# COLORADO WATER CONSERVATION BOARD

## WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

**Today's Date: January 29, 2016**

**Biological Treatment To Remove Selenium from Water Treatment Plant Concentrate (reinstatement of water treatment plant)**

**Name of Water Activity/Project**

**Cottonwood Water and Sanitation District and Arapahoe County Water and Wastewater Authority**

**Name of Applicant**

**Metro Roundtable**

**Approving Basin Roundtable(s)**
*(If multiple basins specify amounts in parentheses.)*

**Amount from Statewide Account:** 475,000

**Amount from Basin Account(s):** 25,000

**Total WSRA Funds Requested:** 500,000

**FEIN: 84-0859481 CWSD**

## Application Content



**Required Exhibits**

A. Statement of Work, Budget, and Schedule
B. Project Map
C. As Needed (i.e. letters of support, photos, maps, etc.)

**Appendices – Reference Material**

1. Program Information
2. Insurance Requirements
3. WSRA Standard Contract Information (Required for Projects Over $100,000)
4. W-9 Form (Required for All Projects Prior to Contracting)

## Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable **AND** the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf. In addition, the applicant should also refer to the Supplemental Scoring Matrix applied to Evaluation Criteria Tiers 1-3 for Statewide Account requests.

The application, statement of work, budget, and schedule **must be submitted in electronic format** (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Craig Godbout - WSRA Application
Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203
Craig.godbout@state.co.us

If you have questions or need additional assistance, please contact Craig Godbout at: 303-866-3441 x3210 or craig.godbout@state.co.us.

**Part I. - Description of the Applicant** (Project Sponsor or Owner);

| | | | | |
|---|---|---|---|---|
| 1. | Applicant Name(s): | Cottonwood Water and Sanitation District ("CWSD") and Arapahoe County Water and Wastewater Authority ("ACWWA") | | |
| | Mailing address: | c/o Mulhern MRE Inc.<br>2 Inverness Drive East, #200<br>Englewood, CO 80112 | | |
| | FEIN #: | 84-0859481 | | |
| | **Primary Contact**: | Patrick Mulhern | Position/Title: | Gen. Manager (CWSD) |
| | Email: | pat@mulhernmre.com | | |
| | Phone Numbers: | Cell: 720-291-0968 | Office: | 303-649-9857 |
| | **Alternate Contact**: | Kevin McBrien | Position/Title: | Eng. Mgr. (ACWWA) |
| | Email: | kmcbrien@arapahoewater.org | | |
| | Phone Numbers: | Cell: | Office: | 303-790-4830 |

2. Eligible entities for WSRA funds include the following. What type of entity is the Applicant?

| | |
|---|---|
| | Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient. |
| XX | Public (Districts) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and water activity enterprises. |
| | Private Incorporated – mutual ditch companies, homeowners associations, corporations. |
| | Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account. |
| | Non-governmental organizations – broadly defined as any organization that is not part of the government. |

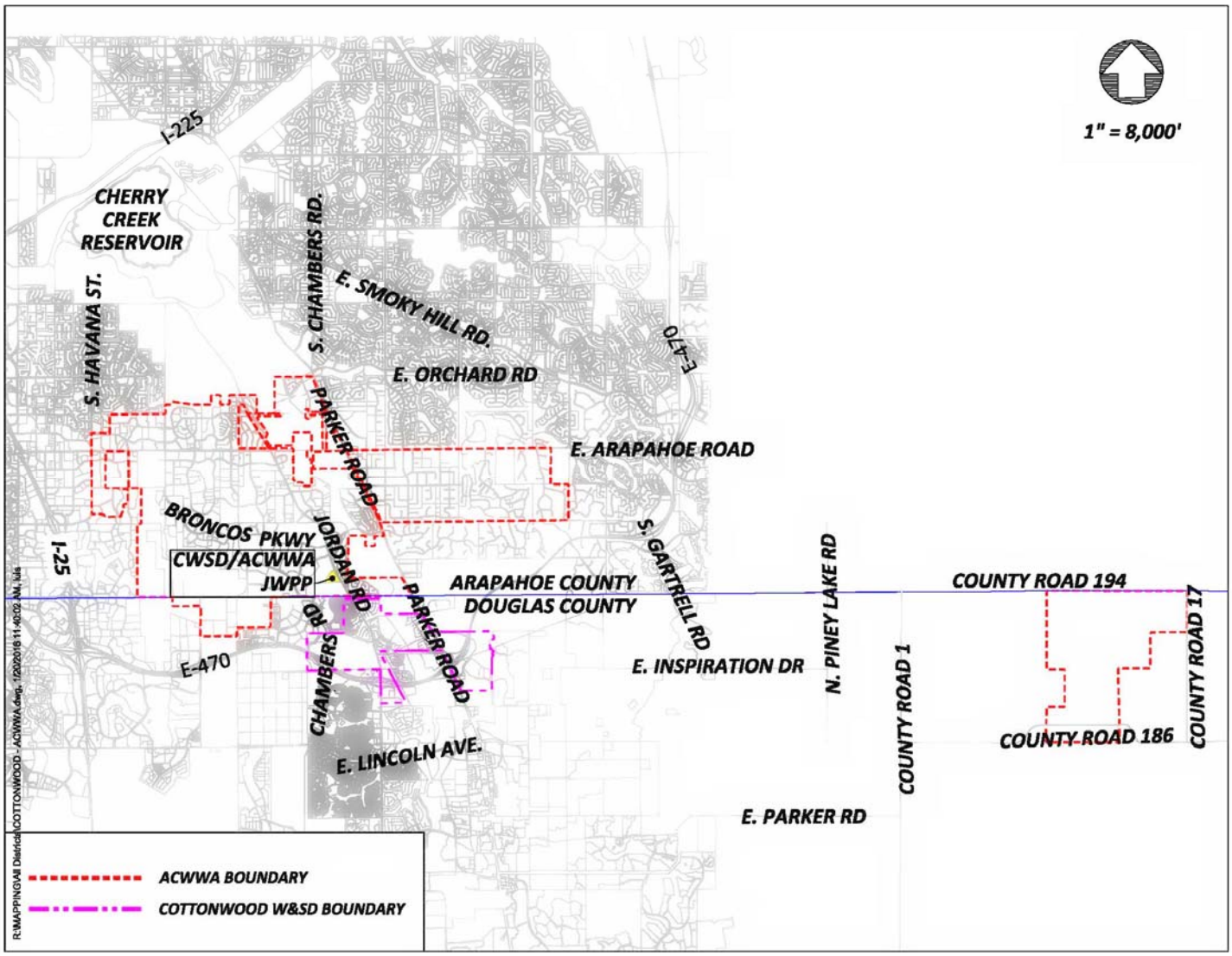
3. Provide a brief description of your organization

