ANTIDEGRADATION REVIEW FORM
UTAH DIVISION OF WATER QUALITY

Instructions

The objective of antidegradation rules and policies is to protect existing high quality waters and set forth a process for determining where and how much degradation is allowable for socially and/or economically important reasons. In accordance with Utah Administrative Code (UAC R317-2-3), an antidegradation review (ADR) is a permit requirement for any project that will increase the level of pollutants in waters of the state. The rule outlines requirements for Level I and Level II ADRs, as well as public comment procedures. This review form is intended to assist the applicant and Division of Water Quality (DWQ) staff in complying with the rule but is not a substitute for the complete rule in R317-2-3.5. Additional details can be found in the *Utah Antidegradation Implementation Guidance* and relevant sections of the guidance are cited in this review form.

ADRs should be among the first steps of an application for a UPDES permit because the review helps establish treatment expectations. The level of effort and amount of information required for the ADR depends on the nature of the project and the characteristics of the receiving water. To avoid unnecessary delays in permit issuance, the Division of Water Quality (DWQ) recommends that the process be initiated at least one year prior to the date a final approved permit is required.

DWQ will determine if the project will impair beneficial uses (Level I ADR) using information provided by the applicant and whether a Level II ADR is required. The applicant is responsible for conducting the Level II ADR. For the permit to be approved, the Level II ADR must document that all feasible measures have been undertaken to minimize pollution for socially, environmentally or economically beneficial projects resulting in an increase in pollution to waters of the state.

For permits requiring a Level II ADR, this antidegradation form must be completed and approved by DWQ before any UPDES permit can be issued. Typically, the ADR form is completed in an iterative manner in consultation with DWQ. The applicant should first complete the statement of social, environmental and economic importance (SEEI) in Part C and determine the parameters of concern (POC) in Part D. Once the POCs are agreed upon by DWQ, the alternatives analysis and selection of preferred alternative in Part E can be conducted based on minimizing degradation resulting from discharge of the POCs. Once the applicant and DWQ agree upon the preferred alternative, the review is considered complete, and the form must be signed, dated, and submitted to DWQ.

For additional clarification on the antidegradation review process and procedures, please contact Nicholas von Stackelberg (801-536-4374) or Dave Wham (801-536-4337).

Utah Division of Water Quality
Antidegradation Review Form

Part A: Applicant Information

Facility Name: Riverton City Green Artesian Well

Facility Owner: Riverton City

Facility Location: 12400 River Vista Drive

Form Prepared By: Sunrise Engineering

Outfall Number: 001

Receiving Water: Jordan River

What Are the Designated Uses of the Receiving Water (R317-2-6)?
Domestic Water Supply: None
Recreation: 2B - Secondary Contact
Aquatic Life: 3A - Cold Water Aquatic Life
Agricultural Water Supply: 4
Great Salt Lake: None

Category of Receiving Water (R317-2-3.2, -3.3, and -3.4): Category 3

UPDES Permit Number (if applicable): N/A

Effluent Flow Reviewed: 700 gpm
Typically, this should be the maximum daily discharge at the design capacity of the facility. Exceptions should be noted.

What is the application for? (check all that apply)

☒ A UPDES permit for a new facility, project, or outfall.

☐ A UPDES permit renewal with an expansion or modification of an existing wastewater treatment works.

☐ A UPDES permit renewal requiring limits for a pollutant not covered by the previous permit and/or an increase to existing permit limits.

☐ A UPDES permit renewal with no changes in facility operations.

Part B. Is a Level II ADR required?

This section of the form is intended to help applicants determine if a Level II ADR is required for specific permitted activities. In addition, the Executive Secretary may require a Level II ADR for an activity with the potential for major impact on the quality of waters of the state (R317-2-3.5a.1).

B1. The UPDES permit is new or is being renewed and the proposed effluent concentration and loading limits are higher than the concentration and loading limits in the previous permit and any previous antidegradation review(s).

☒ **Yes** (Proceed to Part B2 of the Form)

☐ **No** No Level II ADR is required and there is no need to proceed further with review questions.

