**Testimony of Marshall P. Brown**
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**Before the**
**Senate Committee on Energy and Natural Resources**
**Subcommittee on Water and Power**

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Madam Chairwoman and members of the Subcommittee, my name is Marshall P. Brown. I am the General Manager for Aurora Water and have served there since 2012. I previously worked at Scottsdale Water in Arizona. Between these two municipalities, I have developed extensive experience in water service in arid climates, focusing in the areas of water reuse and storage to help meet the needs of growing communities in water constrained states.

Aurora Water is a municipal utility located east of Denver, Colorado, providing drinking water, wastewater conveyance, and storm drain services to a population of over 370,000 residents. Aurora is a rapidly growing city projected to double its population over the next 40 years.

I am pleased to also represent the WateReuse Association at today's hearing. The WateReuse Association represents nearly 250 water utilities serving over 60 million customers and over 300 businesses and institutions across the country that are engaged in water recycling. The association advocates for policies that advance safe and sustainable water supplies through various forms of water reuse.

Aurora Water and the WateReuse Association strongly support the Drought Resiliency and Water Supply Infrastructure Act (S. 1932), and thank Senators Gardner, Feinstein, McSally, and Sinema for their leadership on this important legislation. Senator Gardner has long been an advocate for water storage, recharge, and reuse projects essential for municipal and agricultural needs. His efforts on the Upper Colorado River Endangered Fish Program and the Platte River Recovery Implementation Program helped Colorado constituents be able to meet requirements under the Endangered Species Act and, most recently, his leadership on the Colorado River Basin Drought Contingency Plan legislation provides a path forward to help minimize future water supply risks for all those dependent upon the Colorado River.

S. 1932 includes a five-year, $100 million reauthorization of the Bureau of Reclamation's Title XVI Water Reclamation and Reuse competitive grant program, originally authorized in the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act. The Title XVI program is the

only federal program dedicated to advancing water recycling and has been a critical tool for increasing water supplies in a sustainable manner across the West.

There are currently 55 Title XVI-WIIN eligible projects awaiting assistance, with a total of more than $550 million in eligible federal cost-share, and this list will only grow as more projects become eligible. The critical need for this funding is clearly demonstrated by the number of communities that have applied for and are awaiting funding to diversify their communities' water supply.

The legislation also provides support for important desalination projects – a form of water recycling that enables communities and businesses to treat and reuse not only ocean water, but also high-saline waters in inland streams and reservoirs for beneficial fresh water purposes, such as cooling and drinking.

Aurora Water and the WateReuse Association encourage the swift consideration and passage of this bipartisan legislation.

**Aurora Water Overview**

Meeting the demands of a growing community like Aurora is challenging. Colorado is an arid state, with the Front Range averaging only 15 inches of precipitation annually, while the Rocky Mountains can receive significantly more moisture, primarily from winter snows. Colorado is the headwaters of the West's great rivers. Water in the state has been fully allocated in the South Platte, Arkansas, and Rio Grande water basins. The state and water users are developing water demand management policies and projects within the upper Colorado River basin. Colorado's water resources prove additionally challenging as 85 percent of the state's water supply originates in the western half of the state, while 85 percent of the population resides in the eastern half. The logistical challenges of collecting, storing and moving water across mountain ranges are extraordinary. The Bureau of Reclamation (BOR) has been at the forefront of many of these efforts, yet many Colorado municipalities must also develop their own infrastructure in partnership or individually to meet their specific needs.

Aurora Water obtains its water from three separate river basins. 25 percent of our water comes from the Colorado River, where we share facilities with both Colorado Springs Utilities and the Pueblo Board of Water Works. Another 25 percent comes from the Arkansas River Basin, where we utilize BOR facilities. Our final 50 percent of supply is from the South Platte River, primarily in the upper reaches of the basin. As a result, Aurora's water supply infrastructure is extensive and complicated. Aurora owns or partners in 12 reservoirs, manages and maintains hundreds of miles of pipes and has three drinking water treatment plants, as well as a reclaimed water facility. All told, Aurora's water can travel up to 180 miles before it reaches our customers' taps.