*The Cottonwood Water and Sanitation District ("Cottonwood") was established under Title 32 of the Colorado State Statutes as a quasi-municipal corporation and political subdivision of the State of Colorado. The District was established in 1980 to provide the Cottonwood community in Parker, Colorado with water and wastewater services. The District contains approximately 1,300 acres and is comprised of residential, commercial, and open space located along the northern border of Douglas County on either side of Parker Road. Two-thirds of the district is within the Town of*

*Parker and the remainder in unincorporated Douglas County. Cottonwood Water serves approximately 1535 single family homes, 1400 multi-family residences and about 70 commercial customers, including the Parker Adventist Hospital and several medical office buildings and medical care facilities. The Cottonwood boundaries are shown on Figure 1 below.*

*The Arapahoe County Water and Wastewater Authority ("ACWWA") provides the drinking water and wastewater services to the people living and working within its service area, a total of eight-square miles located mostly in the City of Centennial generally between Havana Street on the west, Himalaya on the east, Cherry Creek State Park on the north and the Arapahoe/Douglas County line on the south also shown on Figure 1. The area is comprised of about 3,500 residences and businesses primarily in Arapahoe County, with some additional customers located in northern Douglas County and Elbert County. While most of the customers are businesses, over the past few years ACWWA has realized more residential development of both multi-family and single-family homes.*

***Figure 1***




*The greatest challenge to these water and wastewater providers is to provide adequate and safe*

*water supply for their customers. Water supply in this area is very limited. The water available includes non-tributary ground water ("NTGW") from the Denver Formation and alluvial water from Cherry Creek.*

*In 2004, the South Metro Water Supply Authority completed a study to evaluate NTGW as a water supply source (the Denver Basin Aquifers) and the ability to meet the long-term demands of the current and future South Metro Area population. The conclusion of the study was that the NTGW would not be an economically viable water source for the future. The study then recommended that water providers implement conservation, reuse available supplies, develop all local renewable supplies, and pursue opportunities to import additional water.*

*Cottonwood and ACWWA have implemented successful water conservation programs, have worked to maximize reuse of both NTGW and Cherry Creek alluvial supplies and have constructed a water treatment plant, the "Joint Water Purification Plant" ("JWPP"), to fully use and reuse renewable water supplies on Cherry Creek. In addition, Cottonwood has invested in the WISE Project which imports return flows from Denver Water and Aurora Water, and ACWWA has invested in the ACWWA Flow project, both of which import water from the South Platte River north of Denver.*

*In order to fully use and reuse water from Cherry Creek, Cottonwood and ACWWA jointly developed the JWPP which originally included reverse osmosis ("RO") treatment followed by an advanced oxidation process ("AOP") for disinfection. This level of treatment was provided because of the quality of water in Cherry Creek which includes large amounts of treated effluent. The RO treatment removes high levels of total dissolved solids ("TDS"), and both the RO and AOP treat for chemicals of emerging concern ("CECs") which are largely trace pharmaceuticals found in treated effluent.*

*Early on in operation of the JWPP, selenium concentrations in the concentrate from the plant exceeded the discharge permit limit for aquatic protection. This led to a modification of the JWPP that shut down the RO process and replaced it with microfiltration. The microfiltration process, while meeting drinking water standards, does not remove TDS and does not treat for CECs. As a result, water quality is marginal. Because of this, Cottonwood is not currently using water from the JWPP and ACWWA is using limited volumes from the plant blended with its other water sources.*

*Re-establishment of RO at the JWPP is critical to Cottonwood and ACWWA to fully utilize its renewable water supply on Cherry Creek. This includes reuse of Cherry Creek water rights, and NTGW, WISE and ACWWA Flow returns. This plant is critical for Cottonwood and ACWWA to meet their water supply demands and to replace their use of non-renewing NTGW. Full reuse of all supplies by these entities also minimizes the volume of imported water required from other remote sources.*

4. If the Contracting Entity is different then the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.
   *SAME*

5. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A link to this standard contract is included in Appendix 3. Please review this contract and check the

appropriate box.

[XX] The Applicant will be able to contract with the CWCB using the Standard Contract

[ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

6. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

*Cottonwood and ACWWA both operate Enterprises which are not subject to Tabor restrictions.*

## Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

[ ] Nonconsumptive (Environmental or Recreational)

[ ] Agricultural

[XX] Municipal/Industrial

[ ] Needs Assessment

[ ] Education

[ ] Other Explain: This project will allow for re-establishing the JWPP which will allow full use and reuse of water supplies.

