

O Jordan River Level II Antidegradation Review Report

JORDAN VALLEY WATER CONSERVANCY DISTRICT
Jordan River UPDES Discharge
Level II Antidegradation Review Report
May 2010

Antidegradation Review (ADR) Form

Part A: Applicant Information

Applicant: Jordan Valley Water Conservancy District

Facility Owner: Jordan Valley Water Conservancy District

Facility Location: 8215 South 1300 West

Application or Plans Prepared By: Mark Atencio

Project Name: Southwest Groundwater Treatment Plant

Receiving Water: Jordan River

What are the designated uses of the receiving water?

Secondary Recreation, agriculture, wildlife, aquatic life

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

- An application for a UPDES permit for a new facility or project.
- An expansion or modification of an existing wastewater treatment works facility, with no planned construction activities, which will result in an additional of a new pollutant, or increase in the mass or concentration of a pollutant as defined by the current permit.
- An expansion or modification of an existing wastewater treatment works facility, that involves construction of new treatment facilities, which will result in an additional of a new pollutant, or increase in the mass or concentration of a pollutant as defined by the current permit.
- A permit renewal for a discharge to 1C waters where a previous Level II ADR has been completed.
- A proposed minor expansion as defined in Section 5.4.1 of the Implementation Guidance) to an existing permitted facility.

- A §401 Certification request.

Part B. Level I Antidegradation Review

B1. Is there any evidence that the project will impair the designated uses of the receiving water?

- Yes** No permit can be issued unless the projects can be modified to address maintain the use. Do not proceed further with the application.
- No** Proceed to question B2.

B2. Will the project require a discharge to a Class 1C (Drinking Water) waterbody?

- Yes** A Level II ADR is required. Proceed to Section C of this application.
- No** Proceed to question B3

B3. Will the proposed project result in degradation to water quality?

- Yes** Proceed to B4
- No** Level II ADR is required if DWQ concurs with the rationale. There is no need to proceed further with application questions. Indicate the applicable scenario below (check all that apply):

- The proposed net increase in the discharge of a pollutant of concern does not result in an increase in potential mass loading or an increase in the ambient water quality concentration of the receiving water after mixing.
- The activity is occurring within the design capacity of the treatment plant as specified in the existing construction permit
- A permit for an existing facility does not propose less stringent permit limits or increased treatment plant design capacity.
- Additional treatment is added to an existing discharge and the facility retains their current permit limits and design capacity.
- The activity is a thermal discharge that has been approved through a Clean Water Act §316(a) demonstration.

B4. Are water quality impacts of the proposed project temporary or limited (see implementation guidance Section 3.1.4)?

No Proceed to Part C (optional) or Part D of the ADR Application. A Level II ADR is required.

Yes Indicate the rationale for this determination below:

- The length of time during which water quality will be lowered is temporary.
How long?
- Water quality effects relate exclusively to turbidity and fish spawning will not be impacted.
- The percent change in ambient conditions is minimal.
What parameters will be affected?
For how long?
- There is little potential for long-term residual influences to beneficial uses.
Briefly explain:

Part C. Scoping for Level II Antidegradation Review

C1. Preliminary statement of social, ecological and economic benefit

Briefly describe the nature of the project, receiving water, and the social and economic benefits anticipated from the proposed project.

The Southwest Groundwater Project will benefit the local environment, society, and economy by:

- 1. Preventing contaminated groundwater from affecting existing municipal potable water wells**
- 2. Remediating the contaminated aquifer**
- 3. Producing a new supply of potable quality water to be used by the public in the affected area**

C2. Parameters of concern to be evaluated in the ADR.

TDS, selenium, mercury

C2.1. List all of the parameters that DWQ and the applicant believe warrant consideration as a parameter of concern.

<u>Parameter</u>	<u>Reason for inclusion as a “parameter of concern” for ADR purposes.</u>
selenium	The selenium concentration in the shallow aquifer is higher than the Jordan River ambient selenium concentration.
mercury	The available mercury data from the shallow groundwater and the Jordan River is inadequate to conclusively determine if mercury will be higher in the effluent than the Jordan River ambient mercury concentration.

C2.2. List parameters that were initially considered, but ultimately were removed from consideration based on the characteristics of the wastewater of receiving water.

<u>Parameter</u>	<u>Reason for exclusion as a “parameter of concern” for ADR purposes.</u>
TDS	The Jordan River Segment 6 is impaired for TDS and a Level II ADR is not required (R317-2-3.5.b.2).

C3. Scoping of Alternative Treatment Options that will be evaluated in the Level II ADR.

C3.1 Alternatives to reducing all or part of the discharge to the receiving water.

