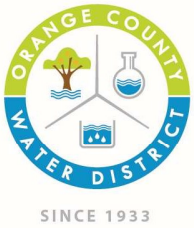

ORANGE COUNTY WATER DISTRICT
ORANGE COUNTY'S GROUNDWATER AUTHORITY

TESTIMONY OF
MR. VINCENTE SARMIENTO

PRESIDENT
BOARD OF DIRECTORS

ORANGE COUNTY WATER DISTRICT
FOUNTAIN VALLEY, CALIFORNIA

PRESENTED BEFORE

SUBCOMMITTEE ON WATER, OCEANS, AND WILDLIFE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

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Chairman Huffman, Ranking Member McClintock and members of the subcommittee, I am Vincente Sarmiento and I appear before you as the president, an elected member of the board of directors, for the Orange County Water District (OCWD) located in Fountain Valley, California. I also appear as a councilmember of the city of Santa Ana, California.

I am deeply honored to appear before you to discuss one of the most pressing issues of our times: the provision of safe and reliable water supply in the western United States where, since 2008, OCWD has operated the world's largest advanced water purification project for indirect potable reuse (IPR) to increase local water supplies and protect the groundwater basin it manages from seawater intrusion and overdraft. As a leader in water reuse, it is our duty to continue to research the IPR purification process and its water quality to spearhead advancements for our project and for other regions that depend on this type of water recycling project for their water supply.

In addition to significant advancements in infrastructure, such as our nearly one-billion-dollar IPR project, called the Groundwater Replenishment System (GWRS) and continued research to support commercially-viable advancements in water recycling, OCWD is also harnessing nature to use advancements in weather forecasting to collect more stormwater that would otherwise be lost to the Pacific Ocean and use that water to supplement drinking water supplies. We are on the front lines of changing climate and the adverse impacts to the delivery of a safe and reliable water supply it is creating for communities like those OCWD serves. With a robust commitment from the federal government and the use of traditional and innovative approaches, we can effectively work to reverse the challenges of water scarcity. I will discuss these approaches in detail.

First, by means of introduction, OCWD was established in 1933 by the California Legislature to manage the Orange County Groundwater Basin. It is located in Southern California and provides groundwater to 13 cities, five retail water districts, and one investor owned water utility (which include the cities of Anaheim, Buena Park, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, La Palma, Newport Beach, Orange, Santa Ana, Seal Beach, Tustin, Westminster, East Orange County Water District, Irvine Ranch Water District, Mesa Water District, Serrano Water District, Yorba Linda Water District, and Golden State Water Company). Together, they serve more than 2.5 million citizens and businesses within the sixth largest county of the nation (by population). This distinction is important as it drives our priority to find sustainable water supplies for our growing region.

The Orange County Water District is pleased to be part of today's hearing into the implications associated with an uncertain water supply future and how, as a nation, we must respond to this challenge. We all know the statistics that illustrate how scarce our freshwater supplies are becoming. Parenthetically, I must add that this challenge is both economic and social. And while today's hearing focuses on the west, it is vital to recognize that our challenges in Orange County are a microcosm of the global implications associated with a changing climate. Simply stated, drought, population increases, pollution and other factors impacting water supplies threaten our quality of life and economic prosperity. If we lack a reliable supply of water, the impacts on food production, industrial production and recreational activities are dramatic, with reverberations to our national economy.

Today, I would like to address these issues and discuss how OCWD, and its partner, the Orange County Sanitation District (OCSD), developed a sustainable response to severe drought conditions and over drafting and saltwater intrusion into our groundwater basin that serves more than 2.5 million citizens and the related industries of our region. As we prepare for the transition from the rainy season to the dry season, it is true that the past cycle produced record levels of rain and snow that has taken California out of its historic drought condition, but this is just one year. Clearly, the new normal of rainfall and snowfall events, along with accelerated evaporation and melting, means that it is necessary to develop and implement innovative water development approaches.

In Orange County, our climate is becoming more arid. The base flow of the Santa Ana River, our main source of surface water, continues to decline. Imported water supplies from Northern California and the Colorado River are restricted as most recently discussed by this subcommittee last week. As prudent managers of our scarce water supplies, we plan for dry years to occur three out of every 10 years at a minimum. Population growth within our region is expected to increase and so will water demands. And the recent revelations of the public health impacts of contaminants like perfluorooctanoic acid/perfluorooctane sulfonate (PFOA/PFOS) only exacerbate impacts to a safe and reliable water supply.

