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

Date: **November 30, 2018**

Facility: **Grantsville Wastewater Treatment Facility**
UPDES No. UT0021130

Receiving water: **Blue Lakes (2B, 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: Drainage Ditch → Blue Lakes → Irrigation Canal

The maximum daily design discharge is 2.25 MGD and the maximum monthly design discharge is 1.5 MGD for the facility.

Receiving Water
The receiving water for Outfall 001 is an unnamed drainage ditch that is tributary to Blue Lakes, which outlets to an irrigation canal.

Based on the evaluation documented in the attached memorandum dated March 25, 2014, the beneficial uses for Blue Lakes are 2B, 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 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 lake elevation averaged over seven consecutive days with a ten year return frequency (7Q10). No stage records were found for Blue Lakes and no water was assumed present during critical conditions.

TMDL

The receiving water and downstream waterbodies are not listed as impaired for any parameters according to the 2016 303(d) list.

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. Due to the lack of dilution in Blue Lakes during critical conditions, no mixing zone is allowed.

Parameters of Concern

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

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	Dilution Ratio
Annual	100%	0

Effluent Limits

Effluent limits were determined using a mass balance mixing analysis (UDWQ 2012). Due to the lack of dilution from the receiving water during critical conditions, the WQBELs were set at the water quality criteria. The mass balance analysis is summarized in Appendix A.

The toxicity of some metals is dependent on the hardness of the water. Due to the lack of sampling data, a hardness of 300 mg/L as $CaCO_3$ was assumed.

The water quality criteria for chronic ammonia toxicity is dependent on temperature and pH, and for acute ammonia toxicity is dependent on pH. The water quality standards for ammonia are summarized in Appendix B.

Due to the lack of monitoring data, it was not possible to assess the effects of TP, TN, DO and BOD_5 in the effluent on the DO in the downstream receiving waters; therefore, it is presumed that secondary standards for BOD_5, water quality criteria for DO, and technology based limits for TP are sufficiently protective of the receiving water.

Table 3: Water Quality Based Effluent Limits Summary

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow (MGD)		2.25	1 day		1.5	30 days
Dissolved Oxygen, Min. (mg/L)	3.0	3.0	Minimum	5.0	5.0	30 days
Ammonia (mg/L)						
Summer (Jul-Sep)					1.1	
Fall (Oct-Dec)	Varies	3.2	1 hour	Varies	2.5	30 days
Winter (Jan-Mar)					2.9	
Spring (Apr-Jun)					1.7	

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 since the pollutant concentration and load to the receiving waters are not increasing under this permit renewal.

Prepared by:
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Standards and Technical Services Section

Documents:

WLA Document: *grantsville_potw_wla_2018-11-30.docx*
Wasteload Analysis: *grantsville_potw_wla_2018.xlsm*

References:

Holcomb, B. 2014. Memorandum regarding Blue Lakes beneficial uses dated March 25, 2014. Utah Division of Water Quality.

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

WASTELOAD ANALYSIS [WLA] Date: 11/27/2018

Appendix A: Mass Balance Mixing Analysis for Conservative Constituents

Discharging Facility:	Grantsville Lagoons		
UPDES No:	UT-0021130		
Permit Flow [MGD]:	2.25	Annual	Max. Daily
	1.50	Annual	Max. Monthly
Receiving Water:	Blue Lakes		
Stream Classification:	2B, 3D, 4		
Stream Flows [cfs]:	0.0	All Seasons	Critical Low Flow
Fully Mixed:	YES		
Acute River Width:	100%		
Chronic River Width:	100%		

Modeling Information

A mass balance mixing analysis was used to determine the 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)

Physical Parameter	Concentration Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0

Bacteriological

E. coli (30 Day Geometric Mean)	206	(#/100 mL)
E. coli (Maximum)	668	(#/100 mL)

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

Dissolved Oxygen (mg/L)	Minimum Concentration
Instantaneous	3.0
30-day Average	5.0

