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BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In re Petition of Imperial Irrigation District and San Diego County Water Authority for Approval of Long-Term Transfer of Conserved Water and Changes in Point of Diversion, Place of Use and Purpose of Use Under Permit No. 7643	**EXPERT WITNESS STATEMENT OF KENNETH WEINBERG**

I. INTRODUCTION

My name is Ken Weinberg. I am the Director of Water Resources for the San Diego County Water Authority (SDCWA). My department is responsible for the long term and short term water supply and demand planning and environmental compliance activities of the SDCWA. These include long-term and short-term water demand and water conservation forecasts, analysis of imported and local supply availability, participation in the planning and development of water recycling, groundwater recovery and storage, and seawater desalination projects, development and administration of programs implementing the California urban water conservation best management practices (BMPs) and imported water supply pricing programs encouraging effective resource

management.

I have been employed by the SDCWA for the past 10 years. During this period, I was the principal author of the SDCWA 1997 Water Resources Plan (1997 Plan),[1] in which I analyzed, among other things, the efficacy of water transfers from the Colorado River and from northern and central California as a way to enhance the reliability of the SDCWA's supply. I developed SDCWA's Reclaimed Water Development Fund program to encourage the implementation of water recycling projects. I directed the development of SDCWA's 2000 regional Urban Water Management Plan (2000 UWMP). On SDCWA's behalf, I participated in the California Urban Water Agencies Planning Directors' Committee and co-authored a guidebook published by that committee on water recycling projects. I am currently directing an evaluation of potential seawater desalination projects for San Diego County. I have participated in numerous meetings with SDCWA and member agency staff, Metropolitan Water District of Southern California (MWD) staff, and members of the public and industry peer groups regarding water supply alternatives, feasibility studies and demand forecasting.

I have a Bachelors of Science degree from the State University of New York College at Buffalo and a Masters of Public Administration from San Diego State University.

This testimony provides the SWRCB with: an overview of the municipal, industrial and agricultural water demands in SDCWA's service area; a description of the manner in which population growth, economic conditions, and hydrologic conditions impact that demand; a summary of the measures SDCWA and its member agencies have taken to control increasing demand, namely water conservation measures and BMP implementation; a discussion of SDCWA's need for a more reliable supply and the proposed solutions to achieving that reliability, including the proposed IID/SDCWA transfer; as well as a review of several of the most important water supply alternative options that SDCWA has considered over the past decade.

[1] SDCWA Exh. 9: San Diego County Water Authority, *Water Resources Plan* (1997).

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II. OVERVIEW OF WATER USE IN SDCWA'S SERVICE AREA

The SDCDWA supplies the majority – 75 to 95 percent – of the San Diego County region's water supply needs, depending mainly on local rainfall conditions. SDCWA purchases imported water supplies from MWD and sells that water to its 23 member agencies who in turn deliver it to a wide variety of retail customers, from homeowners to businesses to agricultural producers.

Municipal and industrial (M&I) water use, which includes residential demand and water used for commercial and industrial purposes makes up about 80 to 85 percent of the region's total water consumption. Residential water consumption totals 57 percent of the total water use in San Diego County and is composed of both indoor and outdoor uses. Indoor water use includes sanitation, bathing, laundry, cooking, and drinking. Most outdoor water use is to meet landscaping irrigation requirements. For single-family homes and rural areas, outdoor demands may be as high as 60 percent of total residential use. Major commercial water users include service industries, such as restaurants, car washes, laundries, hotels, and golf courses. Water-intensive industrial uses in the City of San Diego and in other parts of the county, such as kelp processing, electronics manufacturing, and aerospace manufacturing, typically require smaller amounts of water when compared to other water-intensive industries found elsewhere in Southern California, such as petroleum refineries, smelters, chemical processors, and canneries.[2] Commercial and industrial water use accounts for 23 percent of total water use.[3]

SDCWA is the largest consumer of agricultural water within MWD's service area, comprising over 60 percent of MWD's total agricultural water demands each year. Agricultural water use within the SDCWA's service area is concentrated mainly in north San Diego county including member agencies such as: Rainbow, Valley Center, Ramona, and Yuima Municipal Water Districts, the Fallbrook Public Utility District, and the City of Escondido. Agricultural water, used mostly for irrigating groves and crops, is expected to account for 10 to 15 percent of SDCWA's total water

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[2] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-2 (Dec., 2000).