B2. Will any pollutants use assimilative capacity of the receiving water, i.e. do the pollutant concentrations in the effluent exceed those in the receiving waters at critical conditions? For most pollutants, effluent concentrations that are higher than the ambient concentrations require an antidegradation review. For a few pollutants, such as dissolved oxygen, an antidegradation review is required if the effluent concentrations are less than the ambient concentrations in the receiving water. (Refer to Section 3.3 of Implementation Guidance)

☒ **Yes** (Proceed to Part B3 of the Form)

☐ **No** No Level II ADR is required and there is no need to proceed further with review questions.

B3. Are water quality impacts of the proposed project temporary and limited (Section 3.3.3 of Implementation Guidance)? Proposed projects that will have temporary and limited effects on water quality can be exempted from a Level II ADR.

☐ **Yes** Identify the reasons used to justify this determination in Part B3.1 and proceed to Part G. No Level II ADR is required.

☒ **No** A Level II ADR is required (Proceed to Part C)

B3.1 Complete this question only if the applicant is requesting a Level II review exclusion for temporary and limited projects (see R317-2-3.5(b)(3) and R317-2-3.5(b)(4)). For projects requesting a temporary and limited exclusion please indicate the factor(s) used to justify this determination (check all that apply and provide details as appropriate) (Section 3.3.3 of Implementation Guidance):

☐ Water quality impacts will be temporary and related exclusively to sediment or turbidity and fish spawning will not be impaired.

Factors to be considered in determining whether water quality impacts will be temporary and limited:

a) The length of time during which water quality will be lowered:
b) The percent change in ambient concentrations of pollutants:
c) Pollutants affected:
d) Likelihood for long-term water quality benefits:
e) Potential for any residual long-term influences on existing uses:
f) Impairment of fish spawning, survival and development of aquatic fauna excluding fish removal efforts:

Additional justification, as needed:

Level II ADR

Part C, D, E, and F of the form constitute the Level II ADR Review. The applicant must provide as much detail as necessary for DWQ to perform the antidegradation review. Questions are provided for the convenience of applicants; however, for more complex permits it may be more effective to provide the required information in a separate report. Applicants that prefer a separate report should record the report name here and proceed to Part G of the form.

Optional Report Name:

Part C. Is the degradation from the project socially and economically necessary to accommodate important social or economic development in the area in which the waters are located?

The applicant must provide as much detail as necessary for DWQ to concur that the project is socially and economically necessary when answering the questions in this section. More information is available in Section 6.2 of the Implementation Guidance.

C1. Describe the social and economic benefits that would be realized through the proposed project, including the number and nature of jobs created and anticipated tax revenues.

This deployment will use previous unused water resources that the public have already paid for, provide additional water resources to the west bench of Salt Lake County that is growing significantly and will need additional water resources. This will also add more jobs to the Riverton City Water team.

This deployment will be cheaper for Riverton City then the water that they are currently sourcing.

C2. Describe any environmental benefits to be realized through implementation of the proposed project.

The deployment of this Reverse Osmosis system will enable Riverton City to use water resources that have already been developed.

Discharging water into the Jordan River would help contribute to low water levels year round. This would help the river to support all other uses.

C3. Describe any social and economic losses that may result from the project, including impacts to recreation or commercial development.

The equipment will be stored on a small portion of a public park. That small portion of the park will no longer be capable of recreation use.

C4. Summarize any supporting information from the affected communities on preserving assimilative capacity to support future growth and development.

According to the Utah Division of Water Rights, Riverton City has added 2,633 estimated residential connections to their culinary water system in the last five years. That is an average growth rate of 4.8% per year. That is a very large growth rate in a small amount of time. Riverton City is looking to treat the water from the Green Artesian well in order to add additional water source to their system, with the least cost to their users. This well water would not be put to beneficial use without the treatment of this water.

C5. Please describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

A Toray Low Pressure Reverse Osmosis system will be installed in a building near the well. The discharge would be piped to the Jordan River.