Inorganics

Parameter	Acute Standard (1 Hour Average) Standard
Phenol (mg/L)	0.010
Hydrogen Sulfide (Undissociated) [mg/L]	0.002

Ammonia-Total (mg/L)

	Chronic (30-day ave)			Acute (1-hour ave)		
Season	Standard	Background	Limit	Standard	Background	Limit
Summer	1.1		1.1	3.2		3.2
Fall	2.5		2.5	3.2		3.2
Winter	2.9		2.9	3.2		3.2
Spring	1.7		1.7	3.2		3.2

Metals-Total Recoverable

	Chronic (4-day ave)			Acute (1-hour ave)		
Parameter	Standard[1]	Background	Limit	Standard[1]	Background	Limit
Aluminum (µg/L)[2]	N/A		NONE	750		750
Arsenic (µg/L)	150		150	340		340
Cadmium (µg/L)	0.5		0.5	5.9		5.9
Chromium VI (µg/L)	11.0		11.0	16.0		16.0
Chromium III (µg/L)	182		182	1,401		1,401
Copper (µg/L)	22.9		22.9	37.8		37.8
Cyanide (µg/L)[2]	5.2		5.2	22.0		22.0
Iron (µg/L)				1,000		1,000
Lead (µg/L)	8.1		8.1	209		209
Mercury (µg/L)[2]	0.012		0.012	2.4		2.4
Nickel (µg/L)	132		132	1,186		1,186
Selenium (µg/L)	4.6		4.6	18.4		18.4
Silver (µg/L)				21.3		21.3
Tributylin (µg/L)[2]	0.072		0.072	0.46		0.46
Zinc (µg/L)	300		300	297		297

1: Based upon a Hardness of 300 mg/l as CaCO3

2: 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]

	Chronic (4-day ave)		Acute (1-hour ave)	
Parameter	**Standard**	**Limit**	**Standard**	**Limit**
Aldrin (µg/L)			1.5	1.5
Chlordane (µg/L)	0.0043	0.0043	1.2	1.2
DDT, DDE (µg/L)	0.001	0.001	0.55	0.55
Diazinon (µg/L)	0.17	0.17	0.17	0.17
Dieldrin (µg/L)	0.0056	0.0056	0.24	0.24
Endosulfan, a & b (µg/L)	0.056	0.056	0.11	0.11
Endrin (µg/L)	0.036	0.036	0.086	0.086
Heptachlor & H. epoxide (µg/L)	0.0038	0.0038	0.26	0.26
Lindane (µg/L)	0.08	0.08	1.0	1.0
Methoxychlor (µg/L)			0.03	0.03
Mirex (µg/L)			0.001	0.001
Nonylphenol (µg/L)	6.6	6.6	28.0	28.0
Parathion (µg/L)	0.0130	0.0130	0.066	0.066
PCB's (µg/L)	0.014	0.014		
Pentachlorophenol (µg/L)	15.0	15.0	19.0	19.0
Toxephene (µg/L)	0.0002	0.0002	0.73	0.73

Radiological

	Maximum Concentration
Parameter	**Standard**
Gross Alpha (pCi/L)	15

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

	Maximum Concentration		
Parameter	**Standard**	**Background**	**Limit**
Total Dissolved Solids (mg/L)	1,200		1,200
Boron (mg/L)	0.8		0.8
Arsenic, Dissolved (µg/L)	100		100
Cadmium, Dissolved (µg/L)	10.0		10.0
Chromium, Dissolved (µg/L)	100		100
Copper, Dissolved (µg/L)	200		200
Lead, Dissolved (µg/L)	100		100
Selenium, Dissolved (µg/L)	50		50
Gross Alpha (pCi/L)	15.0		15.0

Freshwater total ammonia criteria based on Title R317-2-14 Utah Administrative Code
Acute