2. If you feel this project addresses multiple purposes please explain.

*This project proposes using a biological treatment system 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 Cottonwood and ACWWA for first use and reuse, and to reduce the reliance on NTGW. This facility is also ACWWA's Identified Project and Process ("IPP") (Reuse of ACWWA Flow Project Deliveries, see South Platte/Metro BIP. p. 4-25.) Cottonwood and ACWWA estimate that restoration of the plant will result in some 3,000 acre-feet of water use and reuse that is largely unused today.*

*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.*

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

| | | | |
|---|---|---|---|
| | Study | XX | Implementation |

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

| | |
|---|---|
| | New Storage Created (acre-feet) |
| 3000 AF | New Annual Water Supplies Developed, Consumptive or Nonconsumptive (acre-feet) |
| 13,690 AF | Existing Storage Preserved or Enhanced (acre-feet) |
| 21,850 LF | Length of Stream Restored or Protected (linear feet) |
| | Length of Pipe/Canal Built or Improved (linear feet) |
| | Efficiency Savings (acre-feet/year OR dollars/year – **circle one**) |
| | Area of Restored or Preserved Habitat (acres) |
| | Other -- Explain: |

5. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude: 39* 34′ 9.53″ N Longitude: 104* 48′ 22.02″W

6. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

*In 2010, Cottonwood and ACWWA completed the JWPP, a $30 million water treatment plant utilizing RO and 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*

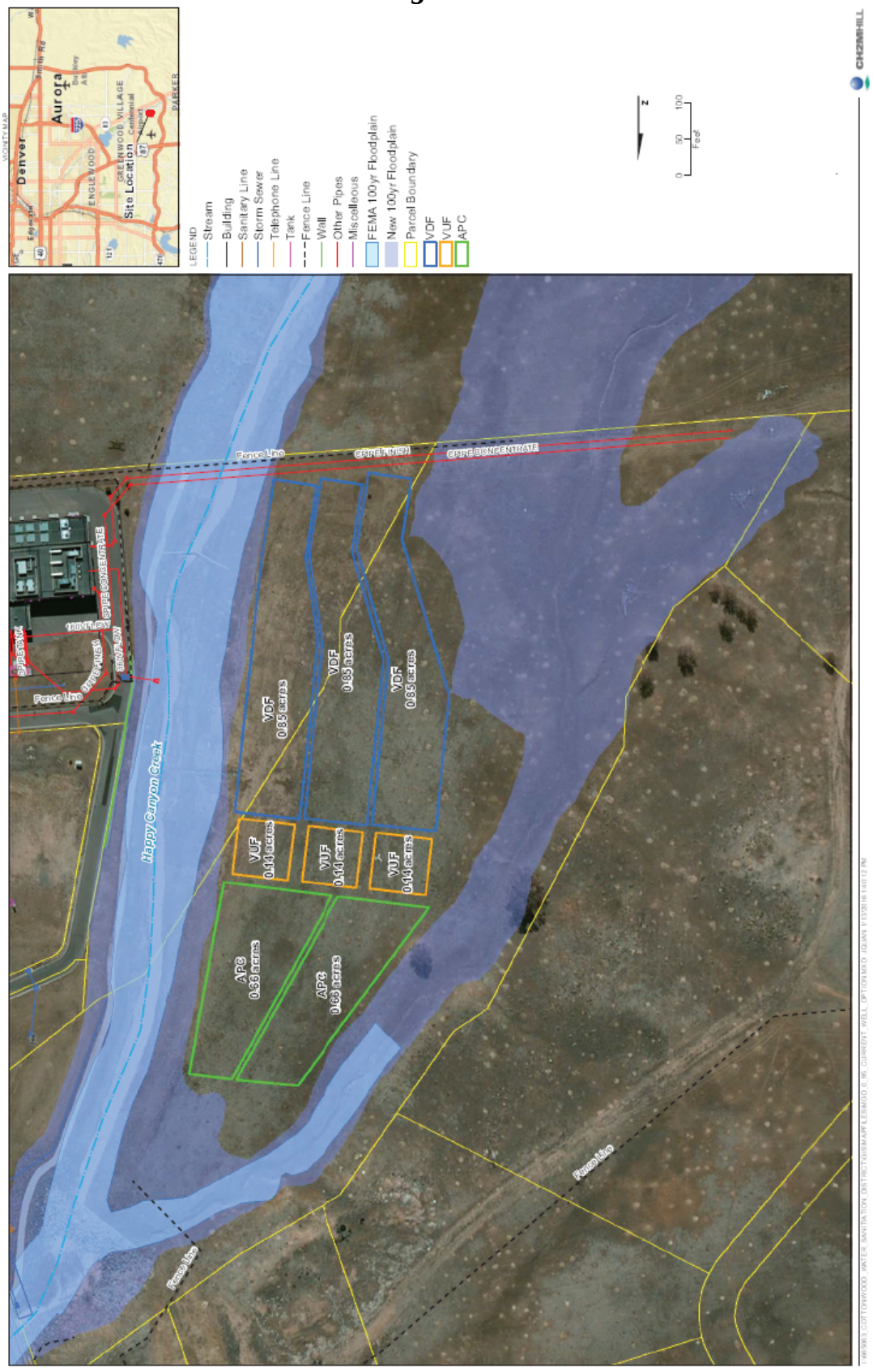
*converted to a microfiltration plant because of a violation due to selenium concentration in the concentrate discharge from the plant. As a microfiltration plant, quality is poor due to high TDS (700 ppm), and a lack of treatment of CECs. As a consequence, the plant is very underutilized by ACWWA and Cottonwood 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. "Treatment systems designed for selenium reduction consist of a vertical or horizontal subsurface flow of water through a reducing organic substrate. This achieves microbial and chemical reduction of selenium naturally. The organic substrate utilized has been composed of wood chips, saw dust, mushroom compost, horse manure, field hay, yard wastes, and limestone granules in varying proportions." (CH2M, Exhibit D)*