Part D. Identify and rank (from increasing to decreasing potential threat to designated uses) the parameters of concern. *Parameters of concern are parameters in the effluent at concentrations greater than ambient concentrations in the receiving water. The applicant is responsible for identifying parameter concentrations in the effluent and DWQ will provide parameter concentrations for the receiving water. More information is available in Section 3.3.3 of the Implementation Guidance.*

Parameters of Concern:

Rank	Pollutant	Ambient		Effluent	
		Concentration / Units	Basis	Concentration / Units	Basis
1	Total Dissolved Solids			1,198 mg/L	
2	Selenium	0.0014 mg/L		0.0072 mg/L	
3	Temperature		12.2 C		20 C
4	Cadium	0.0001 mg/L		0.0004 mg/L	
5	Chromium	0.0019 mg/L		0.0093 mg/L	
6	Cyanide	0.0035 mg/L		0.0037 mg/L	
7	Lead	0.00045 mg/L		0.0009 mg/L	
8	Mercury	0.000008 mg/L		0.0004 mg/L	
9	Nickel	0.005 mg/L		0.0093 mg/L	
10	Silver	0.0005 mg/L		0.0009 mg/L	

Pollutants Evaluated that are not Considered Parameters of Concern:

Pollutant	Ambient Concentration	Effluent Concentration	Justification
Arsenic	0.012 mg/L	0.0091 mg/L	Lower than the WLA
Copper	0.0047 mg/L	0.0030 mg/L	Lower than the WLA
Zinc	0.023 mg/L	0.0185 mg/L	Lower than the WLA

Part E. Alternative Analysis Requirements of a Level II Antidegradation Review.

Level II ADRs require the applicant to determine whether there are feasible less-degrading alternatives to the proposed project. For new and expanded discharges, the Alternatives Analysis must be prepared under the supervision of and stamped by a Professional Engineer registered with the State of Utah. DWQ may grant an exception from this requirement under certain circumstances, such as the alternatives considered potentially feasible do not include engineered treatment alternatives.More information regarding the requirements for the Alternatives Analysis is available in Section 5 of the Implementation Guidance.

E1. The UPDES permit is being renewed without any changes to flow or concentrations. Alternative treatment and discharge options including changes to operations and maintenance were considered and compared to the current processes. No economically feasible treatment or discharge alternatives were identified that were not previously considered for any previous antidegradation review(s).

☐ **Yes** (Proceed to Part F)

☒ **No or Does Not Apply** (Proceed to E2)

E2. Attach as an appendix to this form a report that describes the following factors for all alternative treatment options 1) a technical description of the treatment process, including construction costs and continued operation and maintenance expenses, 2) the mass and concentration of discharge constituents, and 3) a description of the reliability of the system, including the frequency where recurring operation and maintenance may lead to temporary increases in discharged pollutants. Most of this information is typically available from a Facility Plan, if available.

Report Name:

Riverton City Green Artesian Well Alternative Treatment Report

Waste Stream Treatment Analysis

E3. Describe the proposed method and cost of the baseline treatment alternative. The baseline treatment alternative is the minimum treatment required to meet water quality based effluent limits (WQBEL) as determined by the preliminary or final wasteload analysis (WLA) and any secondary or categorical effluent limits.

E4. Were any of the following alternatives feasible and affordable?

Alternative	Feasible	Reason Not Feasible/Affordable
Pollutant Trading	No	According to the EPA website on the NPDES Water Quality Trading there is no existing water quality trading to join in Utah. It would also be very difficult to purchase a different companies discharge credits for the Jordan River.
Water Recycling/Reuse	No	The TDS level of the effluent will be too high for the effluent to be used as irrigation of the adjacent park.
Land Application	No	The TDS level of the effluent will be too high for the effluent to be used as irrigation of the adjacent park.
Connection to Other Facilities	No	There are no other facilities nearby that the Reverse Osmosis System may discharge to.
Upgrade to Existing Facility	Yes	
Total Containment	No	There is not enough land nearby to create a total containment pond.
Improved O&M of Existing Systems	No	The well is existing, but has not been in use. There are no existing treatment systems in place.
Seasonal or Controlled Discharge	No	It is not feasible to create a tank large enough to allow for seasonal discharge only.
New Construction	No	The well is existing, and it is more affordable to treat the existing well water than to create a new source of water for the City.
No Discharge	No	The City needs more culinary water, and the well does not meet Division of Drinking Water Standards without additional treatment.

