfall 001 are summarized in Appendix C.

Models and supporting documentation are available for review upon request.

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 neither pollutant concentration nor load is being increased under this permit renewal.

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Watershed Protection Section

Files

WLA Document: *LoganLagoonsWLA_2020-05-21.docx*
QUAL2Kw Wasteload Model: *LoganLagoonsWLA_2020.xlsm*
QUAL2Kw Calibration Model: *logan_q2k_cal_1.3.xlsm*

References

Middle Bear River and Cutler Reservoir TMDLs 2010. SWCA Environmental Consultants.

Utah 2016 Integrated Report. 2016. Utah Division of Water Quality.

Utah Wasteload Analysis Procedures Version 1.0. 2012. Utah Division of Water Quality.

WASTELOAD ANALYSIS [WLA] Date: 5/1/2020
Appendix A: QUAL2Kw Analysis Results

Discharging Facility:	Logan WWTP	
UPDES No:	UT-0021920	
Permit Flow [MGD]:	22.00	Summer (July-Sept)
	21.00	Fall (Oct-Dec)
	16.00	Winter (Jan-Mar)
	21.00	Spring (Apr-June)

Receiving Water:	Swift Slough		
Stream Classification:	2B, 3B, 3D, 4		
Stream Flows [cfs]:	3.98	Summer (July-Sept)	Critical Low Flow
	8.40	Fall (Oct-Dec)	
	8.82	Winter (Jan-Mar)	
	2.88	Spring (Apr-June)	

Acute River Width:	100.0%
Chronic River Width:	100.0%

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.
Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Headwater/Upstream Information

	7Q10 Flow	Temp.	pH	Alkalinity	Spec. Cond.	ISS
	cfs	Deg. C		mg/L	umhos	mg/L
Summer	4.0	21.6	8.1	225.0	850	26.5
Fall	8.4	12.3	8.5	225.0	409	26.5
Winter	8.8	1.5	8.3	225.0	357	26.5
Spring	2.9	14.9	8.4	225.0	415	26.5

	T-NH4	Org. N	NO3	Org. P	Inorg. P
	mg/L as N	mg/L as N	mg/L as N	mg/L as P	mg/L as P
Summer	0.025	0.084	0.270	0.025	0.025
Fall	0.025	0.084	0.270	0.025	0.025
Winter	0.025	0.084	0.270	0.025	0.025
Spring	0.025	0.084	0.270	0.025	0.025

	Mean DO	Diel DO	CBOD	Detritus	Phytoplank
	mg/L	mg/L	mg/L	mg/L	ug/L
Summer	5.80	-	4.35	3.60	2.60
Fall	9.01	-	4.35	3.60	2.60
Winter	12.09	-	4.35	3.60	2.60
Spring	9.44	-	4.35	3.60	2.60

Discharge Information

	Flow	Temp.	pH	Alkalinity	ISS
	MGD	Deg. C		mg/L	mg/L
Summer	22.00	20.70	7.85	271.5	8.90
Fall	21.00	7.86	7.77	271.5	11.53
Winter	16.00	3.11	7.87	271.5	21.96
Spring	21.00	14.31	8.11	271.5	10.24

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 Limitation for Biological Oxygen Demand (BOD_5) based upon Secondary Standards

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent BOD5 limitation as follows:

	Concentration		
Season	**Chronic**	**Acute**	
Summer	25.0	35.0	mg/L as CBOD5
Fall	25.0	35.0	mg/L as CBOD5
Winter	25.0	35.0	mg/L as CBOD5
Spring	25.0	35.0	mg/L as CBOD5

Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards

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

	Concentration		
Season	**Chronic**	**Acute**	
Summer	5.0	4.0	mg/L
Fall	4.5	4.0	mg/L
Winter	4.0	4.0	mg/L
Spring	5.0	4.0	mg/L

Effluent Limitation for Total Phosphorus based upon TMDL

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

	Total Phosphorus	
Season	**Load**	
May - October	4,405	kg
November - April	11,831	kg