INPUT	Summer	Fall	Winter	Spring
pH:	8.50	8.50	8.50	8.50
Beneficial use classification:	3D	3D	3D	3D

OUTPUT				
	Total ammonia nitrogen criteria (mg N/L):			
Acute:	3.203	3.203	3.203	3.203

Freshwater total ammonia criteria based on Title R317-2-14 Utah Administrative Code
Chronic

INPUT	Summer	Fall	Winter	Spring
Temperature (deg C):	22.4	9.2	3.3	15.6
pH:	8.20	8.20	8.20	8.20
Are fish early life stages present?	No	No	No	No

OUTPUT				
Total ammonia nitrogen criteria (mg N/L):				
Chronic - Fish Early Life Stages Present:	1.078	1.793	1.793	1.675
Chronic - Fish Early Life Stages Absent:	1.078	2.534	2.912	1.675

State of Utah

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Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

MEMORANDUM

TO: All Parties Involved

FROM: Ben Holcomb, Biological Assessment Program Coordinator

DATE: March 25, 2014

SUBJECT: Grantsville Public Water Works Discharge

Attendance: DWQ—Ben Holcomb, Nick Von Stackelberg, Dan Griffin

Grantsville Public Water Works—Ron Griffin

Background:

An initial review of the receiving waters for Grantsville Public Water Works (GPWW) discharge was conducted on March 24, 2014. The GPWW plant is a lagoon-style facility comprising nine treatment cells. The outfall for the discharge is located at 40.618296, -112.442805 (see GoogleEarth image). From there, the effluent flows north through a man-made ditch ~250 meters where it meets a seasonal depression-wetland (see photos). The wetland area is the southern-most component of a connected wetland-complex referred to as the "Blue Lakes". According to the wastewater operator, Ron Griffin, the Blue Lakes were created in 1948 as a Soil and Conservation District project to serve as a reservoir for irrigation water. From aerial photos, the complex consists of approximately 3-4 'lakes' that collected snowmelt, diversions from Fishing Creek, and the discharge from GPWW. The water in each ponded area was likely controlled by structures between ponds. According to Griffin, the local landowner and irrigator, Russell Johnson, breached these structures circa 2008. Since then, water no longer pools up as lakes, but flows through these areas where it is subsequently diverted into canals for irrigation. Currently, the lake areas are best described as seasonal wetlands and have shallow pools during the spring runoff season (see photos 1 & 2) and become dry shortly thereafter. As such, there is no evidence of a fish community in these wetlands. In the event these areas held water for a longer period of time, it would be difficult for fish to navigate up-gradient due to the defunct water control structures through the dikes (see photo 3 & 4). Furthermore, the water exiting 'downstream' of the Blue Lakes complex appears to be used entirely for irrigation and there is no evidence that it is connected to other water bodies (let alone waters with protective aquatic life uses), so that fish colonizing the receiving water (when it exists) would be highly unlikely.

Currently there is not a formal assessment unit associated with the discharge point; therefore there are no

formal designated aquatic life uses for the receiving water. Typically, in these instances, a default aquatic life use is assumed: 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. (Utah Code: R317-2-6). Due to the evidence that was described above, I believe the default aquatic life use (Class 3D) for the receiving water for the Grantsville WWTP discharge is correct.

Google Earth image of Grantsville treatment cells and marker of where discharge meets receiving water.