<u>Practicable? (Y/N)</u>	<u>Treatment Alternative</u>	<u>Notes</u>
<u>No</u>	c) Connection to other wastewater facilities (<u>new facilities only</u>) <input type="checkbox"/> <i>Not Applicable, ADR is for a Renewal to an Existing Facility</i> <input type="checkbox"/> <i>Another facility is nearby, but does not have the capacity and is unable to expand.</i> <input type="checkbox"/> <i>No other facility is nearby.</i> <input checked="" type="checkbox"/> <i>Other (please explain)</i>	South Valley Water Reclamation Facility is nearby, its treatment process does not provide for selenium removal. SVWRF discharges to the Jordan River.
<u>No</u>	e) Seasonable or controlled discharge <input type="checkbox"/> <i>There is not land or facility infrastructure available to store wastewater.</i> <input type="checkbox"/> <i>Limiting season is in the summer and the</i>	

- No *wastewater is needed for instream flows.*
 Other (please explain)
The remediation goal of the project requires year round operation.
- No **f) Pollutant trading**
 Jordan River dischargers whose effluent contains selenium that could be reduced to provide an opportunity for selenium loading to be traded were not identified.
- No **g) Water conservation**
Not applicable to the treatment process.
- No **h) Water recycling and reuse**
Not applicable to the treatment process.
- No **i) Alternative discharge locations or alternative receiving waters (new facilities only)**
 Wastewater is needed for instream flows.
 The proposed receiving water is the only particle discharge point and other sites are not available to locate the proposed facility.
 Other (please explain)
Discharge of shallow groundwater to Great Salt Lake would require an increase in the size of the by-product pipeline. In normal operation when the pipeline would not be conveying shallow groundwater the increased pipeline size and increased pipeline detention time is likely to lead to scale formation within the pipeline. This level of design change is likely to lead to scale formation within the pipeline which could not be removed and could terminate the operation of the project.
- No **j) Land application**
 Wastewater is needed for instream flows.
 Local zoning laws prohibit land application.
 Land application already takes place to the extent feasible.
 Other (please explain)
Evaporation was considered and is feasible during the summer season and not during the winter season. A major concern with the evaporation concept is the loss of water leads to an increase in selenium concentration in the pond resulting in an exposure of elevated selenium to the food chain. Discharging

the shallow groundwater to the Jordan River will not result in a measurable increased in the selenium concentration.

No

- k) **Total containment**
- Wastewater is needed for instream flows.*
 - The land necessary for total containment is not available.*
 - Other (please explain) See response under Land Application.*

C3.2 Alternative treatment options for projects that involve construction of new facilities or upgrades that involve construction for existing facilities.

Use of a biologically active filter to remove selenium and mercury is theoretically feasible. Periodic changes in flow rate to the biologically active filters are likely to lead to an upset resulting in discharge of suspended solids from the filters. An attempt to solve one water quality problem is likely to create another problem.

C3.3 Alternative procedures for the operation and maintenance of facilities.

Ideally the wells feeding the treatment plant would be adjusted to meet the exact flowrate required for the reverse osmosis treatment process. The project has a number of complexities which are challenges to meeting this objective, including: a) the number of wells in the project, b) the variability in flowrates with changing water levels, and c) the variability in flowrate in one well to the next. Although the District intends to improve its operation over time, this is not expected to eliminate a discharge of shallow groundwater to the Jordan River.

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

D1. Attached Report Name:

Jordan River UPDES Permit Antidegradation Level II Review Supplemental Information

D2. From the applicant's perspective, what is the preferred treatment option?

Discharge to Jordan River

D3. Is the preferred option also the least polluting alternative?

Yes

No

If no, what is the least polluting alternative?

If no, provide a brief justification for not using the least polluting alternative:

D4. What is the final alternative approved by DWQ after reviewing the Level II ADR materials? If this is not the least polluting alternative, please describe why this option was selected.

Discharge to Jordan River

Part E. Statement of Net Social, Economic, and Environmental Benefits Importance (SEEI)

**Jordan River UPDES Permit Antidegradation Level II Review
Supplemental Information**

E1. Does the project include an associated mitigation plan?

NO

YES

Note: The Southwest Groundwater Treatment Plant will be operating as a remediation project to meet the following objectives:

- 1. Contain contaminated groundwater,**
- 2. Remediate the aquifer, and**
- 3. Produce potable quality water.**

Please attach the plan as an appendix to this report. None

Report Name:

**Jordan River UPDES Permit Antidegradation Level II Review
Supplemental Information**

E2. 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.

The project will prevent the spread of the groundwater plume into existing municipal wells; if affected these wells would require a similar water treatment process and creation of a by-product.

