STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

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C. L. "Butch" Otter, Governor
John H. Tippets, Director

September 26, 2016

Mr. Michael Lidgard
US EPA Region 10
Attn: OWW-191
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

RE: FINAL Water Quality Certification City of Rigby NPDES # ID-0020010

Dear Mr. Lidgard:

On September 8, the Idaho Department of Environmental Quality received the proposed final National Pollutant Discharge Elimination System (NPDES) permit # ID-0020010 for the city of Rigby, Idaho. Accompanying the permit was the request from the Environmental Protection Agency to prepare and issue a final §401 water quality certification (WQC) for the city. Enclosed, please find DEQ's final WQC for the facility.

Please do not hesitate to contact Troy Saffle at 208.528.2650 or troy.saffle@deq.idaho.gov with questions or concerns about this WQC.

Thank you.

Sincerely,

Erick Neher
Regional Administrator
Idaho Fall Regional Office

enclosure

c: Nicole Deinarowicz, DEQ, TRIM reference
John Drabek, EPA Region 10 w/enclosure
Justin Hayes, Idaho Conservation League

Idaho Department of Environmental Quality

Final §401 Water Quality Certification

September 26, 2016

NPDES Permit Number(s): ID0020010 City of Rigby Wastewater Treatment Plant

Receiving Water Body: Dry Bed Creek

Pursuant to the provisions of Section 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act), as amended; 33 U.S.C. Section 1341(a)(1); and Idaho Code §§ 39-101 et seq. and 39-3601 et seq., the Idaho Department of Environmental Quality (DEQ) has authority to review National Pollutant Discharge Elimination System (NPDES) permits and issue water quality certification decisions.

Based upon its review of the above-referenced permit and associated fact sheet, and published reports from the Idaho Department of Fish and Game (IDFG), DEQ certifies that if the permittee complies with the terms and conditions imposed by the permit along with the conditions set forth in this water quality certification, then there is reasonable assurance the discharge will comply with the applicable requirements of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, the Idaho Water Quality Standards (WQS) (IDAPA 58.01.02), and other appropriate water quality requirements of state law.

This certification does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity. This certification does not excuse the permit holder from the obligation to obtain any other necessary approvals, authorizations, or permits.

Antidegradation Review

The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

- Tier 1 Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.07).
- Tier 2 Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).

- Tier 3 Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (IDAPA 58.01.02.052.05.a). Any water body not fully supporting its beneficial uses will be provided Tier 1 protection for that use, unless specific circumstances warranting Tier 2 protection are met (IDAPA 58.01.02.052.05.c). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (IDAPA 58.01.02.052.05).

Description of Dry Bed Creek

Dry Bed Creek is an historic meander of the Snake River. The Dry Bed Creek, referred to as the "Great Feeder", was the main river channel before the South Fork Snake River moved to its present course in 1902. The Dry Bed Creek is now operated as a feeder canal, utilizing head works to control the flow (Idaho Water Resource Board, 1996). When the irrigation season ends, Dry Bed Creek goes dry from the headgate on the Snake River to below the town of Menan. Between the towns of Menan and Roberts, ground water becomes shallow and re-wets Dry Bed Creek for the remainder of its course to the confluence with the Snake, below Roberts. Photographic documentation is provided in Appendix A capturing the dry stream channel during the non-irrigation season. The antidegradation analysis below addresses protection afforded when Dry Bed Creek is flowing.

Changes in Treatment Capacity and Technology

During the current permit cycle, the City of Rigby wastewater treatment plant (WWTP) upgraded the treatment plant from a lagoon-based treatment system to a mechanical treatment process. This upgrade modified the effluent bacteria removal from chlorine treatment to UV disinfection, and increased the design capacity from 0.53 million gallon per day (mgd) to 2.59 mgd. The technology change for bacteria treatment resulted in the removal of the Total Residual Chlorine (TRC) effluent limit from the current permit to the proposed. This modification also results in increased mass load of pollutants of concern—BOD_5, E. *coli* and TSS. These increases are discussed in the sections below.