*"Because the BCR is comprised of organic media, secondary parameters (e.g. biochemical oxygen demand [BOD], color, sulfide and reduced nitrogen) are generated that require treatment before discharge. Frequently described as aerobic polishing cells, these treatment units function by trapping particulate organic particles, increasing the DO content of the BCR effluent, as well as oxidizing chemical oxygen demand [COD] or BOD present."(CH2M, Exhibit D)*

*The proposed layout of the BCR is shown on Figure 2, and the process drawing is shown in Figure 3. Data from previous pilot studies and installations indicate that selenium can be reduced to concentrations between 1 and 3 ppb which is below the aquatic protection level of 4.6 ppb.*

## *Figure 2*


Aurora
Denver
Site Location
LEGEND
Stream
Building
Sanitary Line
Storm Sewer
Telephone Line
Tank
Fence Line
Wall
Other Pipes
Miscellaneous
FEMA 100yr Floodplain
New 100yr Floodplain
Parcel Boundary
VDF
VUF
APC
Fence Line
EFFLUENT
CONCENTRATE
EFFLUENT
CONCENTRATE
TANK
Fence Line
Happy Canyon Creek
VDF
0.85 acres
VDF
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0.85 acres
VUF
0.44 acres
VUF
0.44 acres
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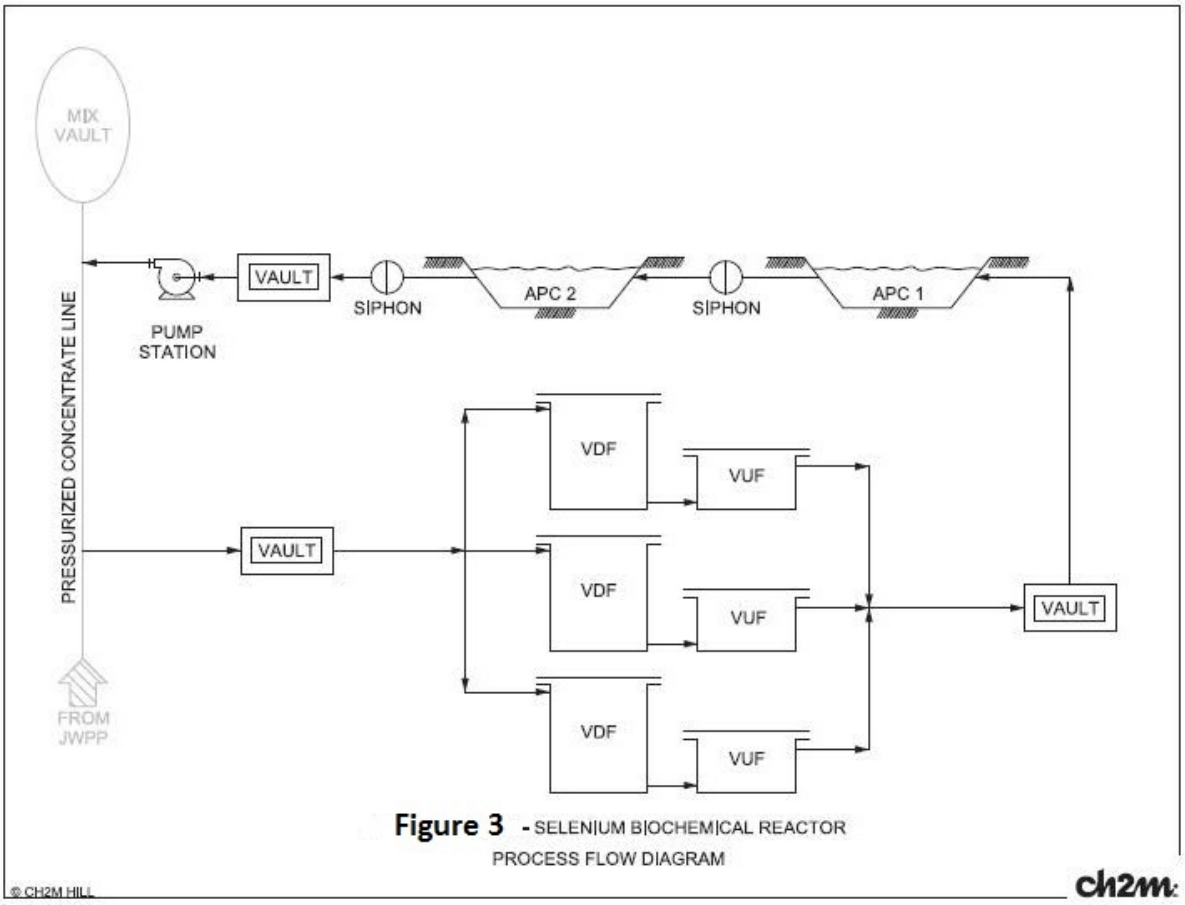
APC
0.66 acres
APC
0.66 acres
Fence Line
Fence Line

***Figure 3***




*Cottonwood and ACWWA propose to purchase additional land adjacent to the JWPP and construct this BCR to reduce the selenium in the concentrate discharge from the JWPP. This will allow restoration of the RO treatment process which is now proposed to treat one-half of the flow with the other half treated using microfiltration. The flow will then be blended and disinfected using the AOP. This reconfiguration will produce a high quality treated water with reduced total dissolved solids, hardness, and contaminants of emerging concern. The plant capacity will be 6 MGD resulting in the treatment of approximately 3,000 acre-feet of alluvial water and return flows that are not currently being utilized.*