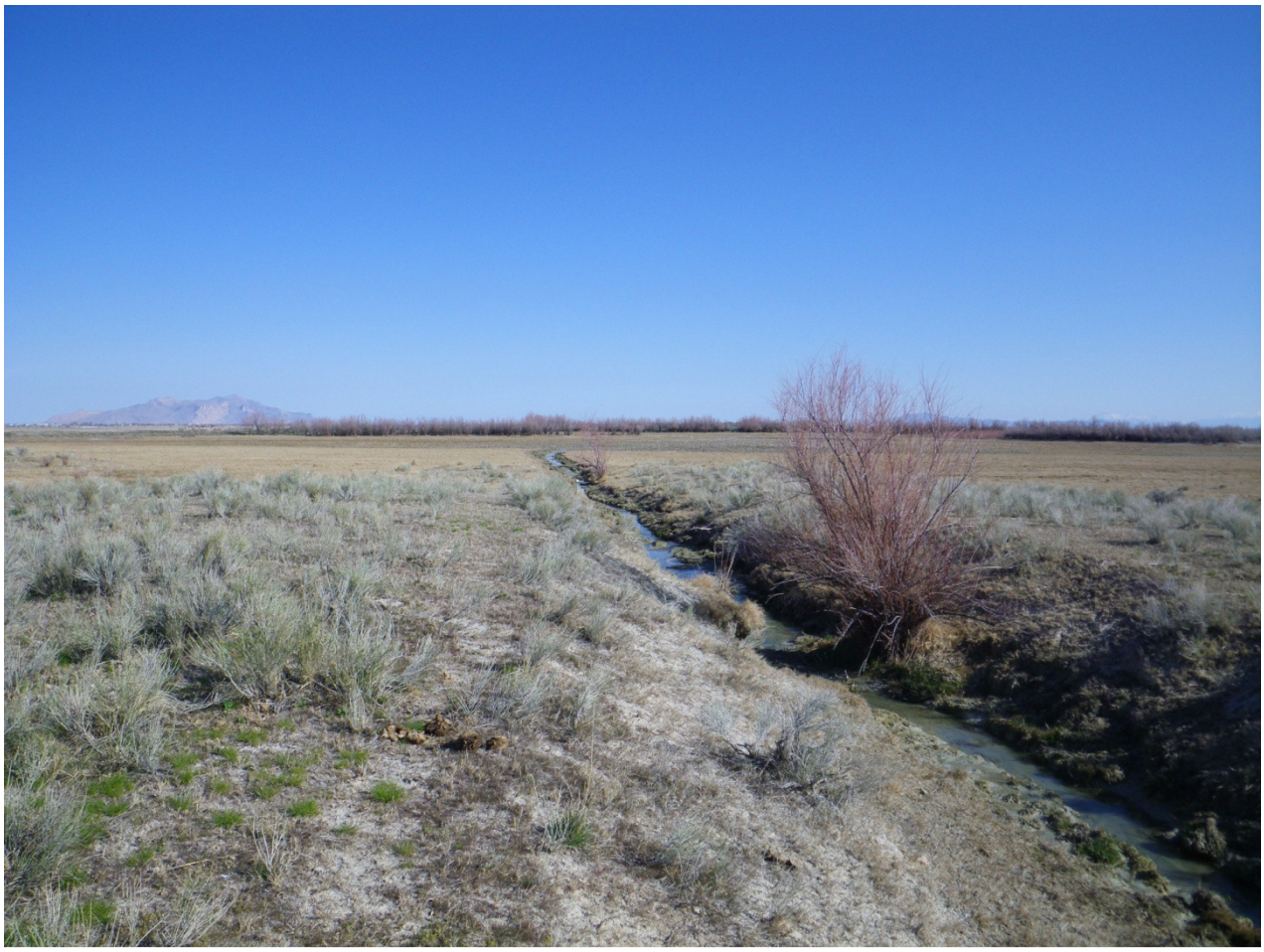

Photo 1. Image of discharge ditch looking north in the direction of flow. Note the vegetation color change from sage uplands, to tan field, and finally green-brown of seasonal wetland receiving water.

Photo 2. Image looking southeast across seasonal wetland towards discharge point. The yellow arrow is pointing at the discharge ditch as it exits the sage uplands and enters the field. The red arrow is pointing at the ditch as it meets the receiving water.

Photo 3. View from the top of dike looking south; below was once the control structure.