Effluent Limitation for Total Ammonia based upon Water Quality Standards

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

	Total Ammonia		
Season	**Chronic**	**Acute**	
Summer	2.0	10.0	mg/L as N
Fall	3.5	12.0	mg/L as N
Winter	3.0	11.0	mg/L as N
Spring	2.0	5.8	mg/L as N

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	2	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	0.240778	/d
Temp correction	1.047	
Fast CBOD:		
Oxidation rate	10	/d
Temp correction	1.047	
Organic N:		
Hydrolysis	0.2964425	/d
Temp correction	1.07	
Settling velocity	0.147494	m/d
Ammonium:		
Nitrification	0.0772945	/d
Temp correction	1.07	
Nitrate:		
Denitrification	1.8113375	/d
Temp correction	1.07	
Sed denitrification transfer coeff	0.22471	m/d
Temp correction	1.07	
Organic P:		
Hydrolysis	0.1360275	/d
Temp correction	1.07	
Settling velocity	0.11495	m/d
Inorganic P:		
Settling velocity	0.02022	m/d
Sed P oxygen attenuation half sat constant	1.40616	mgO2/L

Phytoplankton:		
Max Growth rate	1.99746	/d
Temp correction	1.07	
Respiration rate	0.49199	/d
Temp correction	1.07	
Death rate	0.97217	/d
Temp correction	1	
Nitrogen half sat constant	22.0366	ugN/L
Phosphorus half sat constant	1.95708	ugP/L
Inorganic carbon half sat constant	1.30E-05	moles/L
Phytoplankton use HCO3- as substrate	Yes	
Light model	Smith	
Light constant	97.3006	langleys/d
Ammonia preference	27.86895	ugN/L
Settling velocity	0.326705	m/d
Bottom Plants:		
Growth model	Zero-order	
Max Growth rate	7.262455	gD/m2/d or /d
Temp correction	1.07	
First-order model carrying capacity	100	gD/m2
Basal respiration rate	0.1455158	/d
Photo-respiration rate parameter	0.39	unitless
Temp correction	1.07	
Excretion rate	0.202475	/d
Temp correction	1.07	
Death rate	3.8662	/d
Temp correction	1.07	
External nitrogen half sat constant	288.016	ugN/L
External phosphorus half sat constant	98.1445	ugP/L
Inorganic carbon half sat constant	1.19E-04	moles/L
Bottom algae use HCO3- as substrate	Yes	
Light model	Half saturation	
Light constant	89.3608	langleys/d
Ammonia preference	21.65055	ugN/L
Subsistence quota for nitrogen	0.5779116	mgN/gD
Subsistence quota for phosphorus	0.1656965	mgP/gD
Maximum uptake rate for nitrogen	636.1775	mgN/gD/d
Maximum uptake rate for phosphorus	136.553	mgP/gD/d
Internal nitrogen half sat ratio	3.4205925	
Internal phosphorus half sat ratio	2.539308	
Nitrogen uptake water column fraction	1	
Phosphorus uptake water column fraction	1	
Detritus (POM):		
Dissolution rate	1.1092505	/d
Temp correction	1.07	
Settling velocity	0.125501	m/d
pH:		
Partial pressure of carbon dioxide	370	ppm

Atmospheric Inputs:	Summer	Fall	Winter	Spring
Max. Air Temperature, F	85.7	45.5	36.9	67.5
Min. Air Temperature, F	57.5	27.9	19.7	43.6
Dew Point, Temp., F	55.7	30.9	22.4	46.2
Wind, ft./sec. @ 21 ft.	5.7	3.5	3.2	5.6
Cloud Cover, %	0.1	0.1	0.1	0.1

Other Inputs:		
Bottom Algae Coverage	100.0%	
Bottom SOD Coverage	100.0%	
Prescribed SOD	0.0	gO2/m2/d