*The cost of the land to accommodate the BCR is approximately $200,000. The cost for construction of the BCR is estimated at a total of $3.8 million per the attached study by CH2M. The JWPP itself will need to be modified for the split flow treatment at a cost estimated at $1.05 million for a total project cost of $5.05 million. Cottonwood and ACWWA have retained CH2M to complete a pilot study of the proposed BCR. The pilot study will confirm selenium and phosphorous removal and will also address odor control and whole effluent toxicity ("WET") testing to assure compliance with permit requirements.*

*For ACWWA, this project will complete an IPP identified as part of the South Platte/Metro BIP. This will provide for reuse of an estimated 1,900 acre-feet of water from the ACWWA Flow importation project. For Cottonwood, this will allow for use and reuse of Cherry Creek and WISE return flows amounting to an estimated 1,100 acre-feet that was lost when the RO treatment process was shut down.*

*This $30 million asset, constructed using funds from the Drinking Water Revolving Fund, is extremely underutilized due to the water quality that is produced. This project is estimated to restore some $20 million in this asset value.*

**Part III. – Threshold and Evaluation Criteria**

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

*Cottonwood and ACWWA have alluvial water rights along the Cherry Creek and non-tributary ground water rights in the Denver Basin decreed for municipal use and all available water is usable to extinction allowing for full reuse under the entities' respective augmentation plans. In addition, water acquired through ACWWA Flow or delivered under contract through WISE is fully reusable, and each entity currently has water court cases filed to add these flows to the decreed augmentation plans.*

b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

*This proposal was presented to the Metro Roundtable at their meeting on December 14, 2015, and will be presented for formal approval at their meeting on January 14, 2016. The proposed application was well received by the Roundtable and all comments were supportive and positive. The Metro Roundtable approval letter will be attached.*

***c)*** The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments. ***(Please see following page)***

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

*For ACWWA, this project will complete an IPP identified as part of the South Platte/Metro BIP. This will provide for reuse of an estimated 1,900 acre-feet of water from the ACWWA Flow importation project. For Cottonwood, this will allow for use and reuse of Cherry Creek and WISE return flows amounting to an estimated 1,100 acre-feet that was lost when the RO treatment process was shut down. In both cases, this is water needed to replace NTGW which was originally thought to be a permanent water supply source. However, the South Metro Water Supply Study completed in 2004 determined that this water supply was not economically viable for urban demands in the long term and recommended that this source of supply be replaced. The study specifically recommended that the South Metro water providers reduce demands through conservation, maximize reuse of all reusable sources, fully develop local renewable supplies, and then import additional water supplies as needed to replace NTGW use. Replacement of this NTGW use was part of the water supply gap identified in the 2010 Statewide Water Supply Initiative.*

*In the Metro Basin Roundtable's Needs Assessment ("MBRT Needs Assessment") 2011, one of the Major Findings in 7.2.1 states that "the long-term use of the Denver Basin aquifers is not sustainable as a main water supply." The recommendations go on to support the development of additional water supply to replace use of the Non-Tributary Ground Water ("NTGW"), such as the Water Infrastructure and Supply Efficiency ("WISE") Project and other planned projects to reduce the reliance on NTGW and to preserve it as a drought reserve. Recognizing the need to meet this water supply gap, Cottonwood and ACWWA joined together to design and construct the JWPP which allowed them to fully utilize their local renewable water supply on Cherry Creek, and allowed them to make full reuse of that supply under their augmentation plans. In addition, Cottonwood invested in the WISE Project and ACWWA invested in the ACWWA Flow Project to import additional renewable water supply. In both cases, the amount of imported water required was reduced by the ability of these entities to fully reuse these water sources with proper treatment through the JWPP. When the JWPP was modified to a microfiltration plant because of exceedance of the selenium standard for aquatic protection, water quality was compromised so that these entities could not fully use or reuse these supplies. Hence, when the plant was modified, the water supply gap was immediately increased substantially for these entities.*

*One of the key findings of the SWSI 2010 is related to the significant M&I water supply gap in the demand forecast for 2050 even with implementation of the IPPs. In the Metro Roundtable area, this gap is at 58%. This serves to highlight the importance of completing the IPP for reuse of ACWWA Flow, and to fully re-establish the ability of these two entities to reuse all available water supplies through use of the JWPP. The MBRT Needs Assessment encourages development of these types of collaborative and forward-thinking approaches to water projects through WSRA grants.*

d) Matching Requirement: <u>For requests from the **Statewide Fund**</u>, the applicants will be required to demonstrate a **25 percent** (or greater) match of the total grant request from the other sources, including but not limited to Basin Funds. <u>A minimum match of 5% of the total grant amount shall be from Basin funds. A minimum match of 5% of the total grant amount must come from the applicant or 3rd party sources</u>. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the contract or purchase order between the applicant and the State of Colorado is executed. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in **Exhibit A** of this application)

*The cost of revising the JWPP is substantial at approximately $5.05 million. This includes bioreactor construction at $3.8 million, land acquisition at $0.2 million, and modification of the plant interior*

*piping, pump systems and controls at $1.05 million.*

*The project would be funded as follows:*

| | | |
|---|---|---|
| • *Cottonwood* | *$3,050,000* | *( 60.4%)** |
| • *ACWWA* | *$1,500,000* | *( 29.7%)** |
| • *Metro Roundtable* | *$ 25,000* | *( 0.5%)* |
| • *CWCB Grant* | *$ 475,000* | *( 9.4%)* |
| ***TOTAL:*** | ***$5.05 million*** | *(100.0%)* |

**Cottonwood and ACWWA are pursuing an additional grant opportunity for up to $0.3 million of this combined amount through the US Bureau of Reclamation. The success of this application will not be known until June of this year.*