This diverse and extraordinary water supply system requires a large and concerted effort to move water through tunnels, pipelines, and pumping facilities. Large reservoirs are strategically located to help preserve this supply to meet current and future demands in both wet and dry

years. Aurora Water has storage capacity to meet three years of average demand to help see us through Colorado's variable climate and endemic droughts. As we grow in population, our storage capacity must continue to grow to meet these future demands.

Aurora is in the planning phases for three surface reservoirs. Wild Horse Reservoir, which will be located in the upper reaches of South Platte Basin, could have a capacity of up to 96,000 acre feet. This will be an off-stream reservoir located primarily on private land. Targeted for completion by the late 2020's, the design work and land acquisition have been underway for several years and permitting is expected to begin soon.

Box Creek Reservoir, proposed for the Upper Arkansas River Basin, began with initial scoping and land acquisitions in year 2000. With a proposed initial capacity of 25,000 acre feet, this reservoir is planned to include an estimated 400 surface acres on Aurora's property and 20 surface acres on U.S. Forest Service lands. There is also a potential interaction with a Bureau of Reclamation project that may benefit both parties. Due to costs and permitting complexities for this project, Aurora Water is planning this project for completion sometime between 2050 and 2070.

Last on our surface storage list is a new water supply and storage cooperative project within the confines of a regional joint use agreement called the Eagle River Memorandum of Understanding (Eagle River MOU). Established in 1998, the Eagle River MOU includes the cities of Aurora and Colorado Springs, Climax Molybdenum Company, Colorado River Water Conservation District, Eagle River Water and Sanitation District (ERWSD), Upper Eagle Regional Water Authority, and Vail Associates, Inc. The shared project goal is to develop up to 30,000 acre-feet of new annual supply with initial allocations of 20,000 acre-feet of average yield for Aurora and Colorado Springs and 10,000 acre-feet of firm yield for the Vail area. Several components are in the early conceptual review stage, including Whitney Reservoir, with proposed capacity of up to 20,000 acre feet.

Surface reservoirs in the west are effective methods for storing and moving large amounts of water. In Colorado, due to our dry climate, high evaporative losses are a consideration with open storage. These three reservoirs are all at high altitude and are relatively deep, reducing losses from evaporation. For storage at lower elevations, especially near municipalities, new and innovative solutions, beyond the typical surface reservoir, are required to ensure people have water available for delivery year-round. Aquifer Storage and Recovery (ASR), which uses ground water recharge, is a scalable and cost-effective storage mechanism. I will discuss Aurora's strategy for ASR later in my testimony.

## **Aurora Is a Leader in Reuse**

Aurora's potential for growth has forced the utility to seek innovative solutions to meet water demands. Water reuse has been an important strategy used by Aurora Water for over 50 years and is ingrained in our policies and culture.

Since 1968, many of the city's golf courses and parks have been irrigated using reclaimed water, which is "scalped" off the city's sewer system and treated to meet or exceed federal and state standards. Aurora Water currently provides up to five million gallons of reclaimed water per day. While reclaimed water has proved beneficial for Aurora, challenges exist in creating additional uses for this resource. Due to the nature of reclaimed water's water quality, this source must use dedicated infrastructure, including treatment, pumping, pipelines and storage. Also, with Colorado's seasonal variabilities, irrigation demand for reclaimed water is limited to the summer months, which is a substantial impact on the cost effectiveness of this system.

Potable water demand, however, is year-round, so when Colorado faced its deepest drought on record in 2002-2003, Aurora Water had to take reuse to a new level. In 2010, we completed a potable reuse system called Prairie Waters. By recapturing wastewater effluent and treating the water with a multi-barrier process, Prairie Waters currently provides up to 10 million gallons of high-quality drinking water per day. Built by the city at an initial cost of $638 million, this system was designed for expansion, since increased demands will mean increased water that is available for reuse. This included the development of a natural pre-treatment campus downstream of the regional wastewater treatment facility; the laying of 34 miles of 60 inch pipeline that crosses four counties, supported by three large pumping stations; and the construction of a state-of-the-art water purification facility. Prairies Waters was designed, permitted and constructed in only five years by carefully avoiding impacts on Waters of the US and jurisdictional wetlands. While this approach added to construction and land costs, the savings in time and related permitting impacts was immense.