WASTELOAD ANALYSIS [WLA] Date: 5/21/2020
Appendix B: Mass Balance Mixing Analysis Results

Discharging Facility:	Logan WWTP	
UPDES No:	UT-0021920	
Permit Flow [MGD]:	22.00	Summer (July-Sept)
	21.00	Fall (Oct-Dec)
	16.00	Winter (Jan-Mar)
	21.00	Spring (Apr-June)

Receiving Water:	Swift Slough		
Stream Classification:	2B, 3B, 3D, 4		
Stream Flows [cfs]:	3.98	Summer (July-Sept)	Critical Low Flow
	8.40	Fall (Oct-Dec)	
	8.82	Winter (Jan-Mar)	
	2.88	Spring (Apr-June)	

Acute River Width:	100.0%
Chronic River Width:	100.0%

Modeling Information

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

Model Inputs

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

Flow Rate

	Headwaters	Discharge	Combined
	cfs	MGD	cfs
Summer	4.0	22.0	38.0
Fall	8.4	21.0	40.9
Winter	8.8	16.0	33.6
Spring	2.9	21.0	35.4

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 for Protection of Recreation (Class 2B Waters)

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

Effluent Limitations for Whole Effluent Toxicity (WET)

WET TestChronic IC_{25}

Season	Percent Effluent	Dilution Ratio
Summer	90%	0.12 :1
Fall	79%	0.26 :1
Winter	74%	0.36 :1
Spring	92%	0.09 :1

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

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

Total Recoverable Metals (µg/L)

	Chronic Standard (4 Day Average)				Acute Standard (1 Hour Average)			
Parameter	Standard[1]	Background[2]	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Aluminum	N/A[3]		N/A		750	503	772	142
Arsenic	150	101	154	28.3	340	101	361	66.3
Cadmium	0.53	0.36	0.55	0.10	5.4	0.4	5.9	1.1
Chromium VI	11.0	7.4	11.3	2.1	16.0	7.4	16.8	3.1
Chromium III	183	122	188	34.5	3,819	122	4,146	761
Copper	20.4	13.7	21.0	3.9	33.2	13.7	34.9	6.41
Cyanide	5.2	3.5	5.4	1.0	22.0	3.5	23.6	4.34
Iron					1,000	670	1,029	189
Lead	10.2	6.8	10.5	1.9	262.1	6.8	284.7	52.3
Mercury	0.012	0.008	0.012	0.002	2.4	0.008	2.6	0.48
Nickel	113	76	117	21.4	1,019	76	1,102	202
Selenium	4.6	3.1	4.7	0.87	18.4	3.1	19.8	3.6
Silver					18.3	12.3	18.8	3.5
Tributylin	0.072	0.048	0.074	0.014	0.46	0.05	0.50	0.09
Zinc	260	174	268	49.2	260	174	268	49.2

1: Based upon a Hardness of 250 mg/l as CaCO3

2: Background concentration assumed 67% of chronic 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 CaC03 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	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Acrolein	3.0		3.0	0.55	3.0		3.0	0.55
Aldrin					1.5		1.5	0.28
Carbaryl	2.1		2.1	0.39	2.1		2.1	0.39
Chlordane (µg/L)	0.0043		0.0043	0.0008	1.2		1.2	0.22
Clorpyrifos	0.041		0.041	0.008	0.083		0.083	0.015
4,4' - DDT	0.001		0.001	0.0002	0.55		0.55	0.10
Diazinon	0.17		0.17	0.03	0.17		0.17	0.03
Dieldrin	0.056		0.056	0.010	0.24		0.24	0.04
Endosulfan, a & b	0.056		0.056	0.010	0.11		0.11	0.02
Endrin	0.036		0.036	0.007	0.086		0.086	0.016
Heptachlor & H. epoxide	0.0038		0.0038	0.0007	0.26		0.26	0.05
Lindane	0.08		0.08	0.015	1.0		1.0	0.18
Methoxychlor					0.03		0.03	0.006
Mirex					0.001		0.001	0.0002
Nonylphenol	6.6		6.6	1.2	28.0		28.0	5.1
Parathion	0.013		0.013	0.0024	0.066		0.066	0.012
PCB's	0.014		0.014	0.0026				
Pentachlorophenol	15.0		15.0	2.8	19.0		19.0	3.5
Toxephene	0.0002		0.0002	0.00004	0.73		0.73	0.13