In the late 1980s, OCWD recognized that to preserve our region's economic and social vitality, the challenges of our groundwater depletion, seawater intrusion and unreliable surface water supplies demanded an innovative solution. OCWD implemented an aggressive program to develop a novel water purification process with OCSD. This initiative grew into the GWRS. But our experiences and achievements since the 1980s demonstrates that solutions can be developed that overcome significant challenges to our water reliability. What needs to be addressed, as resiliency to climate conditions becomes increasingly the priority for water managers, is tying together traditional solutions with innovative solutions.

Since 1933, OCWD has taken pride in advancing the development of sustainable

water supplies to address a growing population and precipitation pattern changes. This commitment is demonstrated vividly by our recently expanded GWRS, which went from producing 70 million gallons of water per day (MGD) in 2008 to 100 MGD in 2015. This subcommittee has been an important advocate of policies that made the GWRS a reality and we thank you for your unwavering support of effective federal programs of assistance. If it were not for Congress to have authorized a $20 million Title XVI grant for the GWRS in 1996, the project would not have been built, nor could we have leveraged additional state funding. I would note, that OCWD is a supporter of legislation currently pending before the subcommittee, H.R. 1162, that would reinvigorate the Title XVI water recycling program, authorizing $500 million dollars in competitive grants assistance and, for the first time, increase the ceiling on project assistance to $30 million. We hope that the subcommittee will move in short order to approve H.R. 1162 so that many more projects like the GWRS may be built.

Unlike traditional approaches to water treatment, our approach recognized that wastewater is a valuable resource. The ability to design a technological approach that would capture this resource, remove the impurities and recycle it back into the environment, would address multiple needs ranging from supplementing water supply to protecting our natural resources.

The GWRS takes treated wastewater from OCSD that otherwise would be discharged into the Pacific Ocean. It implements a sophisticated process to purify this water. The process involves using a three-step advanced treatment process that consists of microfiltration, reverse osmosis, and ultraviolet light with hydrogen peroxide. This purification process produces high-quality water that exceeds all state and federal drinking water standards. Let me emphasize this point. OCWD is able to exceed public health standards in developing a sustainable water supply.

It has often been stated that California has always met challenges and succeeded, defying the conventional wisdom that our state is too big and the problems are too big to find a long-lasting solution. In the case of water supply, OCWD and OCSD have taken a big problem, challenging meteorological conditions, and designed a solution that delivers long-term water security for our region that is being replicated throughout the arid and semi-arid regions of our nation and the world.

Orange County Water District's once innovative approach to developing the world's largest water recycling plant has morphed into a response that agencies across the western U.S. and other regions of the country can turn to for help to decreasing demands on potable supplies. The limited original Title XVI federal assistance that

contributed to building the $500 million project enabled OCWD to construct a new technology approach that today is returning dividends to other water agencies that can implement such projects with certainty that benefits will be delivered in sustainable water supplies.

The GWRS has allowed our region to take control of our future. However, this effort has been achieved in a partnership with federal and state agencies that provided vital assistance in making this project a reality. Today, the partnership is readying for the completion of the final expansion of the GWRS. We currently are on track to deliver 130 million gallons per day of sustainable, highly-purified drinkable water in 2023, which is enough water for 1 million residents.

As much as the GWRS is providing an important water supply, locally it sends an important message to other water scarce regions of the nation and the world. The GWRS is a project based upon a local solution grounded in local control, reliability and a high- quality water supply. The opportunity to implement a proven approach like the GWRS can return important dividends to political and economic security needs.

Working with the information gained from OCWD's successes, other water agencies throughout the United States and international delegations from countries such as Australia, Brazil, Israel, Korea, China, Spain and Saudi Arabia have come to visit the GWRS and learn from OCWD and OCSD's success. Orange County Water District's example is that of a technology transfer and collaboration to solve global water supply and quality problems. This kind of collaboration delivers tangible benefits in the form of improved quality of life, robust economic activity, public health improvements, and long-term socio-economic stability. The lessons that OCWD has learned in its decades of developing and implementing responses to water scarcity demands a meaningful partnership among various local, regional, state, national and international agencies to ensure the development of sustainable water supplies that, in turn, will reduce, if not eliminate, the potential for conflict related to unreliable water supplies

In order to successfully secure a safe and reliable water supply, we must have federal policies that provide resources to construct projects and also promote innovation to push the envelope in delivering sustainable and affordable water supplies.