E5. From the applicant's perspective, what is the preferred treatment option?

The preferred method would be to upgrade the existing well with a reverse osmosis treatment plant. This would require the plant to discharge the effluent to the Jordan River.

E6. Is the preferred option also the least polluting feasible alternative?

☒ **Yes**

☐ **No**

If no, what were less degrading feasible alternative(s)? ☐

If no, provide a summary of the justification for not selecting the least polluting feasible alternative and if appropriate, provide a more detailed justification as an attachment.

Part F. Optional Information

F1. Does the applicant want to conduct optional public review(s) in addition to the mandatory public review? Level II ADRs are public noticed for a thirty day comment period. More information is available in Section 3.7.1 of the Implementation Guidance.

☒ **No**

☐ **Yes**

F2. Does the project include an optional mitigation plan to compensate for the proposed water quality degradation?

☒ **No**

☐ **Yes**

Report Name: ☐

Part G. Certification of Antidegradation Review

G1. Applicant Certification

The form should be signed by the same responsible person who signed the accompanying permit application or certification.

Based on my inquiry of the person(s) who manage the system or those persons directly responsible for gathering the information, the information in this form and associated documents is, to the best of my knowledge and belief, true, accurate, and complete.

Print Name: John L. Holbrook

Signature: John J Holbrook

Date: 1-12-22

G2. DWQ Approval

To the best of my knowledge, the ADR was conducted in accordance with the rules and regulations outlined in UAC R-317-2-3.

Print Name: _____

Signature: _____

Date: _____

RIVERTON CITY
WASTE STREAM TREATMENT ANALYSIS

January 12, 2022

Prepared by:

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1.0 INTRODUCTION

This report is meant to accompany the Antidegradation Review Form as part of the Riverton City's Green Artesian Well Reverse Osmosis Discharge permit application.

Riverton City purchases the majority of their water source from the Jordan River Water Conservancy District. This is expensive and limits the growth that Riverton City can experience.

Riverton City currently owns the Green Artesian Well, but they are not able to use the water from the well because the water does not meet Division of Drinking Water standards. Though the Green Artesian Well remains unused, it has already been paid for and could potentially provide additional water resources to the west bench of Salt Lake County at a lower cost than the current water supply the City is sourcing. For this reason, the City hopes to use a reverse osmosis (RO) system to treat the well water to provide culinary water that meets Division of Drinking Water standards. The proposed RO system will be 46% efficient; therefore, the RO reject will have a higher concentration of toxic metals than the source water.

The City has been monitoring the water quality of the well for the past several years. Samples were taken annually, between 2017 and 2020, and used to in the analysis of this well treatment. Additional samples were taken in 2021 as Riverton City began to explore the possibility of turning the Riverton City well into a culinary well. The results of the sampling are shown on Table 1. Table 1 also shows the calculated RO reject concentration. To be conservative, the RO rejection concentrations were calculated using the maximum values from the historical data. The minimum level detectable was assigned if the samples listed the parameter as non-detectable.

Table 1

	Riverton Well - Compiled Historical Analyses							
	7/18/17	9/10/19	7/15/20	4/15/21	8/12/21	**Average**	**Max**	**RO 46% Recovery Reject Concen.**
TDS (mg/L)	576	584	572	620	608	565	620	1148.1
Selenium (µg/L)	3.9	2.9	2.4	2.6	2.8	2	4	7.2
Arsenic (mg/L)	0.0049	0.0045	0.0045	0.0032		0.0043	0.0049	0.0091
* Cadmium (mg/L)	0.0002	0.0002	0.0002			0.0002	0.0002	0.0004
* Chromium (mg/L)	0.005	0.005	0.005			0.0050	0.0050	0.0093
Copper (mg/L)	0.0016	0.001				0.0013	0.0016	0.0030
* Cyanide (mg/L)	0.002	0.002	0.002			0.0020	0.0020	0.0037
* Lead (mg/L)	0.0005	0.0005				0.0005	0.0005	0.0009
* Mercury (mg/L)	0.0002	0.0002	0.0002			0.0002	0.0002	0.0004
* Nickel (mg/L)	0.005	0.005	0.005			0.0050	0.0050	0.0093
* Silver (mg/L)	0.0005	0.0005				0.0005	0.0005	0.0009
* Zinc (mg/L)	0.01	0.01				0.0100	0.0100	0.0185
Iron (mg/L)	0.06	0.05		0.03		0.0467	0.0600	0.1111