Radiological

Parameter	Maximum Concentration
Gross Alpha	15 pCi/L

Numeric Criteria for the Protection of Human Health from Consumption of Water and Fish

	Class 1C (Water and Organism)				Class 3 (Organism Only)			
Toxic Organics	**Standard**	**Background**	**Conc. Limit (µg/L)**	**Load Limit (lbs/day)**	**Standard**	**Background**	**Conc. Limit (µg/L)**	**Load Limit (lbs/day)**
Antimony	5.6		N/A	N/A	640		640	118
Copper	1300		N/A	N/A				
Nickel	610		N/A	N/A	4600		4600	845
Selenium	170		N/A	N/A	4200		4200	771
Thallium	0.24		N/A	N/A	0.47		0.47	0.09
Zinc	7400		N/A	N/A	26000		26000	4774
Cyanide	4		N/A	N/A	400		400	73
Asbestos (million fibers/L)	7		N/A	N/A				
2,3,7,8-TCDD Dioxin	5.00E-09		N/A	N/A	5.1E-09		5.1E-09	9.36354E-10
Acrolein	3		N/A	N/A	400		400	73
Acrylonitrile	0.061		N/A	N/A	7		7.0	1.3
Benzene	2.1		N/A	N/A	51		51	9.4
Bromoform	7		N/A	N/A	120		120	22
Carbon Tetrachloride	0.4		N/A	N/A	5		5.0	0.9
Chlorobenzene	100		N/A	N/A	800		800	147
Chlorodibromomethane	0.8		N/A	N/A	21		21	3.9
Chloroform	60		N/A	N/A	2000		2000	367
Dalapon	200		N/A	N/A				
Dichlorobromomethane	0.95		N/A	N/A	27		27	5
1,2-Dichloroethane	9.9		N/A	N/A	2000		2000	367
1,1-Dichloroethylene	300		N/A	N/A	20000		20000	3672
1,2-Dichloropropane	0.9		N/A	N/A	31		31	6
1,3-Dichloropropene	0.27		N/A	N/A	12		12	2
Ethylbenzene	68		N/A	N/A	130		130	24
Ethylene Dibromide	0.05		N/A	N/A				
Methyl Bromide	100		N/A	N/A	10000		10000	1836
Methylene Chloride	20		N/A	N/A	1000		1000	184
1,1,2,2-Tetrachloroethane	0.2		N/A	N/A	3		3.0	0.6
Tetrachloroethylene	10		N/A	N/A	29		29	5
Toluene	57		N/A	N/A	520		520	95
1,2 -Trans-Dichloroethyle	100		N/A	N/A	4000		4000	734
1,1,1-Trichloroethane	10000		N/A	N/A	200000		200000	36720
1,1,2-Trichloroethane	0.55		N/A	N/A	8.9		8.9	2
Trichloroethylene	0.6		N/A	N/A	7		7.0	1
Vinyl Chloride	0.022		N/A	N/A	1.6		1.6	0.3
2-Chlorophenol	30		N/A	N/A	800		800	147
2,4-Dichlorophenol	10		N/A	N/A	60		60	11
2,4-Dimethylphenol	100		N/A	N/A	3000		3000	551
2-Methyl-4,6-Dinitrophenol	2		N/A	N/A	30		30	6
2,4-Dinitrophenol	10		N/A	N/A	300		300	55
3-Methyl-4-Chlorophenol	500		N/A	N/A	2000		2000	367
Penetachlorophenol	0.03		N/A	N/A	0.04		0.04	0.007
Phenol	4000		N/A	N/A	300000		300000	55080
2,4,5-Trichlorophenol	300		N/A	N/A	600		600	110
2,4,6-Trichlorophenol	1.5		N/A	N/A	2.8		2.8	1
Acenaphthene	70		N/A	N/A	90		90	17
Anthracene	300		N/A	N/A	400		400	73
Benzidine	0.00014		N/A	N/A	0.011		0.011	0.0020
BenzoaAnthracene	0.0012		N/A	N/A	0.0013		0.0013	0.0002
BenzoaPyrene	0.00012		N/A	N/A	0.00013		0.00013	0.00002
BenzobFluoranthene	0.0012		N/A	N/A	0.0013		0.0013	0.0002
BenzokFluoranthene	0.012		N/A	N/A	0.013		0.013	0.0024