*Below is the cost estimate for the project:*

***Cost Estimate for Proposed System***

| | **Capital Cost** | **Non-Construction Costs** | **Contingency** | **Total Capital Costs** |
|---|---|---|---|---|
| Biochemical Reactor | $2,590,000 | $681,000 | $529,000 | $3,800,000 |
| Land Acquisition | $200,000 | | | $200,000 |
| Plant Modifications | $753,750 | $113,063 | $173,363 | $1,050,000 (rounded) |
| **TOTALS:** | **$3,543,750** | **$794,063** | **$702,363** | **$5,050,000** |

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

**Evaluation Criteria** – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the Statewide Account. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. The applicant should also refer to the Supplemental Scoring Matrix applied to Evaluation Criteria Tiers 1-3 for Statewide Account requests. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

Tier 1: Promoting Collaboration/Cooperation and Meeting Water Management Goals and Identified Water Needs

a. The water activity addresses multiple needs or issues, including consumptive and/or non-consumptive needs, or the needs and issues of multiple interests or multiple basins. This can be demonstrated by obtaining letters of support from other basin roundtables (in addition to an approval letter from the sponsoring basin).

b. The number and types of entities represented in the application and the degree to which the activity will promote cooperation and collaboration among traditional consumptive water interests and/or non-consumptive interests, and if applicable, the degree to which the water activity is effective in addressing intrabasin or interbasin needs or issues.

c. The water activity helps implement projects and processes identified as helping meet Colorado's future water needs, and/or addresses the gap areas between available water supply and future need as identified in SWSI or a roundtable's basin-wide water needs assessment.

*We believe this project is unique in providing a multitude of benefits. These include:*

1. *The project is an IPP by ACWWA for reuse of its ACWWA Flow Water (See South Platte/Metro BIP p. 4-25.)*
2. *This project will enable these entities to utilize some 3,000 acre-feet of renewable water from Cherry Creek thereby replacing this volume of NTGW use and reuse. By effectively using and reusing this water, the water supply gap in the South Platte/Metro Basin is greatly reduced and there is less pressure on the import of water from remote locations.*
3. *The project provides for appropriate treatment for a safe, high quality water supply given that these entities are the fourth user of these supplies in a 12 mile stretch of Cherry Creek.*
4. *The project will remove selenium currently in water tributary to Cherry Creek thereby reducing the loading to Cherry Creek tributaries and Cherry Creek Reservoir. Selenium levels in the reservoir are a concern for fish in general and specifically the Walleye Fishery. Hence this project would be a benefit to the Cherry Creek State Park Recreational Area and would benefit the Walleye Fishery.*
5. *The project proposes to discharge, meeting all permit requirements, above a constructed water quality pond on Windmill Creek. This water quality pond has an existing wetland that is stressed because of a lack of base flow. This discharge would provide a base flow which would increase the vibrancy of the wetland thereby allowing for additional phosphorous, nitrogen and selenium removal above the Cherry Creek Watershed and Cherry Creek Reservoir. (This is subject to necessary approvals by the State, the Cherry Creek Basin Water Quality Authority, and the Southeast Metropolitan Storm Water Authority.)*
6. *This project would serve to further technology to remove selenium in a cost effective manner which could benefit selenium compliance issues statewide.*
7. *The project would restore the value of a $30 million facility for which these entities customers are paying without receiving the benefit of the facility. The current facility, if constructed for the existing microfiltration process, could have been constructed for an estimated $10 million. Therefore, there is a substantial cost benefit ratio whereby $20 million in lost investment is largely restored for a cost of $5 million. This project was funded with the DWRF, and we believe it is a matter of statewide interest, as well as these entities' customers interest, to restore the value of this investment.*
8. *This project has very low operational costs associated using natural biological and chemical reactions to remove naturally occurring pollutants. The water providers do not add any pollutants to the system but remove a number of constituents to the benefit of the downstream environment.*

*This project is completely consistent with the Metro Basin Roundtable Needs Assessment, 2011, which recommends support of water providers with funding and assistance in pursuing available technologies in treatment and support of IPPs for reuse projects.*

Tier 2: Facilitating Water Activity Implementation

d. Funding from this Account will reduce the uncertainty that the water activity will be implemented. For this criterion the applicant should discuss how receiving funding from the Account will make a significant difference in the implementation of the water activity (i.e., how will receiving funding enable the water activity to move forward or the inability obtaining funding elsewhere).
e. The amount of matching funds provided by the applicant via direct contributions, demonstrable in-kind contributions, and/or other sources demonstrates a significant & appropriate commitment to the project.

*Cottonwood and ACWWA worked for 8 years and invested more than $30 million to develop and implement the JWPP. The cost is a substantial burden to these 2 relatively small water providers. The cost is extraordinary because these entities are the 4th users of water supply in a 12 mile stretch of Cherry Creek above Cherry Creek Reservoir. That is, treatment requirements are substantial to provide a good quality, safe water supply given the increased TDS in the water and the CECs that are associated with large volumes of treated effluent in the source water. Therefore, the expensive but effective treatment processes of RO and AOP were utilized.*

*In addition, the concentrate discharge from the RO process had to be further treated to remove phosphorous to meet the requirements for phosphorous concentrations in discharges above Cherry Creek Reservoir. This required additional treatment processes of coagulation and microfiltration prior to discharge of the concentrate. Now another separate treatment process to remove selenium, i.e., the BCR, will be constructed. The cost of this additional treatment system and plant modifications will add another $5 million in project costs.*

*These entities are acting to provide water supply to the area by very efficiently using and reusing the water supply available. They also have initiated water conservation that has resulted in very low demands. They do not add any pollutants to the system, however, selenium and phosphorous are concentrated through the treatment process and must be removed. In doing so, there is a net reduction in loading to the reservoir by virtue of this treatment.*