* Indicates that levels were considered non-detectable during sampling. To be conservative, the minimum level detectable was assigned.

The purpose of this report is to identify parameters of concern and determine if secondary treatment is recommended prior to discharge. To identify these parameters, the RO reject concentration found in Table 1 was compared to the Chronic Metals-Total Recoverable Background levels, shown on page A-2 of the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review, dated December 6, 2021, see Table 2.

Table 2

	Comparison of Maximum RO Recovery Reject Concentration Vs. Chronic Metals-Recoverable Background Levels		
	RO 46% Recovery Reject Concen.	Chronic Metals-Recoverable Background Levels	Acute (1-hour Ave) Background Levels
TDS (mg/L)	1148.1		
Selenium (µg/L)	7.2	1.4	
Arsenic (µg/L)	9.1	12	
* Cadmium (µg/L)	0.4	0.1	
* Chromium (µg/L)	9.3	1.9	
Copper (µg/L)	3.0	4.7	
* Cyanide (µg/L)	3.7	3.5	
* Lead (µg/L)	0.9	0.45	
* Mercury (µg/L)	0.4	0.008	
* Nickel (µg/L)	9.3	5	
* Silver (µg/L)	0.9		0.5
* Zinc (µg/L)	18.5	23.6	
Iron (µg/L)	111.1		32

* Indicates that levels were considered non-detectable during sampling. To be conservative, the minimum level detectable was assigned.

The Division of Water Quality also provided the Jordan Basin Water Reclamation Facility's wasteload analysis (WLA), which was also used for comparison.

2.0 PARAMETERS OF CONCERN

Parameters of concern were identified by comparing the projected maximum concentration with to the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review, dated December 6, 2021. Parameters in which the projected concentration exceeded the levels identified on the wasteload analysis are of concern and will discussed below.

2.1 SELENIUM

A 46% efficient system would also take the 3.4 µg/L of selenium into the RO and discharge 7.2 µg/L of selenium. We began evaluating selenium reduction methods in May due to the chronic limit of 4.6 µg/L, indicated on a waste load analysis dated May 14, 2020. Zero Valent Iron (ZVI) was investigated as a method to reduce the selenium concentration in the RO reject. This method proved to be effective in reducing the selenium; however, it significantly increases the concentration of iron in the water way above and adds significant construction and operational cost to the City.

Through email communication on October 25, 2021 and the Utah's Combined 2018/2020 Integrated Report, selenium was delisted as a pollutant of concern in the segment of the Jordan River that the proposed Riverton facility would discharge into. The Jordan Basin Water Reclamation Facility's wasteload analysis shows a chronic limit for selenium of 8.7 µg/L. The proposed discharge of 7.2 µg/L is below the chronic limit used by the Jordan Basin Water Reclamation Facility; therefore, no additional treatment is recommended at this time.

2.2 CADMIUM

When sampling, cadmium was undetectable. To be conservative, the minimum level detectable (0.2 µg/L) was assigned as the cadmium concentration. The proposed 46% efficient system would concentrate the assumed 0.2 µg/L of cadmium and discharge 0.4 µg/L cadmium. The discharge concentration of 0.4 µg/L is greater than the Chronic Metal-Total Recoverable Background level (0.1 µg/L) assigned in the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level 1 Review and is listed as a parameter of concern; however, it is less than the chronic limit of 0.46 µg/L used by the Jordan Basin Water Reclamation Facility. Therefore, no additional treatment is recommended for cadmium at this time.