In 2018, OCWD received two research grants totaling $400,000 from the United States Bureau of Reclamation (USBR) Desalination and Water Purification Program. The research will provide critical data to support advancements in water reuse and

treatment. The first grant will enable OCWD to conduct pilot-scale testing on closed circuit desalination and forward osmosis as alternate technologies that can be used to recover water from reverse osmosis (RO) concentrate. The second research grant will fund a water quality study to determine the occurrence of N-nitrosodimethylamine (NDMA) and NDMA precursors at the GWRS, including diurnal trends and efficacy of RO and ultraviolet-advanced oxidation.

Using conventional RO technology, the GWRS currently purifies and recovers 85% of the feedwater supply of treated wastewater effluent from OCSD. This currently results in OCWD discharging 17 MGD of a concentrate waste stream to the OCSD ocean outfall, which will increase to 22 MGD with the GWRS Final Expansion. Traditionally, it has been cost prohibitive to go above 85% recovery because RO system performance declines rapidly. OCWD will pilot test and evaluate two commercially available recovery enhancements to the RO process that have been applied to industrial water treatment, but had not been thoroughly evaluated for recycled water treatment. This work will help us evaluate the regulatory compliance, operational requirements, and Capital Expenditure (CAPEX) and Operating Expenses (OPEX) costs associated with deploying enhanced recovery technologies at a large reuse facility.

Our research and development team looks forward to testing promising technologies that have potential to increase overall water recovery of the RO process from the current 85 percent up to 95 percent or greater. Reverse Osmosis concentrate represents a significant new source of water. The pilot-scale testing will be done in collaboration with Desalitech (CCD pilot), Porifera (FO pilot), and Carollo Engineers over an approximately year-long study. Each pilot will treat RO concentrate from the GWRS to produce high-quality membrane-treated water. The pilot-scale testing may help maximize even more water, and that's our job. Increased water supply and water quality help economies like Orange County thrive and we are grateful for federal support to conduct this important research.

The Orange County Water District was also a recipient, with the University of Maryland and CosmosID, Inc., of a National Science Foundation (NSF) grant that will aid the water industry in its continued effort to improve water quality. The $100,000 award will be used to apply metagenomics, an exciting new technology that holds significant promise to water quality assessment. This technology will provide comprehensive information on microbial water quality and ecology of water treatment and distribution systems. Compared to current microbial techniques, metagenomics with exceptional

speed, accuracy and affordability provides improved identification of microbial communities.

As much as the GWRS is providing an important local water supply, harnessing nature's gift of rainwater through Forecast Informed Reservoir Operations (FIRO) will provide OCWD with an additional water supply with no new infrastructure needed.

As manager of the Orange County Groundwater Basin, OCWD's key activities is to replenish (recharge) the groundwater basin. While purified recycled water now makes up more than 30% of the water OCWD puts back into the groundwater basin, one of the other major sources of supply to replenish the basin is stormwater captured at Prado Dam in Riverside County. In coordination with the Army Corps of Engineers, stormwater is captured at Prado Dam and is released for recharge downstream in the Orange County Groundwater Basin. FIRO will allow OCWD to expand the existing stormwater program.

Up to half of California's total annual precipitation and 90 percent of its flooding are caused by sporadic, extreme atmospheric river (AR) rain events. An AR is a narrow region in the atmosphere that is responsible for most of the horizontal transport of water vapor outside of the tropics. An entire water year, and the risk of flooding and drought, may hinge on a few AR storms. Prado Dam's water control manual could be updated to allow forecast information to be utilized in operating the dam.

A new Federal policy* is in place allowing water managers to incorporate forecasted conditions in planning water operations. This policy change allows forecast information to be incorporated in Water Control operations and in updates to Water Control Manuals. (*May 2016, USACE Water Control Management Engineering Regulation, 1110-2-2400, Section 3-3).

Developing tools and techniques to incorporate better forecasts of extreme rainfall events into their management processes, water managers may be able to retain water they would otherwise needlessly release - resulting in cost savings and a more reliable water supply, while preserving and enhancing flood control capabilities.

Improved forecasts and new tools can be tailored by water managers to be incorporated into water operations and used in water control manual updates. The Orange County Water District is committed to increasing water supply reliability and flood control management through advance forecasting tools such as FIRO.

