Water Supply Reserve Account – Grant and Loan Program
Water Activity Summary Sheet
March 16-17, 2016
Agenda Item 14(p)

Co-Applicants:	Cottonwood Water and Sanitation District (CWSD) & Arapahoe County Water and Wastewater Authority (ACWWA)
Fiscal Agent:	Cottonwood Water and Sanitation District
Water Activity Name:	Biological Treatment to Remove Selenium from Water Treatment Plant Concentrate
Water Activity Purpose:	M&I
County:	Arapahoe & Douglas
Drainage Basin:	South Platte
Water Source:	Non-tributary Ground Water (Denver Basin Aquifers) and Cherry Creek (tributary alluvial)
Amount Requested/Source of Funds:	$25,000 Metro Account $375,000 Statewide Basin Account $400,000 Total Grant Request
Matching Funds:	Basin Account Match ($25,000) = 6.3% of total grant request (meets 5% min); Basin Account & Applicant Match ($4,675,000) = 1,170% of total grant request (meets 25% min); Applicant/3rd Party Match ($4,650,000) = 92% of total project costs ($5,050,000) (refer to *Funding Summary/Matching Funds* section)

Note: The apparent discrepancy between the $475,000 Statewide Account request indicated in the application and the $375,000 Statewide Account request represented herein (and on the spreadsheet accompanying the Memo) can be attributed to the applicant agreeing to reduce their Statewide Account request by $100,000 to accommodate the Statewide Account funding shortfall.

Staff Recommendation:

Staff recommends approval of up to $25,000 from the Metro Account; and $375,000 from the Statewide Account to help fund the project titled: Biological Treatment to Remove Selenium from Water Treatment Plant Concentrate.

Water Activity Summary: WSRA funds, if approved, will be expended to fund the construction of a biological treatment system in the existing Joint Water Purification Plant (JWPP) to reduce selenium concentrations in the concentrate discharge from RO. The biological system also causes chemical reactions to occur, and treatment can be enhanced through the addition of chemicals. The primary benefit of the project is to make the renewable water supply from Cherry Creek available to

CWSD and ACWWA for first use and reuse, and to reduce the reliance on non-tributary ground water. The goals of the project are as follows:

1. Reduce dependence on non-renewable supply;
2. Reuse available renewable supply;
3. Utilize a $30 million investment;
4. Meet aquatic protection standards for selenium;
5. Not impacting the Cherry Creek Reservoir by maintaining phosphorous discharge standards;
6. Maintain home values through a secure water supply;
7. Reduce the cost burden on a small water provider and its customers;
8. Provide high quality and safe water supply (TDS, hardness, ECE).

To accomplish these goals the applicants will undertake the following tasks:

1. Pilot Study and Preliminary Design (in process, costs not a part of the proposed project)
2. Land Purchase
3. Revise Discharge Permit
4. Biochemical Reactor Final Design
5. Treatment Plant Design of Modifications
6. CDPHE Plan Approvals

In 2010, CWSD and ACWWA completed the JWPP, a $30 million water treatment plant utilizing reverse osmosis (RO) and advanced oxidation process (AOP) to effectively treat water from Cherry Creek. This enabled the entities to fully use and reuse their water rights on Cherry Creek which now include in-priority water rights and the reuse of these rights as well as imported water from the WISE and ACWWA Flow Projects. However, the JWPP was subsequently converted to a microfiltration plant because of a violation due to selenium concentration in the concentrate discharge from the plant. As a microfiltration plant, quality is poor due to high total dissolved solids (TDS -700 ppm), and a lack of treatment of chemicals of emerging concern (CECs). As a consequence, the plant is very underutilized by ACWWA and CWSD does not utilize the plant at all.

Means of restoring the RO process through efficient and cost effective treatment of selenium in the discharge concentrate of the Joint Water Purification Plant have been studied for several years without identification of an economically viable alternative. Recently, a new study was completed to evaluate the potential for treatment using a biological treatment system called a biochemical reactor ("BCR"). This reactor could be constructed on about 6 acres of vacant land behind the JWPP. It is constructed by developing treatment cells buried in the ground.