	Class 1C (Water and Organism)				Class 3 (Organism Only)			
Toxic Organics	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)	Standard	Background	Conc. Limit (µg/L)	Load Limit (lbs/day)
Bis2-Chloro1methylether	0.00015		N/A	N/A	0.017		0.017	0.0031
Bis2-Chloro1methylethylether	200		N/A	N/A	4000		4000	734
Bis2-ChloroethylEther	0.03		N/A	N/A	2.2		2.2	0.4
Bis2-Chloroisopropy1Ether	1400		N/A	N/A	65000		65000	11934
Bis2-EthylhexylPhthalate	0.32		N/A	N/A	0.37		0.37	0.07
Butylbenzyl Phthalate	0.1		N/A	N/A	0.1		0.1	0.02
2-Chloronaphthalene	800		N/A	N/A	1000		1000	184
Chrysene	0.12		N/A	N/A	0.13		0.13	0.02
Dibenzoa, (h)Anthracene	0.00012		N/A	N/A	0.00013		0.00013	0.00002
1,2-Dichlorobenzene	1000		N/A	N/A	3000		3000	551
1,3-Dichlorobenzene	7		N/A	N/A	10		10.0	2
1,4-Dichlorobenzene	300		N/A	N/A	900		900	165
3,3-Dichlorobenzidine	0.049		N/A	N/A	0.15		0.15	0.03
Diethyl Phthalate	600		N/A	N/A	600		600	110
Dimethyl Phthalate	2000		N/A	N/A	2000		2000	367
Di-n-Butyl Phthalate	20		N/A	N/A	30		30	6
2,4-Dinitrotoluene	0.049		N/A	N/A	1.7		1.7	0.3
Dinitrophenols	10		N/A	N/A	1000		1000	184
1,2-Diphenylhydrazine	0.03		N/A	N/A	0.2		0.2	0.04
Fluoranthene	20		N/A	N/A	20		20	4
Fluorene	50		N/A	N/A	70		70	13
Hexachlorobenzene	0.000079		N/A	N/A	0.000079		0.000079	0.000015
Hexachlorobutedine	0.01		N/A	N/A	0.01		0.01	0.002
Hexachloroethane	0.1		N/A	N/A	0.1		0.1	0.02
Hexachlorocyclopentadiene	4		N/A	N/A	4		4.0	0.7
Ideno 1,2,3-cdPyrene	0.0012		N/A	N/A	0.0013		0.0013	0.0002
Isophorone	34		N/A	N/A	1800		1800	330
Nitrobenzene	10		N/A	N/A	600		600	110
N-Nitrosodiethylamine	0.0008		N/A	N/A	1.24		1.2	0.2
N-Nitrosodimethylamine	0.00069		N/A	N/A	3		3	0.6
N-Nitrosodi-n-Propylamine	0.005		N/A	N/A	0.51		0.5	0.1
N-Nitrosodiphenylamine	3.3		N/A	N/A	6		6	1
N-Nitrosopyrrolidine	0.016		N/A	N/A	34		34	6
Pentachlorobenzene	0.1		N/A	N/A	0.1		0.1	0.02
Pyrene	20		N/A	N/A	30		30	6
1,2,4-Trichlorobenzene	0.071		N/A	N/A	0.076		0.076	0.01
Aldrin	0.00000077		N/A	N/A	0.00000077		0.00000077	0.00000014
alpha-BHC	0.00036		N/A	N/A	0.00039		0.00039	0.00007
beta-BHC	0.008		N/A	N/A	0.014		0.014	0.003
gamma-BHC (Lindane)	4.2		N/A	N/A	4.4		4.4	0.8
Hexachlorocyclohexane (HCH)	0.0066		N/A	N/A	0.01		0.01	0.002
Chlordane	0.00031		N/A	N/A	0.00032		0.00032	0.00006
4,4-DDT	0.00003		N/A	N/A	0.00003		0.00003	0.000006
4,4-DDE	0.000018		N/A	N/A	0.000018		0.000018	0.000003
4,4-DDD	0.00012		N/A	N/A	0.00012		0.00012	0.00002
Dieldrin	0.0000012		N/A	N/A	0.0000012		0.0000012	0.0000002
alpha-Endosulfan	20		N/A	N/A	30		30	6
beta-Endosulfan	20		N/A	N/A	40		40	7
Endosulfan Sulfate	20		N/A	N/A	40		40	7
Endrin	0.03		N/A	N/A	0.03		0.03	0.01
Endrin Aldehyde	1		N/A	N/A	1		1.0	0
Heptachlor	0.0000059		N/A	N/A	0.0000059		0.0000059	0.0000011
Heptachlor Epoxide	0.000032		N/A	N/A	0.000032		0.000032	0.000006
Methoxychlor	0.02		N/A	N/A	0.02		0.02	0.00
Polychlorinated Biphenyls (PCB)	0.000064		N/A	N/A	0.000064		0.000064	0.000012
Toxaphene	0.0007		N/A	N/A	0.00071		0.00071	0.00013