*All of this has resulted in extraordinary costs to the customers of these entities. This grant request and potentially another grant through Bureau of Reclamation would serve to help reduce the burden on these customers.*

*The amount of this grant request represents only 10% of the total project costs to restore use of the JWPP. As proposed, Cottonwood and ACWWA will pay 90% of project costs. These entities hope that they may be able to obtain a Bureau of Reclamation grant as well. If they were to be successful, then a maximum of 20% of overall costs would be funded by grants, and the entities would pay the remaining 80%. Hence, in any case, these entities will be funding a majority of project costs.*

Tier 3: The Water Activity Addresses Other Issues of Statewide Value and Maximizes Benefits

f. The water activity helps sustain agriculture & open space, or meets environmental or recreational needs.
g. The water activity assists in the administration of compact-entitled waters or addresses problems related to compact entitled waters and compact compliance and the degree to which the activity promotes maximum utilization of state waters.
h. The water activity assists in the recovery of threatened and endangered wildlife species or Colorado State species of concern.
i. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.
j. The water activity is complimentary to or assists in the implementation of other CWCB programs.

*This Water Activity will develop water supply and will treat to remove selenium, phosphorous and nitrogen to the benefit of the Cherry Creek Watershed and Cherry Creek Reservoir. There is currently a concern for levels of selenium, phosphorous and nitrogen in Cherry Creek Reservoir. Selenium is a concern for fish in general and specifically for the Walleye Fishery in the reservoir that provides recreational amenities for those using this State Park. Nutrient loading to the reservoir leads to algae growth and then low oxygen levels when the algae decay. This leads to concerns for reservoir eutrophication and oxygen levels detrimental to fish. The water treatment process does not add any selenium, phosphorous or nitrogen, and therefore the removal of such reduces the loading to the reservoir providing environmental and recreational benefits.*

*This Water Activity also provides the ability for Cottonwood and ACWWA to efficiently utilize a large volume of renewable water supply while providing meaningful environmental and recreational benefits. In doing so, these entities limit their need to import water from the Lower South Platte or from the west slope thereby providing additional environmental benefits. The cost of the grant at $500,000 is a very low cost compared to the cost of producing this amount of water supply plus the reduction in loads of selenium, phosphorous and nitrogen to Cherry Creek Reservoir.*

*The Water Activity also serves to further the technology to remove selenium through natural treatment processes. This should help the researchers to better understand the capability of such systems as they strive to make this treatment more economically viable. This should provide benefits statewide with regard to discharge issues related to water supply and mine waste discharges, and non-compliance of natural stream systems.*

Continued: Explanation of how the water activity/project meets all applicable **Evaluation Criteria**.
**Please attach additional pages as necessary.**

*This water project meets the Evalutaion Criteria per the following:*

*Tier 1- Promotes cooperation and meets water management goals/needs:*

1. *Environment – The reduction of selenium into the Cherry Creek tributary system is a benefit to the Walleye Fishery. Subject to state agency approvals, the proposed discharge point for the BCR treated water is above a water quality pond lacking a base flow to the area and would enhance this natural wetland while providing for additional treatment of phosphorous, nitrogen and selenium into the Cherry Creek Watershed.*
2. *Municipal & Industrial – The ACWWA Flow Project is an IPP that was included in the South Platte/Metro BIP to reduce the M&I gap. Without implementation of this project, the gap is increased.*
3. *Agriculture – By reinstating the JWPP, the water supply requirements of the ACWWA Flow Project are reduced as supplies will be used more efficiently requiring less importation of water from the north reserving the supply for agricultural use.*
4. *Recreation – The Cherry Creek State Park Recreational Area would benefit when considering the fish population within the Reservoir and the effects of selenium. This project will meet aquatic protection standards for selenium prior to discharge preventing any additional loading to the Cherry Creek tributaries. Colorado Parks and Wildlife has agreed to a letter of support which we have not yet received. We will forward this to you as soon as we have it.*
5. *Interstate Compacts – N/A*
6. *Multiple Basins – N/A*

7. *Multi-Purpose & Cooperative Projects- This project is a cooperation of 2 local area service providers to benefit from economies of scale and demonstrate fiscal responsibility, address water quality concerns and to supply concerns, and*
8. *Intrabasin – N/A*

*Tier 2- Facilitates Water Activity Implementation*

1. *Matching Commitment – Both Cottonwood and ACWWA anticipate funding approximately 90% of the project costs through collection of customer service fees.*
2. *Matching Commitment, Other Sources – The applicants will also submit an application for a WaterSMART Grant through the Bureau of Reclamation which would provide an additional funding source equal to about 6% of the overall cost of $5.05 million.*
3. *Grant Funding Critical to Success – The grant funding requested is 10% of the total project cost of $5.05 million.*

*Tier 3- Water Activity Addresses Other Issues of Statewide Value and Mazimizes Benefits*

1. *Addresses Issues of Statewide Value – The Denver Basin is non-renewable water source that has slowly diminished over time and has become of great concern to business and homeowners alike. Without a reliable and sustainable water supply, property values decline, development decreases, and area economies suffer. The proposed project makes use of each applicants available water rights from a renewable resource decreasing the dependence on the Denver Basin. By having a renewable water supply a large component of each applicants water portfolio, the requirement for importation of water from other areas including the western slope, are diminished. This project will also further technology in the use of this type of treatment. By furthering the advancement of treatment capabilities to remove selenium from source water, there is statewide benefit to increase water supplies and protecting the environment.*
2. *Threatened and Endangered Species – The aquatic protection standards for the Cherry Creek Watershed will be met following treatment of concentrate at the BCR.*
3. *Cost-Benefit is High for Colorado – The JWPP was constructed for $30 million using reverse osmosis and advanced oxidation processes to provide a high quality and safe water supply to our customers. The current process of microfiltration at the plant does not provide the same protections that were funded with the assistance of DWRF. Restoration of the RO treatment process at the plant will restore the value of the applicants' and state's investment.*

**Part IV. – Required Supporting Material**

1. **Water Rights, Availability, and Sustainability** – This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by, the water activity. This should include a description of applicable water rights, and water rights issues, and the name/location of water bodies affected by the water activity.