The project will create a new drinking water supply which will be used to sustain human life within the JWCD service area.

E3. Describe any environmental benefits to be realized through implementation of the proposed project.

According to the USGS, without operation of the project the deep and shallow groundwater will slowly migrate into the Jordan River and through the freshwater Great Salt Lake wetlands at the end of the Jordan River. Limited data suggests the ambient Utah Lake selenium concentration is lower than the ambient shallow groundwater concentration. Under normal

operating conditions (a majority of the time) the proposed alternative will prevent the introduction of selenium and mercury into the Jordan River. This will happen as a result of pumping shallow groundwater which would otherwise discharge into the Jordan River and discharge reverse osmosis by-product to Great Salt Lake. The structure of the District's shallow aquifer water rights would allow the State Engineer to call for releases of water from Utah Lake to replace the water pumped from the shallow aquifer. The result is the flowrate in the river would remain unchanged, but with a lower selenium concentration.

E4. Describe any social and economic losses that may result from the project, including impacts to recreation, or current or future commercial development.

Some of the Jordan River's selenium assimilation will be consumed at those times (a small minority of the time) the project is discharging to the Jordan River.

E5. Describe any potential threats or benefits to human health should the project be implemented.

None

E6. Describe any anticipated changes to the overall appearance to the receiving water and surrounding watershed?

There are not expected to be any changes in the appearance of the water and watershed. This is because the flow rate of to be discharged to the Jordan River is less than 5% of the low flow in the river at this location and 0.1% of the high flow in the river at this location.

E7. Describe any structures or equipment associated with the project that will be placed within or adjacent to the receiving water.

The discharge pipeline will be constructed on the west side of the Jordan River bank utilizing a pipeline and a concrete energy dissipation structure at the terminus.

E8. Describe other factors that would help explain why the project is necessary to accommodate social and economic development.

The affected cities of West Jordan, South Jordan, Riverton, and Herriman have been impacted by the groundwater plumes either by being prevented from developing groundwater or at risk of the plumes moving into existing wells. This project will produce drinking water from the affected

groundwater plume and contain the plume to prevent existing wells from being affected.

Part F. Certification of Antidegradation Review

F1. DWQ Certification and 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.

WQM Section

Signature: 

Date: 8/11/10

DWQ Permitting

Signature: 

Date: 8/11/10

P Jordan River Level II Antidegradation Review Report Supplemental Information

JORDAN VALLEY WATER CONSERVANCY DISTRICT SOUTHWEST GROUNDWATER TREATMENT PLANT

Outfall #2 Jordan River UPDES Permit Antidegradation Level II Review Supplemental Information

This information is being provided to the Division of Water Quality to provide assistance in completing a Level II antidegradation review, in accordance with 317-2-3.

1. Are there any reasonable less-degrading alternatives? The alternatives identified below were evaluated.

- a. Innovative or alternative treatment options of by-product: A selenium removal process was evaluated; this process would utilize a biologically active media filter. This technology is feasible for some waters and would likely be successful for the untreated shallow aquifer water. The Division of Water Quality has calculated a waste load analysis which indicates the Jordan River has the ability to absorb the selenium discharged from the untreated shallow aquifer. The extra capital, operating, and maintenance cost is not justified by an unproven benefit when the standard can be met without treatment.

The selenium removal process will not remove 100% of the selenium. Use of this process for the untreated shallow groundwater would increase the suspended solids concentration in the feed water resulting in a requirement for an additional filtration process ahead of the reverse osmosis process. Consequently, use of the selenium removal process on the feed water with relatively low concentrations and high flow rates would result in an expensive and ineffective process.

- b. More effective options or higher treatment levels: If the by-product were to be treated to a higher level more water would be produced and the flow rate of by-product would decrease. The amount of selenium and mercury in the by-product would remain the same. This would result in a higher concentration of selenium and mercury in the by-product.
- c. Connections to other wastewater facilities: The treatment processes of wastewater facilities in Salt Lake which discharge to the Jordan River (e.g. SVWRF) do not remove selenium; a connection to a wastewater treatment plant would not result a reduction of selenium discharged to the Jordan River.
- d. Process changes or product or raw material substitution: The project required TDS removal. Any process which removes TDS, independent of

the product or material used, will result in a by-product with an elevated concentration of selenium.