Our ability to reduce reliance on imported water from the Colorado River and Northern California depends on increasing capture of stormwater released from Prado Dam. Advancing research and observations for unique region-specific forecasts may permit Prado Dam, during a wet year, to capture up to 20,000 acre-feet of additional water behind the dam, or enough water for 160,000 people.

Atmospheric rivers produce 30-50% of California's precipitation and more than 90% of the state's major floods with just a few storms. Increased forecast ability (longer lead time) for atmospheric rivers will allow the United States Army Corps of Engineers and OCWD to update operations at Prado Dam to improve water supply reliability in a changing climate, thereby reducing demands on imported water and saving energy.

In addition to implementing more water recycling projects, improving upon water recycling technologies and developing better tools and techniques to better forecast atmospheric rivers, we believe that an aggressive effort to implement a broad array of initiatives can respond to the realities of today. These include:

- **Conservation:** Reduced demand is one tool to address today's challenges, but will not by itself secure our water future. In order to supplement conservation programs, we must leverage our investments in existing facilities that were designed for the last century's needs. For example, OCWD collaborated with the U.S. Army Corps of Engineers to leverage the investment that our region and the Corps have made in constructing Prado Dam. Rather than use Prado Dam for a single purpose, flood protection, we recognized the potential of conserving water at Prado during storm events that can be subsequently recharged into our basin for future use. The alternative would be to lose this water supply as it courses down the Santa Ana River and into the Pacific Ocean. We need to find ways to expedite administrative reviews to allow for timely use of these facilities when weather patterns present opportunities. On a related matter, we note that Congress passed legislation to enhance the use of modern technology to better understand the impacts of imminent storm events like atmospheric rivers. We recommend that programs like Forecast Informed Reservoir Operations become the norm rather than the exception to assist federal, state and local water managers develop operations to capture stormwater flows that can be used for groundwater recharge and ultimately drinking water.
- **Water Use Efficiency:** Efficient use of water has consistently demonstrated real benefits to sustainable water supplies. We believe that the ability to install technologies that better inform water managers and ratepayers on the consumption of water can lead to improved water use efficiency as the public gains a better understanding on how to use limited water supplies with enhanced efficiency.
- **Energy Efficiency:** The cost of water, whether treatment of wastewater flows for recycling, desalination or the conveyance of potable supplies creates

affordability challenges that only compounds upward pressures on the cost of water delivery. It is vital that we create incentives to reduce these costs and this can only happen through technology innovation. While not within this committee's jurisdiction, we recommend that any infrastructure package that is developed contain tax incentives and other fiscal policies that can incentivize the development and use of energy efficient systems to treat and convey water.

- **Research, Technology and Demonstration:** When OCWD embarked on the GWRS, it required years of research, designing and demonstrating technology and then constructing pilot tests that could become a full-scale project that minimized the risk of failure. An aggressive federal program of assistance can help to reduce the risks associated with the use of new technologies and bring such opportunities into the commercial space on an expedited basis. We need to improve our coordination of water resources research efforts within the federal system and ensure a place at the table for water managers to provide input. The lessons OCWD learned and provided to others has delivered dramatic benefits.
- **Increasing the Purchasing Power of Federal Assistance through Analytics and AI:** Resources will always lag behind needs at every level of government. The American Society of Civil Engineers' annual report card for the nation's infrastructure illustrates the 100's of billions of dollars in water infrastructure needs. One way to help bridge the gap is to provide federal investments to encourage the use of innovative technologies that can provide real time monitoring and identify and/or predict water system needs; pinpointing the actual area of infrastructure disrepair and thereby eliminating the wasteful removal of stable and useful infrastructure. Similarly, if we can utilize advances in weather and stormflow prediction to better forecast stormwater flow rates and then shuttle such flows into existing treatment and storage facilities, we can reduce demands to construct costly facilities and instead allocate resources more efficiently to address projects such as recycling and groundwater banking. And last, an ability to monitor real and apparent water losses can lead to dramatic savings that in turn squeezes the last drop of water.
- **Natural Systems Improvements:** Green infrastructure continues to offer sustainable solutions to water scarcity. The opportunity to treat water naturally in wetlands can enhance ecosystems and reduce conflict between environmental and Modernization & Improvement (M & I) needs.
- **Traditional Approaches to Funding Infrastructure**: The challenge, as noted earlier, is a common challenge. The need far outweighs resources. We believe we must redouble our nation's commitment to providing a safe and reliable