*Cottonwood and ACWWA propose to use this project to develop their capability to fully use and reuse water supply on Cherry Creek per their existing water rights decrees and augmentation plans. Their water rights include senior and junior water rights on Cherry Creek, the reuse of these rights, the reuse of return flows from the decreed NTGW rights, the reuse of water from the ACWWA Flow project that is currently being decreed for use and reuse in water court, and the reuse of WISE flows which are fully reusable through contract with Aurora Water and Denver Water. ACWWA Flow and WISE water are*

*sources imported from the Lower South Platte River north of Denver.*

2. Please provide a brief narrative of any related studies or permitting issues.

*There are three primary studies that define the work and are attached as Exhibit C-Reports. These are:*

1. ***Biological Treatment of Selenium in Concentrate**, prepared by CH2M, dated January 6, 2016. This study evaluated biological treatment options to remove selenium from RO concentrate. The study recommends the installation of a biochemical reactor ("BCR") and provides the layout, processes or treatment cells, the land requirement, and a cost estimate. This study also recommends a pilot study for further refinement of the facility design. This pilot study is currently underway. The CH2M study is Exhibit D to this application. Option 1, the recommended alternative, is the BCR proposed as part of this project.*

2. ***JWPP Selenium Compliance Evaluations,** prepared by Hatch Mott MacDonald, dated November 11, 2015. Exhibit E to this application*
*This study summarizes and updates previous studies prepared to evaluate options to reduce selenium loadings in the concentrate from the JWPP. The substantial recommendation of this study relates to converting the plant to a split flow treatment process where one-half of the flow is treated with RO and the other half is treated with microfiltration. The permeate from the two processes is then blended and treated using advanced oxidation (AOP). This will provide a very high quality water supply while reducing the volume of concentrate and the concentration of selenium in the concentrate. This presents a revision to a previous study (3 below) which has resulted in considerable cost savings. This revision resulted from the fact that the proposed BCR can remove phosphorous and hence the existing in-plant treatment system that included coagulation and microfiltration of the concentrate is no longer needed, and could instead be used for treatment of the source water. This report describes the modifications and the costs associated with piping, pumping and flow control changes to implement this program.*

3. ***JWPP Membrane Conversion,** prepared by Hatch Mott MacDonald, dated January 9, 2013. Exhibit F to this application.*
*This study evaluates options for modifications to processes at the JWPP to reduce selenium loadings in the concentrate from the JWPP. The substantial recommendation of this study relates to converting the plant to a split flow treatment process where one-half of the flow is treated with RO and the other half is treated with ultrafiltration. The permeate from the two processes is then blended and treated using advanced oxidation (AOP). This will provide a very high quality water supply while reducing the volume of concentrate and the concentration of selenium in the concentrate. This report describes the modifications and the costs associated with piping, pumping and flow control changes to implement this program.*

3. Statement of Work, Detailed Budget, and Project Schedule

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and budget, and in return, the State of Colorado is receiving the deliverables/products specified. **Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

**Please provide a detailed statement of work using the template in Exhibit A**. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

*The attached Exhibit A provides further budgeting detail. The proposed project will include the following primary components:*

1. ***Pilot Testing and Preliminary Design –*** *The pilot testing is to confirm and refine the results of the CH2M Study for development of a BCR to treat the concentrate from the JWPP. This is underway and is not part of the proposed project cost.*

2. ***Land Acquisition –*** *Cottonwood and ACWWA are currently negotiating purchase of the land required for the BCR. The land will need to be purchased and the land use will need to be approved through Arapahoe County. If for any reason, the purchase is not completed, the entities have the ability to condemn the property for this purpose. The land use process will be a Location and Extent Process through the County.*

3. ***Revise Discharge Permit –*** *The initial discharge permit remains in place but is inactive and needs to be revised. The permit will be updated which will better define discharge requirements.*

4. ***BCR Final Design –*** *This will be the final design of BCR using the results of the Pilot Study and Preliminary Design.*

5. ***Treatment Plant Design of Modifications –*** *This is the design of modifications within the existing treatment plant to allow for a split flow blended treatment using RO and microfiltration. It includes revised piping, pumps, and control system programming.*

6. ***CDPHE Plan Approvals –*** *Submit and process plans through to approval by the CDPHE engineering staff.*

7. ***Construct BCR –*** *This is construction of the BCR and startup operations. Initially, the processed flow will be discharged to the wastewater treatment plant until discharge permit conditions are reliably met.*

8. ***Construct Plant Modifications –*** *Construction or installation of the piping, pump and control system modifications to achieve blended flow treatment.*

9. ***System Startup –*** *Initial Operation of the JWPP.*

## REPORTING AND FINAL DELIVERABLE

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 statement 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.

## PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 10 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. 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 help promote the development of a common technical platform.

The above statements are true to the best of my knowledge:

**Signature of Applicant**: 

**Print Applicant's Name**: Patrick F. Mulhern
**Project Title**: Biological Treatment for Removal of Selenium from Water Treatment Plant Concentrate

**Return an electronic version (hardcopy may also be submitted) of this application to**:

Craig Godbout – WSRA Application
Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203
303-866-3441, ext. 3210 (office)
303-547-8061 (cell)
craig.godbout@state.co.us