Selenium loading will be reduced to the Cherry Creek Watershed and to Cherry Creek Reservoir through gasification and immobilization. This will help to protect the lower portions of the watershed that are currently selenium compliant, and will reduce loading to the Cherry Creek Reservoir where selenium levels are a concern to fish and especially the Walleye Fishery. The system also has the ability to remove/reduce nitrates and phosphorous and will also break down CECs that are in the concentrate. The removal of nutrients such as phosphorous and nitrogen is beneficial for Cherry Creek Reservoir as evidenced by studies completed by the Cherry Creek Basin Water Quality Authority.

Further, high selenium concentrations are an obstacle to water use in many locations in Colorado. This is the result of naturally occurring selenium levels that frequently exceed the aquatic protection

standard, and because of efforts to use and reuse water supplies high in TDS. By furthering the advancement of treatment capability to remove selenium from water, there is benefit statewide to increase water supply and protect the environment. Therefore, the project has multiple benefits including water supply development, watershed protection, and protection of Cherry Creek State Park Reservoir through water quality and recreational enhancement.

In addition, if permitted through the CDPHE, water discharged after biological treatment could be released above the existing water quality pond on Windmill Creek owned by the Southeast Metropolitan Stormwater Authority. This could greatly enhance the existing wetland in this pond that is marginal today because of a lack of baseflow. In doing this, there is a large potential for additional removal of selenium, nitrogen and phosphorous in water tributary to the watershed and Cherry Creek Reservoir.

Discussion: This project aligns with well with several of the Goals and Measurable Outcomes as addressed in the South Platte Basin Implementation Plan. For example, Goal 1.9.2: Municipal Water Conservation, Reuse and Efficiency and its associated Measurable Outcome #3 promotes "Enhance current levels of municipal water reuse and consider studies to quantify the effects of: 1) additional municipal water conservation on water available for reuse; 2) additional municipal water reuse in relation to water available for exchanges; 3) reuse and successive uses of water downstream including effects on agricultural water shortages" (SPBIP; Section 1.9.2, page 1-27). Furthermore, the SPBIP lists this effort as an IPP in Section 4.3.2.1: Reuse Identified Projects and Processes; Table 4-10: South Platte and Metro Provider's Reuse IPPs; page 4-25.

In addition this effort advances Colorado's Water Plan Reuse options as a means to close the supply-demand gap as highlighted in Chapter 6.3.2: Reuse (CWP; Chapter 6.3.2: Reuse; pages 6-75 thru 6-81), and promotes Water Quality goals as emphasized in Chapter 7.3: Water Quality (CWP; Chapter 7.3: Water Quality; pages 7-17 thru 7-33).

Issues/Additional Needs: No issues or additional needs have been identified.

Threshold and Evaluation Criteria: The application meets all four Threshold Criteria.

Tier 1-3 Evaluation Criteria:
This project has undergone review and evaluation and staff has determined that this request satisfies the Evaluation Criteria. Further analysis of the project, and how the project will meet Tiered Evaluation Criteria, is provided by the applicant in the WSRA Application.

Funding Summary/Matching Funds:

Funding Source	**Cash**	**In-kind**	**Total**
Cottonwood Water & Sanitation District	$3,100,000	$0	$3,100,000
ACWWA	$1,550,000	$0	$1,550,000
Subtotal matching funds	$4,650,000	$0	$4,650,000
WSRA Metro Account	$25,000	n/a	$25,000
WSRA Statewide Account	$375,000	n/a	$375,000
Total Project Costs	**$5,050,000**	**$0**	**$5,050,000**

CWCB Project Manager: Craig Godbout

All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and will help promote the development of a common technical platform. In accordance with the revised WSRA Criteria and Guidelines, staff would like to highlight additional reporting and final deliverable requirements. The specific requirements are provided below.

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the scope of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

Engineering: All engineering work (as defined in the Engineers Practice Act (§12-25-102(10) C.R.S.)) performed under this grant shall be performed by or under the responsible charge of professional engineer licensed by the State of Colorado to practice Engineering.