- e. Seasonal or controlled discharge options to minimize discharging during critical water quality periods: By its nature, this remediation project must operate year round to achieve the required containment of the contaminated groundwater.
- f. Pollutant trading: Jordan River dischargers who remove selenium at the flowrate required for this project were not identified; therefore there is no opportunity to pollutant trade.
- g. Water Conservation: JWCD is a leader in the education of wise water use. However, conservation of water resources will not provide for any remediation of contaminated groundwater and/or a reduction in shallow groundwater discharged to the Jordan River.
- h. Water recycling and reuse: The untreated shallow groundwater could be used for irrigation during the irrigation season. During the non-irrigation season the water would need to be discharged to the Jordan River or disposed of in another fashion.
- i. Alternative discharge locations or alternative receiving waters: All surface waters within the Jordan River basin have the same water quality standards. These other waters have the same limitations as the Jordan River.
- j. Land application: Applying the by-product to land application would result in a pond which would likely result in an increasing dissolved selenium concentration. This method has the potential to expose the food chain to selenium concentrations above the selenium aquatic standard. Discharge to Jordan River would keep the selenium concentration below the aquatic standard.
- k. Total containment: A total containment process will have a similar requirement for discharge of shallow groundwater which the proposed project has.
- l. Improved operation and maintenance of existing treatment systems:

Ideally the wells feeding the treatment plant would be adjusted to meet the exact flowrate required for the reverse osmosis treatment process. The project has a number of complexities which make this challenging to achieve, including: a) the number of wells in the project, b) the variability in flowrates with changing water levels, and c) the variability in flowrate in one well to the next.

In theory, each of the 20 – 25 wells could be equipped with a variable frequency drive allowing for minor changes in flowrate of each well. However, in the size of pump and motor to be used for this project, there are a number of technical limitations which could prevent the project from operating reliably and create a significant increase in maintenance costs. The increase in operation cost and complexity is not justified.

- m. Other appropriate alternatives: A selective selenium removal process was considered for the untreated shallow groundwater to remove the selenium ahead of the reverse osmosis process. The selenium removal process does not remove 100% of the selenium. Use of this process ahead of the reverse osmosis would increase the suspended solids concentration in the feed water resulting in a requirement for an additional filtration process ahead of the reverse osmosis process. Consequently, use of the selenium removal process on the feed water with relatively low concentrations and high flow rates would result in an expensive and ineffective process.

2. Special Procedures for 404 Permits

JVWCD has received a 404 stream alteration permit through the State Engineer's Office and the Army Corps of Engineers for the construction of the discharge structure pipeline on the bank of the Jordan River.

3. Does the proposed activity have economic or social importance?

- a. Employment: The project will result in three permanent full-time jobs and approximately 150 jobs during the design and construction phases.
- b. Increased production; not applicable
- c. Improved community tax base: not applicable – JVWCD is a tax exempt public entity
- d. Housing; not applicable
- e. Correction of an environmental or public health problem; This project will correct a major environmental problem covering 50 square miles of aquifer which is otherwise unusable by the local public. In addition the project will contain the existing contamination and remediate the aquifer over the life of the project.
- f. Other information that may be necessary to determine the social and economic importance of the proposed surface water discharge: If the project is not completed the contaminated groundwater will continue to migrate towards hundreds of existing municipal wells and into shallow aquifer. From the shallow aquifer the elevated TDS will discharge into the Jordan River

g. Mitigation: JWCD has taken a number of actions to mitigate the potential impacts and accommodate concerns which have been expressed. These actions include the following:

1. Planned installation of variable frequency drives at two deep wells where the size of the flow rate is justified.
2. Connection of the deep and shallow groundwater sources, through an appropriate backflow prevention device, to allow the flexibility of the deep aquifer wells to reduce the flowrate of untreated shallow aquifer water which is to be discharged to the Jordan River.

4. Will water quality standards be violated by this discharge?

a. No.

5. Will existing uses be maintained and protected?

a. Yes

6. Are there existing uses which are higher than the current water quality use designation or classification?

a. No

CONCLUSION

Jordan River Basin Shallow Aquifer

USGS reports the shallow aquifer discharges/recharges the Jordan River. Pumping extra water from this aquifer and discharging it to the Jordan River will change the current state of the natural groundwater hydraulic system.

Project Benefits The completion of this project will enable JWCD to meet the following project objectives:

1. Contain a contaminated groundwater plume and prevent it from affecting hundreds of existing municipal wells.
2. Remediate the contaminated aquifer.
3. Provide a new supply of municipal water for the public.

Perpetual Water Supply Without issuance of the UPDES permit the project will be limited in the volume of water produced and effective operational time frame. Jordan

Valley Water Conservancy District has done all that is possible to address the needs and concerns of state agencies, environmental organizations, its member agencies, and individuals who have expressed interest and concern. After six years of effort JWCD believes the UPDES permit should be issued. Issuance of this permit will allow for a perpetual municipal water supply to be developed for the public.