Pollutants of Concern

The City of Rigby WWTP discharges the following pollutants of concern: biological oxygen demand (BOD_5), total suspended solids (TSS), E. *coli,* pH, temperature, ammonia, phosphorus, copper and chronic whole effluent toxicity (WET_c). Effluent limits have been developed for BOD_5, TSS, E. *coli,* pH, and ammonia. No effluent limits are proposed for phosphorus, temperature, WET_c, or copper, although monitoring is required, with the exception of phosphorus where monitoring has been discontinued.

Receiving Water Body Level of Protection

The City of Rigby WWTP discharges to the Dry Bed Creek within the Idaho Falls subbasin assessment unit (AU) ID17040201SK004_06 (Dry Bed Creek – source to mouth). Dry Bed Creek is undesignated. DEQ presumes undesignated waters in the state will support cold water

aquatic life and primary or secondary contact recreation beneficial uses; therefore, undesignated waters that are not man-made are protected for these uses (IDAPA 58.01.02.101.01.a). There is no available information indicating the presence of any existing beneficial uses aside from those that are already designated.

According to DEQ's 2012 Integrated Report, this AU is included in Category 3 (Unassessed Waters). Therefore, DEQ must provide an appropriate level of protection on a case-by-case basis using information available at this time (IDAPA 58.01.02.052.05.b). Water quality data collected for the draft NPDES permit indicate no exceedance of temperature, pH or ammonia criteria. DEQ collected bacteria samples from stagnant areas of Dry Bed Creek in March, 2016 and found no instantaneous exceedances of the primary contact recreation trigger value of 406 cfu/100 mL. Additionally, salmonid species of fish use Dry Bed Creek as refuge when water levels are sufficiently high (IDFG, 2009, 2010 and 2012); annual fish salvage operations are conducted when water levels are reduced to unsustainable levels for salmonids. Lastly, Idahoan Foods, Inc. Plant 1 in Lewisville annually collects surface water samples for compliance with their DEQ reuse permit. This sampling, conducted approximately 1.5 miles below the City of Rigby WWTP reported nitrogen and phosphorus levels not sufficiently high to impair Dry Bed Creek. As such, DEQ will provide Tier 2 protection, in addition to Tier 1, for aquatic life and recreation uses (IDAPA 58.01.02.051.02; 58.01.02.051.01).

Protection and Maintenance of Existing Uses (Tier 1 Protection)

As noted above, a Tier 1 review is performed for all new or reissued permits or licenses, applies to all waters subject to the jurisdiction of the Clean Water Act, and requires demonstration that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In order to protect and maintain designated and existing beneficial uses, a permitted discharge must comply with narrative and numeric criteria of the Idaho WQS, as well as other provisions of the WQS such as Section 055, which addresses water quality limited waters. The numeric and narrative criteria in the WQS are set at levels that ensure protection of designated beneficial uses. The effluent limitations and associated requirements contained in the City of Rigby WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS. Therefore, the permit will ensure that existing uses and the water quality necessary to protect existing uses are maintained and protected.

High-Quality Waters (Tier 2 Protection)

The Dry Bed Creek is considered high quality for aquatic life and contact recreation. As such, the water quality relevant to these uses of the Dry Bed Creek must be maintained and protected, unless a lowering of water quality is deemed necessary to accommodate important social or economic development.

To determine whether degradation will occur, DEQ must evaluate how the permit issuance will affect water quality for each pollutant that is relevant to aquatic life and contact recreation uses of the Dry Bed Creek (IDAPA 58.01.02.052.05). These include the following: BOD_5, TSS, E. *coli*, pH, temperature, ammonia, phosphorus, copper and WET_c. Effluent limits are established in the proposed and existing permit for BOD_5, E.*coli*, pH, and TSS. An effluent limit for ammonia is established in the proposed permit; WET_c, is required to be monitored and reported (See EPA's Permit, pages 9-13) and; temperature and copper monitoring is required above the

influence of the outfall. For a reissued permit or license, the effect on water quality is determined by looking at the difference in water quality that would result from the activity or discharge as authorized in the current permit and the water quality that would result from the activity or discharge as proposed in the reissued permit or license (IDAPA 58.01.02.052.06.a). For a new permit or license, the effect on water quality is determined by reviewing the difference between the existing receiving water quality and the water quality that would result from the activity or discharge as proposed in the new permit or license (IDAPA 58.01.02.052.06.a).