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

	Maximum Concentration			
Parameter	**Standard**	**Background**	**Conc. Limit**	**Load Limit (lbs/day)**
Total Dissolved Solids (mg/L)	1,200	569	1,256	231
Boron (µg/L)	75	50.25	77	14.2
Arsenic (µg/L)	100	100	100	18.4
Cadmium (µg/L)	10	0.36	10.9	2.0
Chromium (µg/L)	100	7	108	19.9
Copper (µg/L)	200	13.7	217	39.7
Lead (µg/L)	100	6.8	108	19.9
Selenium (µg/L)	50	3.1	54.2	9.9
Gross Alpha (pCi/L)	15		15.0	2.8

WASTELOAD ANALYSIS [WLA] Date: 5/1/2020
Appendix C: Effluent Limits for Outfall 001

Discharging Facility:	Logan WWTP		
UPDES No:	UT-0021920		
Permit Flow [MGD]:	22.00	Summer (July-Sept)	
	21.00	Fall (Oct-Dec)	
	16.00	Winter (Jan-Mar)	
	21.00	Spring (Apr-June)	
Receiving Water:	Irrigation Ditch		
Stream Classification:	2B, 3E, 4		
Stream Flows [cfs]:	0	Summer (July-Sept)	Critical Low Flow
Acute River Width:	100.0%		
Chronic River Width:	100.0%		

Modeling Information

A simple mixing analysis 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

	7Q10 Flow
	cfs
Summer	0

Discharge Information

	Flow
	MGD
Summer	22.0
Fall	21.0
Winter	16.0
Spring	21.0

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

Effluent Limitations

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

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	Maximum Concentration	
Total Dissolved Solids	1200	mg/L
Boron	75	µg/L
Arsenic	100	µg/L
Cadmium	10	µg/L
Chromium	100	µg/L
Copper	200	µg/L
Lead	100	µg/L
Selenium	50	µg/L
Gross Alpha	15	pCi/L