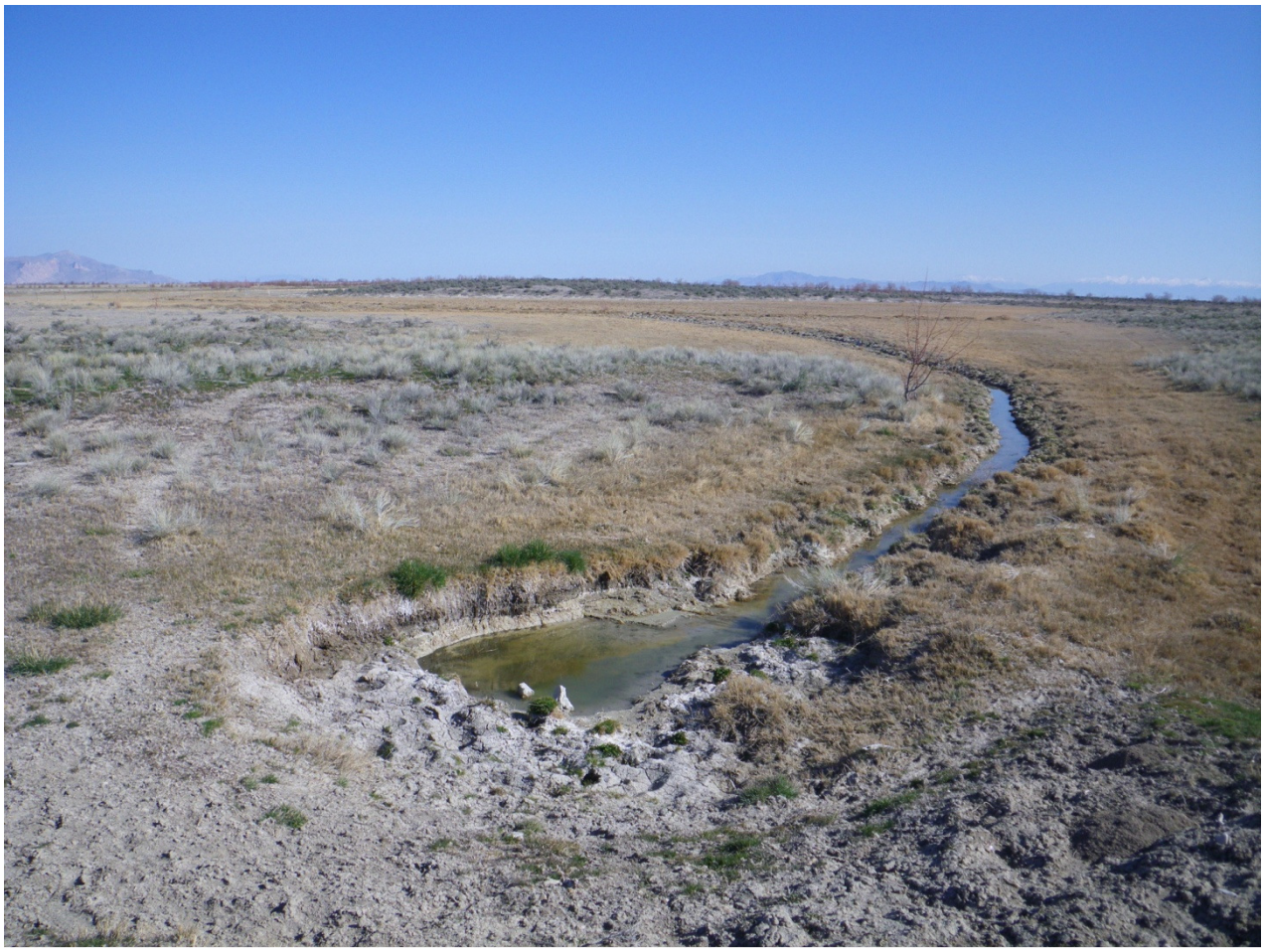

Photo 4. View from the top of dike looking north. Receiving water as it exits the ponded wetland unit.