Pollutants with Limits in the Current and Proposed Permit: BOD_5, E. coli, pH, TSS

For pollutants that are currently limited and will have limits under the reissued permit, the current discharge quality is based on the limits in the current permit or license (IDAPA 58.01.02.052.06.a.i), and the future discharge quality is based on the proposed permit limits (IDAPA 58.01.02.052.06.a.ii). For the City of Rigby WWTP permit, this means determining the permit's effect on water quality based upon the limits for BOD_5, E. *coli, pH,* and TSS in the current and proposed permits. Table 1 provides a summary of the current permit limits and the proposed or reissued permit limits.

Table 1. New and Existing Effluent Limits and Changes in Limits for Outfall 001

		Draft Permit			2005 Permit (Current)			Change[1]		
Parameters	**Units**	**AML[2]**	**AWL[3]**	**MDL[4]**	**AML**	**AWL**	**MDL**	**AML**	**AWL**	**MDL**
	Pollutants with limits in the proposed permit									
Biochemcial Oxygen Demand (BOD_5)	mg/L	30	45	---	30	45	---	NC	NC	---
	lbs/day	648	972	---	133	199	---	I	I	---
BOD_5 Percent Removal	%	85% minimum	--	---	No limits Monitor and report			N	---	---
Total Suspended Solids (TSS)	mg/L	30	45	---	30	45		NC	NC	---
	lbs/day	648	972	---	133	199		I	I	---
TSS Percent Removal	%	85% minimum	---	---	---	---	---	N	---	---
E. *coli*	CFU/100 mL	126	---	406[5]	126	---	406	NC	---	NC
pH	standard units	Between 6.5-9.0						NC	NC	NC
Total ammonia (as N) May 1- September 30[6]	mg/L	4.3	---	12.6	No limits Monitor and report			N	---	N
	lbs/day	93	---	272				N	---	N
Total ammonia (as N) October 1- April 30	mg/L	0.65	---	1.7	No limits Monitor and report			N	---	N
	lbs/day	14	---	37				N	---	N
	Pollutants with no limits in both the current and proposed permit									
Copper	mg/L	No Limits. Monitor and report only	---	---				N		
Whole Effluent Toxicity (WET)	TUc[7]	No limits Monitor and report	---	---				N		
Temperature	°C	No Limits. Monitor and report only	---	---				N		

[1] Change defined as: I-increased limit, D-decreased limit, NC-no change from current permit, N-new in draft permit
[2]AML is Average Monthly Limit
[3]AWL is Average Weekly Limit
[4]MDL is Maximum Daily Limit
[5]Instantaneous value
[6]Final limit achieved by August 1, 2021
[7]TUc is Toxicity Units, chronic

The concentration based effluent limits for BOD_5, E. *coli,* pH, and TSS in the proposed permit are the same as the previous permit. However, the increased capacity of the WWTP results in increased loads for BOD_5, E. *coli* and TSS. Therefore, the new permit will result in some level of degradation.

If the degradation is deemed insignificant, however, then no further Tier 2 analysis is required (IDAPA 58.01.02.52.08.a.iii). Degradation may be deemed insignificant if the discharge results in a cumulative decrease in assimilative capacity of ten percent (10%) or less (IDAPA 58.01.02.52.08.a.i). Table 2 displays the loss of assimilative capacity for these pollutants. Using the 7Q10 flow values for the summer critical flow, there is less than a 10 percent loss in assimilative capacity and DEQ has determined the degradation to be insignificant. A full explanation of those calculations can be found in Appendix B.