2.3 CHROMIUM

Chromium was also undetectable during sampling. Therefore, to be conservative, the minimum level detectable was assigned to chromium, or 5 µg/L. The proposed RO system would concentrate the assumed chromium level to a discharge of 9.3 µg/L. Page A-2 of the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review shows a chronic background level for chromium VI and chromium III of 1.9 µg/L.

The chromium concentrate of the Jordan Basin Water Reclamation Facility's WLA shows a chromium III limit of 526 µg/L and a chromium VI limit of 19.2 µg/L, both of which are considerably higher than the maximum calculated RO reject concentration. For this reason, no additional treatment is recommended for chromium at this time.

2.4 CYANIDE

Cyanide was also undetectable during the sampling; therefore, to be conservative, the minimum level detectable was assigned, or 2 µg/L. The cyanide discharge concentration (3.7 µg/L) is greater the background level indicated on the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review, which shows a level of 3.5 µg/L; however, it is less than the chronic limit of 11.3 µg/L used by the Jordon Basin Water Reclamation Facility. No additional treatment is recommended for cyanide at this time.

2.5 LEAD

Lead was undetectable in the water samples. To remain conservative, the minimum level detectable was assigned, which is 0.5 µg/L in the case of lead. With a 46% efficient RO system, the discharge would have a concentration of 0.9 µg/L of lead. According to the wasteload analysis dated December 6, 2021, the chronic background limit for lead was 0.45 µg/L; therefore, the lead concentration has to the potential to be high, comparatively.

The lead concentration in the Jordan Basin Water Reclamation Facility's WLA shows a limit for lead at 34.5 µg/L, which is higher than the anticipated discharge concentrate. Therefore, no treatment is recommended at this time.

2.6 MERCURY

Mercury was also undetectable in the water samples, so the conservative level of 0.2 µg/L was assigned. Using this minimum detectable level and treatment through the proposed 46% efficient system, the maximum mercury concentration in the discharge would be 0.4 µg/L. The Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review shows a chronic background level of 0.008 µg/L for mercury. Additionally, the Jordan Basin Water Reclamation Facility's WLA shows a chronic limit

of 0.026 µg/L. In comparison, the mercury concentration in the RO recovery reject has the potential of being too high; however, the actual mercury levels are unknown. It is possible that the mercury level is much lower than assigned. For this reason, no treatment is recommended at this time. It is also recommended that mercury should be monitored over time and additional treatment should be evaluated if the concentration is found to exceed 0.026 µg/L.

2.7 NICKEL

Nickel, like many of the other parameters of concern, was undetectable during sampling. To remain conservative, the minimum level detectable was assigned to nickel, or 5 µg/L. A 46% efficient system would also take the 5 µg/L of nickel into the RO and discharge 9.3 µg/L of nickel. A concentrate of 9.3 µg/L is greater than that shown on the Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review (shown at 5 µg/L); however, it is less than the chronic limit of 327 µg/L, shown on the Jordan Basin Water Reclamation Facility's WLA. No treatment is recommended at this time.

2.8 SILVER

Silver was also undetectable in the water samples. For this reason, the minimum level detectable was assigned to silver, or 0.5 µg/L and after treatment, the discharge concentration of silver would be approximately 0.9 µg/L. The Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review indicates an acute (1-hour ave background) level of 0.5 µg/L, which is lower than the discharge concentration. The silver concentration in the Jordan Basin Water Reclamation Facility's WLA shows an acute limit for silver at 53 µg/L, which is higher than the anticipated discharge concentrate. Therefore, no treatment is recommended at this time.

2.9 IRON

A 46% efficient system would take the 46.7 µg/L of iron into the RO and discharge 111 µg/L of iron. The Riverton City Water Treatment Plant Wasteload Analysis and Antidegradation Level I Review indicates an acute (1-hour ave background) level of 32 µg/L, which is lower than the discharge concentration. The iron concentration in the Jordan Basin Water Reclamation Facility's WLA shows an acute limit for iron at 1581 µg/L, which is higher than the anticipated discharge concentrate. Therefore, no treatment is recommended at this time.