Aurora Water had to overcome many challenges with Prairie Waters, including technical and financial hurdles and customer perception issues regarding reuse in drinking water. In the end, this new water source has been accepted by our drinking water customers as indistinguishable from our original mountain water supply. To date, there have been no water quality concerns that have been attributed to Prairie Waters, and the treatment facility that delivers this water has been recognized by the Partnership for Safe Water with its highest honor, the "Excellence in Drinking Water" Phase IV designation (one of only 18 facilities in the nation to have achieved this level).

Prairies Waters has become a model in water reuse for other communities. Aurora Water recently participated in workshops hosted by WateReuse Colorado and Western Resource Advocates to promote the expanded use of potable reuse. Over the past two years, these workshops have brought stakeholders together from across Colorado, including large and small utilities, water resource agencies, and the State regulatory body for drinking water compliance, the Colorado Department of Public Health and Environment (CDPHE), to create a framework for regulatory acceptance of potable reuse. These groups also developed baseline materials for public outreach that are customizable for any utility that wished to pursue potable reuse for its community. Accessible funding remains critical for many utilities that seek to build and implement similar systems to help provide renewable and sustainable water sources.

Prairie Waters also provides the backbone for a water sharing partnership between Aurora Water, Denver Water, and 10 members of the South Metro Water Supply Authority. Called the WISE Partnership, this cooperative agreement provides potable reuse water from both Denver and Aurora to small districts that are dependent on non-renewable water sources from deep aquifer wells. Incremental WISE deliveries began in 2017 as infrastructure was put in place connecting the South Metro entities, with full deliveries of 7,725 acre feet per year. WISE not only helps smaller communities achieve sustainability with a renewable supply, but it also provides a creative funding solution for other large reuse projects.

**Groundwater Storage Projects**

I understand that other experts will speak directly to groundwater recharge, but I want to emphasize the importance this mechanism is as a cost-effective means to supplement surface storage. For much of the history of the West, groundwater has been pumped at unsustainable rates; it is a non-renewable resource that has been mined and depleted. Over the past couple of decades, advances in technology have afforded communities with the ability to not just withdraw that resource, but also replenish it. Known as Aquifer Storage and Recovery, the ability to use emptied underground storage space has many advantages for storing water to help meet the needs in the arid and growing West. Since ASR is underground, surface land impacts are minimized. Cities, towns, and communities can grow and thrive above ground while being in close proximity to their water supply. With ASR, a community does not need to submerge large swaths of land far from their citizens, nor seek to dam streams.

One of the biggest challenges with surface storage and conveyance is evaporation. Each year, a significant percentage of the water stored in a surface reservoir is lost to the atmosphere to no benefit of the community that stored it. With ASR, the stored water does not evaporate and is available when it is needed. By storing the water underground, a community's water supply is stored more sustainably and efficiently over the long term, providing an effective tool with which to meet the climatological uncertainties of hydrologically lean years.

An often-forgotten benefit of ASR is that it is a scalable operation. This means that an ASR project can be built as a pilot or small project and grow as need grows. Over time, a community can add to and expand their ASR operation from a single well at a single location to many wells over multiple locations throughout the area as necessary to best meet their growing needs. Being sensitive to subsurface constraints, a community can choose when and where best to store water depending on the outcomes they need most.

Within Colorado, ASR has historically been selectively practiced in a specific series of aquifers along the Front Range known as the Denver Basin aquifers. These four bedrock aquifers have been and are the primary source of water for many of the greater metro communities. As a non-renewable resource, the Denver Basin ground water is being depleted, and the aquifer water levels are dropping. Dropping water levels means there is less water and that the cost to withdraw the water from the aquifer is increasing, causing additional hardship on the communities that rely on this type of water supply.

As communities grow, higher demands result in greater depletions of the Denver Basin. In the past two decades, however, more utilities are exploring ASR as a tool with which to slow aquifer declines.

Aurora Water is now establishing an ASR program as a priority, recognizing that all communities need a diverse portfolio when it comes to drought resiliency and water supply planning.