Table 2: Dry Bed Creek Change in Assimilative Capacity for Existing Limits

Dry Bed Creek Summer Critical Flow (7Q10) 746 cfs										
		Draft Permit (2016)			2005 Permit (Current)			% change in Assimilative Capacity		
Parameters	**units**	**AML**	**AWL**	**MDL**	**AML**	**AWL**	**MDL**	**AML**	**AWL**	**MDL**
BOD_5	mg/L	30	45	---	30	45	---	0.4%	0.4%	---
	lbs/d	648	972	---	133	199	---			
TSS	mg/L	30	45		30	45		0.4%	0.4%	---
	lbs/d	648	972	---	133	199				
E. *coli*	CFU/100 mL	126	---	406	126	---	406	0.4%	---	0.4%

New Permit Limits for Pollutants Currently Discharged: Ammonia

When new limits are proposed in a reissued permit for pollutants in the existing discharge, the effect on water quality is based upon the current discharge quality and the proposed discharge quality resulting from the new limits. Current discharge quality for pollutants that are not currently limited is based upon available discharge quality data (IDAPA 58.01.02.052.06.a.i). Future discharge quality is based upon proposed permit limits (IDAPA 58.01.02.052.06.a.ii).

The proposed permit for the City of Rigby WWTP includes new limits for ammonia (Table 1). DEQ compared the water quality resulting from the existing level of ammonia discharged (based upon discharge monitoring report data) and the water quality resulting from the proposed ammonia effluent limits. The limits proposed are calculated using pH and temperature data collected near the WWTP, and represent the 95- percentile of all existing pH and temperature data. This data includes values measured after the 2008 upgrades to the WWTP. The May-September limit represents a 5% decrease in assimilative capacity, while the October-April limits

represent an increase in assimilative capacity of 1300% (Table 3). The 5% degradation is less than the 10% threshold established by DEQ for significant degradation. Therefore, the new limits proposed result in no significant degradation with respect to ammonia. A full explanation of those calculations can be found in Appendix C.

Table 3: Dry Bed Creek Change in Assimilative Capacity for Ammonia				
Ammonia Average Monthly Limit				
Parameters	units	Ammonia Average Monthly Limit AML	Current Discharge 95% Percentile since upgrade	% change in Assimilative Capacity[1]
Total ammonia (as N) May 1-September 30	mg/L	4.3	7.21	5%
Total ammonia (as N) October 1- April 30	mg/L	0.65	15.7	-1300%

[1]Negative values indicate an INCREASE in Assimilative Capacity

Pollutants with No Limits: Temperature, Phosphorus, WET_c and Copper

There are four pollutants of concern relevant to Tier 2 protection of aquatic life that currently are not limited and for which the proposed permit also contains no limit: temperature, phosphorus, WET_c and copper. Temperature and phosphorus effluent monitoring was found to be unnecessary in the proposed permit cycle. Effluent water monitoring is proposed for WET_c due to the upgrade in the facility above 1 mgd. Surface water monitoring, above the impact of the outfall, is required for copper, including constituents required for the Biotic Ligand Model (BLM). Using the BLM requires the collection of copper and also dissolved organic carbon, hardness and conductivity. Temperature monitoring is only required upstream of the outfall as part of the surface water monitoring requirements. For such pollutants without effluent limits, a change in water quality is determined by reviewing whether changes in production, treatment, or operation that will increase the discharge of these pollutants are likely (IDAPA 58.01.02.052.04.a.ii). The City of Rigby WWTP increased design flows from 0.53 mgd to 2.59 mgd. There have been no new connections to the City of Rigby WWTP which may have increased levels of these pollutants. However, the increase in design flow may increase the concentration of these pollutants at the edge of a mixing zone. A Tier 2 analysis, however, is only required if the degradation is significant; this only occurs when the discharge of the pollutant will cumulatively decrease the assimilative capacity by more than 10%. There is no information available concerning current levels of WET_c or copper concentration, either in Dry Bed Creek or the City of Rigby WWTP's effluent, therefore making the assimilative capacity analysis impossible to complete. The proposed permit requires monitoring of these pollutants. The next permit cycle will include the assimilative capacity evaluation, once the existing levels of each pollutant are known.