water supply through robust funding. In the 1970s, this nation committed more than $5 billion annually to address wastewater infrastructure. Today, we debate whether to fund the Clean Water Act's State Revolving Fund program (SRF) at $1 billion or $1.5 billion. On the drinking water side of the equation, the debate centers on $800 million or $1 billion. The core water recycling program Title XVI is proposed to be funded at $3 million. The disconnect between funding assistance and needs is glaring. An innovative approach to funding is to provide increased incentives and assistance to communities that implement sustainable, alternative water supplies that deliver benefits like reducing the discharge of wastewater that is a resource. This approach could also spur on the development and adoption of innovative treatment technologies. Additionally, we need to address groundwater recharge. Funding to support this need will deliver multiple benefits ranging from reducing saltwater intrusion into the aquifer to providing a safe and reliable water supply for disadvantaged communities that have over drafted basins. The past few years have demonstrated that innovative financing approaches can lead to the construction of large water infrastructure projects. The key program is the Water Infrastructure Finance and Innovation Act (WIFIA). This program resides in the U.S. Environmental Protection Agency (USEPA), but we note that last year's America's Water Infrastructure Act requires USBR to enter into an agreement with USEPA to develop a WIFIA like program for USBR. The concept of WIFIA is sound as OCWD has used a $135 million WIFIA low-interest loan to achieve our priority of building the final expansion of the GWRS that will serve the needs of 1 million Orange County residents. The ability to use federal borrowing authority and provide public agencies with low cost assistance is crucial. Finally, Congress must at all costs preserve the use of tax-exempt financing of our water infrastructure (among other public purpose needs). Any effort to restrict or eliminate such a financing tool must be vociferously rejected.

- **Project Approvals:** Many of our federal programs mandate standards of approval that can lead to delays or misalignment of permits and project construction timetables. Let me be clear that we are not seeking to limit the ability to ensure compliance and enforcement of federal environment and public health standards. However, mandates developed in the 1970s and 1980s should be re-examined to determine if opportunities can be identified to expedite these vital projects that can combat climate change challenges. This one innovation could help to reduce project costs, freeing up resources.
- **Desalination:** It is an option that should not be discounted, especially given the challenges of brackish water supplies due to over drafting groundwater basins, as well as the benefits derived from coastal desalination. When we speak of

desalination, we need to be clear that there is a real need to commit resources to research and technology development. Examples from Israel clearly demonstrate the return on such investments. We must also understand that desalination as a source of water supply carries different challenges depending upon whether it is coastal or inland. From OCWD's perspective, we believe that coastal desalination might serve an important asset in our arsenal of water supply solutions. However, as an agency that must address the needs of our ratepayers, the challenge for OCWD and other agencies is the cost of desalinated water. As the Claude "Bud" Lewis Carlsbad Desalination Plant has illustrated, there are solutions that can be put in place to protect the ratepayers, but it requires careful review and approvals for any proposed project because desalinated water supplies carry a cost beyond traditional sources. Given the new realities that we face in securing a safe and reliable water supply, we cannot turn away from this potential opportunity. This is why OCWD is currently exploring the opportunities and costs of a desalinated water supply. Whether you support desalination or are on the fence, one important step that we should pursue is a commitment to drive down the costs of producing such a supply. We have seen important advances in driving down the costs on an acre-foot basis over the past several decades. But we can do more. From bringing clarity to the permitting process to reducing the costs of producing water and disposing of the byproducts produced during the treatment process, we can find ways to make desalination more attractive to meeting emergency and long-term water supply needs.

I have provided a summary of areas where innovation can, we believe, provide solutions to traditional and new water scarcity challenges. I would like to close with one other thought. Often, we in the water industry tend to see innovation within the context of advancing technologies. However, OCWD has learned that a critical component of innovation is education. Our future opportunities to find innovative solutions will depend on the understanding of our communities about the importance of innovation in securing our water future. This was clearly the situation when we successfully constructed and began operating the GWRS. We would urge you to provide for adequate support of education needs going forward so that the public appreciates and better understands the value of our investments in water supply innovation. At OCWD, we recently completed the construction of an educational platform that offers visitors a comprehensive presentation of the water cycle, technology advancements and the overall value of water to our economic, environmental and recreational needs. While technology can deliver solutions, one of the greatest resources we have in meeting the new normal of water supply is an

educated public.

Again, OCWD deeply appreciates the opportunity to appear before you today. We look forward to working with you to advance the adoption of innovative solutions to our water resources needs. I would be happy to respond to any questions you may have.