Aurora is engaged in expanding ASR efforts on several fronts and within varying hydrogeologic settings. Aurora is developing partnerships with farmers and rural aquifer users in an area called the Lost Creek Designated Groundwater Basin. The Box Elder Creek Basin, adjacent to Lost Creek, is also under review for the potential to serve as a place for ASR and aid in meeting Aurora's critical water needs into the future. Aurora is reviewing the Denver Basin aquifer for its potential to help optimize the City's water supply planning, its drought resiliency, and to support solving regional water problems in partnership with other water suppliers.

**Desalination**

Desalination is not an intuitive solution being sought by inland utilities. As arid western communities continue to grow, so too does the demand for the water to sustain them. As water becomes more difficult to acquire, we must be creative and innovative in our solutions. Every drop is precious, so we use and reuse it as many times as possible through water recycling. And each time that drop is used, it collects salts. Over time that drop will become too salty to feasibly use or dilute.

Traditionally, desalination has been used by coastal communities to turn seawater into drinking water; however, increased salinity in freshwater sources is increasing the need for this treatment process by inland communities. Salinity sources in freshwater streams and lakes have several primary sources, including return flows from agricultural irrigation and runoff from urban uses such as deicers and road salt and wastewater effluent. Salinity impacts water quality, making water harder to treat and rendering it difficult for downstream agricultural users who depend on the freshwater source to operate. Desalination and water reuse are, and should be, closely related. Without desalination, communities that reuse water or receive the higher salinity water downstream must blend the lower quality water with high quality water to reduce the salt concentration and make the water usable. Finding and using high quality blending water is an expensive endeavor as the source of high quality water is often from high mountain water, or from groundwater, which is a short-term limited solution due to slow recharge rates and over-pumping. Blending has severe limits, as over time, the freshwater streams become more saline and low-salinity water becomes more valuable. Desalination will be required to remove the salinity, which is an expensive and energy intensive process that, through traditional means, results in a brine solution that must be disposed. Coastal communities return the brine to the oceans, which can have its own ecological downsides, but inland communities must find alternative methods for this disposal. Currently, deep well injection is the common standard for brine disposal, but this technology has limited capacity, is expensive financially, has extensive

regulatory oversight, wastes water, and can have unintended consequences, including localized seismic activity.

We need to invest in Zero Liquid Discharge desalination technologies to ensure that drops can continue to be put to beneficial uses indefinitely, continuing our mission to be good stewards of every drop. In years of plenty, as that drop grows into many drops, we will need more places to store them. Additional storage is needed to buffer ourselves for the drought years. Zero Liquid Discharge and ASR are newer, innovative, and more flexible water supply tools. As one who has lived and worked in the arid West, all parts of the Drought Resiliency and Water Supply Infrastructure Act are equally crucial for the continued prosperity of those States that work with and rely on the Bureau of Reclamation.

**Funding**

For many utilities, the financial component of developing much needed infrastructure can be daunting. These solutions are not inexpensive, and many utilities do not have sufficient cash-on-hand or reasonable access to the bond markets.

Given the enormous capital needs to build and maintain necessary water infrastructure to meet future growth and the challenges of a variable climate, Aurora Water and all water utilities must be resourceful and have funding mechanisms available. Federal funding is critical to ensure that water suppliers large and small will be able to provide essential water supplies. The forward thinking funding opportunities contained in the Drought Resiliency and Water Supply Infrastructure Act can help both challenged and well positioned utilities find the most sustainable method to build and maintain extremely expensive, but critically necessary infrastructure.

**Conclusion**

Thank you for allowing me to discuss how S. 1932 can assist the challenges that municipalities have in the arid west. I especially want to recognize Senator Gardner for his engagement and leadership in water issues. Aurora Water's relationship with the Senator and his excellent staff has been enormously helpful to moving us closer to solutions for sustainable, efficient and effective means to create much needed infrastructure.

In short, S. 1932 goes a long way in helping to provide a realistic and sustainable funding mechanism to help us develop solutions to critical water needs. Aurora Water and WateReuse strongly urge support for and passage of this bill.