Conditions Necessary to Ensure Compliance with Water Quality Standards or Other Appropriate Water Quality Requirements of State Law

Mixing Zones

Pursuant to IDAPA 58.01.02.060, DEQ authorizes a mixing zone that utilizes 25% of the critical flow volumes of Dry Bed Creek for ammonia.

Compliance Schedule

Ammonia limit compliance will require modifications to the City of Rigby WWTP. EPA considered these upgrades and proposed a schedule of compliance with interim tasks related to planning, funding and modifying the WWTP and outlined them in the draft permit. DEQ authorizes this compliance schedule pursuant to IDAPA 58.01.02.400.03, except that the City of Rigby WWTP must comply with the final ammonia limits by **August 1, 2023**.

Other Conditions

This certification is conditioned upon the requirement that any material modification of the permit or the permitted activities—including without limitation, any modifications of the permit to reflect new or modified TMDLs, wasteload allocations, site-specific criteria, variances, or other new information—shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to Section 401.

Right to Appeal Final Certification

The final Section 401 Water Quality Certification may be appealed by submitting a petition to initiate a contested case, pursuant to Idaho Code § 39-107(5) and the "Rules of Administrative Procedure before the Board of Environmental Quality" (IDAPA 58.01.23), within 35 days of the date of the final certification.

Questions or comments regarding the actions taken in this certification should be directed to Troy Saffle, Idaho Falls Regional Office at 208.528.2650 or troy.saffle@deq.idaho.gov.

Erick Meher
Regional Administrator
Idaho Falls Regional Office

References

Idaho Water Resources Board. December 13, 1996. Comprehensive State Water Plan SWP: South Fork Snake River Basin.

Idaho Department of Fish and Game. 2009, 2010, 2012. Annual Fisheries Report. https://collaboration.idfg.idaho.gov/FisheriesTechnicalReports/Forms/AllItems.aspx

Appendix A: Photographic Documentation of Dry Bed Creek

Figure 1 Great Feeder Diversion Maintenance 2016

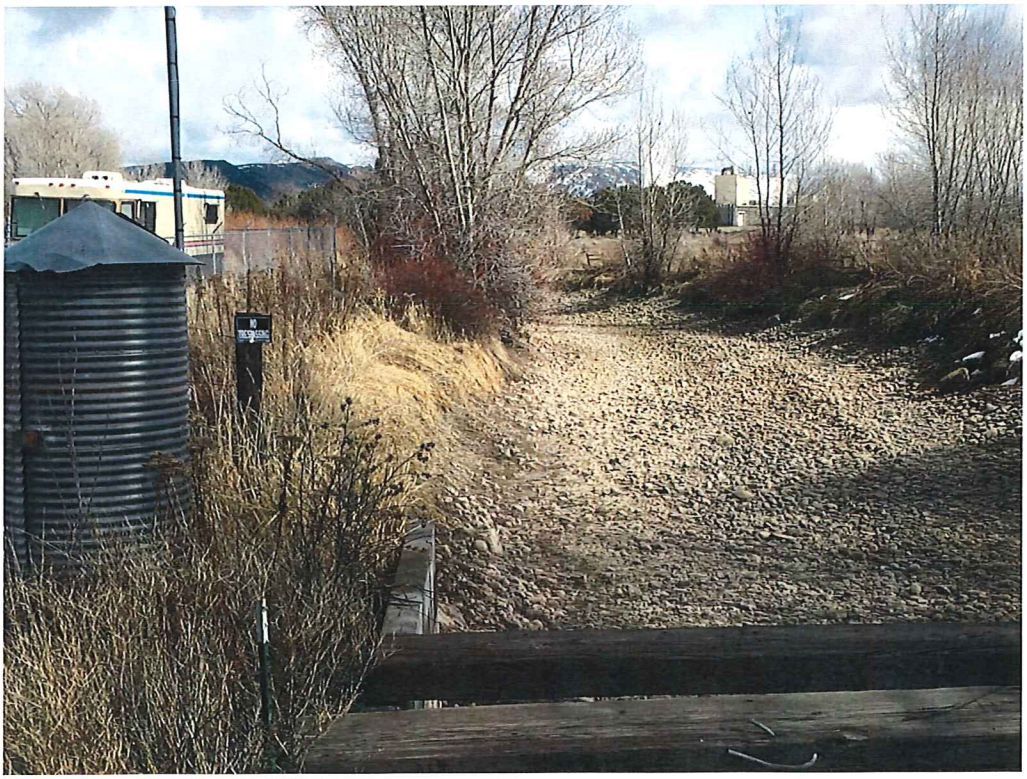

Figure 2 Dry Bed Creek at Ririe

Figure 3 Dry Bed Creek between Ririe and Rigby

Figure 4 Rigby Outfall into Dry Bed Creek Depression (Outfall Flow approx. 0.3 mgd)

Figure 5 Dry Bed Creek at Menan

Figure 6 Dry Bed Creek at Roberts

Appendix B: Antidegradation calculations for Pollutants of Concern with Increase Loads

Three pollutants had no change in the effluent limits, but do have increasing mass limits. Table B displays the results of insignificant degradation for BOD_5, TSS and E. *coli.* These limits are technology based and part of all municipal waste water treatment plants and identify the minimum levels of effluent quality for these pollutants

Table B: Dry Bed Creek Change in Assimilative Capacity for Existing Limits

Dry Bed Creek Summer Critical Flow (7Q10) 746 cfs										
		Draft Permit (2016)			2005 Permit (Current)			% change in Assimilative Capacity		
Parameters	**units**	**AML**	**AWL**	**MDL**	**AML**	**AWL**	**MDL**	**AML**	**AWL**	**MDL**
BOD_5	mg/L	30	45	---	30	45	---	0.4%	0.4%	---
	lbs/d	648	972	---	133	199	---			
TSS	mg/L	30	45		30	45		0.4%	0.4%	---
	lbs/d	648	972	---	133	199				
E. *coli*	CFU/100 mL	126	---	406	126	---	406	0.4%	---	0.4%

These values were calculated using DEQ's draft Antidegradation Guidance Document (2012). The calculations for each pollutant are below.

BOD_5 and TSS Percentage Change in Assimilative Capacity

Technology based limits for these pollutants are the same, at 30 mg/L and 45 mg/L respectively. Because the loading increases due to design capacity upgrades, degradation will occur. DEQ quantifies degradation by the percentage loss of assimilative capacity through the following equations and input parameters:

Background concentrations: 0 mg/L
Effluent Limits: 30 mg/L (AML) and 45 mg/L (AWL)
Remaining assimilative capacity: 30 mg/L (AML) and 45 mg/L (AWL)
10% of remaining assimilative capacity: 3.0 mg/L (AML) and 4.5 mg/L (AWL)
Increase in design flow: 0.53 mgd (0.82 cfs) to 2.59 mgd (4.0 cfs)
Receiving water flow: 746 cfs

Current Mixed Concentration: 0.03 mg/L (AML)
Proposed Mixed Concentration: 0.16 mg/L (AML)

0.16 – 0.03 = 0.13 mg/L (0.43%) is the reduction in assimilative capacity for the AML

Current Mixed Concentration: 0.05 mg/L (AWL)
Proposed Mixed Concentration: 0.24 mg/L (AWL)

0.24-0.05 = 0.19 mL (0.42%) is the loss of assimilative capacity for the AWL

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [(Ce * Qe) +(Cu * Qu)] / (Qe+Qu)

Where:

Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)
Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316)

E. *coli* Percentage Change in Assimilative Capacity

Water quality based limits for E. *coli* are 126 cfu/100 mL (AWL) and 406 cfu/100 mL (MDL) respectively.

Because the loading increases due to design capacity upgrades, degradation will occur. DEQ quantifies degradation by the percentage loss of assimilative capacity through the following equations and input parameters:

Background concentrations: 0 cfu/100mL
Effluent Limits: 126 cfu/100 mL (AML) and 406 cfu/100 mL (MDL)
Remaining assimilative capacity: 126 cfu/100 mL (AML) and 406 cfu/100 mL (MDL)
10% of remaining assimilative capacity: 12.6 cfu/100 mL (AML) and 40.6 cfu/100 mL (MDL)
Increase in design flow: 0.53 mgd (0.82 cfs) to 2.59 mgd (4.0 cfs)
Receiving water flow: 746 cfs

Current Mixed Concentration: 0.14 cfu/100 mL (AML)
Proposed Mixed Concentration: 0.67 mg/L (AML)

0.67-0.14= 0.53 cfu/100mL (0.42%) reduction in assimilative capacity for the AML

Current Mixed Concentration: 0.45 cfu/100 mL (MDL)
Proposed Mixed Concentration: 2.17 cfu/100 mL (MDL)

2.17-0.45 = 1.7 cfu/100 mL (0.4%) is the loss of assimilative capacity for the MDL

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [(Ce * Qe) +(Cu * Qu)] / (Qe+Qu)

Where:
Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)

Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316)

Appendix C: Antidegradation Calculations for Pollutants of Concern with New Limits

The proposed permit for the City of Rigby WWTP includes new limits for ammonia (Table C). DEQ compared the water quality resulting from the existing level of ammonia discharged (based upon discharge monitoring report data) and the water quality resulting from the proposed ammonia effluent limits. The limits proposed are calculated using pH and temperature data collected near the WWTP, and represent the 95th percentile of all existing pH and temperature data. This data includes values measured after the 2008 upgrades to the WWTP. Antidegradation calculations are also based on the monitored ammonia values using DEQ's draft Antidegradation Guidance Document (2012).

Table C: Dry Bed Creek Change in Assimilative Capacity for Ammonia				
Ammonia Average Monthly Limit				
Parameters	units	Ammonia Average Monthly Limit AML	Current Discharge 95 Percentile since upgrade	% change in Assimilative Capacity[1]
Total ammonia (as N) May 1-September 30	mg/L	4.3	7.21	5%
Total ammonia (as N) October 1- April 30	mg/L	0.65	15.7	-1300%

[1]Negative values indicate an INCREASE in Assimilative Capacity

Background concentrations: 7.21 mg/L May-Sep and 15.7 mg/L Oct-Apr
Proposed Effluent Limits: 4.3 mg/L (AML) May-Sep
Proposed Effluent Limits: 0.65 (AML) Oct-Apr
Remaining assimilative capacity: 2.91 mg/L May-Sep and 6.65 mg/L Oct-Apr
0.294 mg/L May-Sep and 0.633 mg/L (AML)
10% of remaining assimilative capacity: 0.291 mg/L (AML) and 0.665mg/L (AML)
Increase in design flow: 0.53 mgd (0.82 cfs) to 2.59 mgd (4.0 cfs)
Receiving water flow: 746 cfs May-Sep, 0.65 cfs Oct-Apr

Current Mixed Concentration: 0.1 mg/L May-Sep and 8.8 mg/L Oct-Apr
Proposed Mixed Concentration: 0.1 mg/L May-Sep and 0.6 mg/L Oct-Apr

0.1-0.1 = 0.0 mg/L (5%) is the reduction in assimilative capacity for the May-Sep AML
0.6-8.8= -8.2 mg/L (-1300%) is the increase in assimilative capacity for Oct-Apr AML

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [(Ce * Qe) +(Cu * Qu)] / (Qe+Qu)

Where:

Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)

Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316