[3] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-4 (Dec., 2000).

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demand in the future.[4]

A. Population and Growth Factors

Water use in the San Diego area is closely linked to the local economy, population, and weather. Over the last half century a prosperous local economy has stimulated population growth, which in turn has produced a relatively steady increase in water demand.[5] Additionally, the tourism industry in San Diego County affects water usage within the SDCWA's service area, both directly by the actual number of visitors to the area, and indirectly by the number of service industries and attractions that emerge to support that industry. Although fluctuating economic and weather conditions in the 1990s and lingering effects from the 1987-1992 drought resulted in reductions in total water consumption from historic peaks during this period, by 1999, a new combination of natural population increase and job creation surfaced as the primary drivers of long-term water consumption increases.[6]

San Diego County is now experiencing a strong economic expansion that has again increased the region's demand for water. In fact, fiscal year 2000 total water use (imported and local supplies) exceeded the prior historic peak (646,645 acre-feet in 1990) and reached an estimated total water use of 695,000 acre-feet.[7]

B. Water Use Efficiency and Conservation

Water conservation plays a central role in SDCWA's water demand management strategy. SDCWA has consistently demonstrated over the past eleven years a concerted effort to use water efficiently. As a result, SDCWA has been highly successful in achieving real water savings, and thus offsetting demand. Through the full implementation of BMPs and other conservation measures described below, SDCWA and it member agencies have utilized all reasonable water conservation options available to them, thereby maximizing their existing available water supplies. Water conser-

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[4] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-2 (Dec., 2000).

[5] SDCWA Exh.7: *2000 Urban Water Management Plan* at 2-3 (Dec., 2000).

[6] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-3 (Dec., 2000).

[7] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-3 (Dec., 2000).

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vation has proven to be among the least cost and longest lasting new water supply alternatives available to the SDCWA.

The SDCWA has also been a recognized leader in the development and implementation of BMPs in California. The SDCWA was part of the negotiating team that developed California's water conservation BMPs and was among the first signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California (Conservation MOU).[8] Over a two–year period, SDCWA staff met with other large California water agencies and the Environmental Water Caucus to reach agreement on the specifics of the BMPs. Since then, SDCWA staff has played a leadership role in assuring the success of the California Urban Water Conservation Council. This group is charged with monitoring progress in implementation of the BMPs by signatories to the Conservation MOU. The SDCWA has regularly provided financial support to the Council for conservation-related studies.

The SDCWA has consistently implemented all wholesaler BMPs, thereby demonstrating its commitment to water conservation.[9] The SDCWA either meets or exceeds all recognized California water wholesaler industry standards and is truly one of the national leaders in the field of water conservation.

Additionally, the SDCWA has assisted its 23 member agencies in implementing the retailer BMPs. This assistance has included both co-funding and operation of most water conservation programs in San Diego County. Finally, the SDCWA and its member agencies have implemented numerous potential BMPs on a pilot basis. Examples of these potential BMPs include the residential clothes washer program and the coin-op clothes washer program.

The SDCWA has a longstanding commitment to the aggressive implementation of water conservation measures in the San Diego region and is an innovative leader in the field. The SDCWA has conceived, developed, implemented and continues to administer several major urban and agricultural water conservation programs. These programs include an ultra-low-flush toilet incentive

[8] *See* SDCWA Exh. 35: *Memorandum of Understanding Regarding Urban Water Conservation in California* (as amended Mar. 14, 2001).

[9] *See* SDCWA Exh. 7: *2000 Urban Water Management Plan* at Table 4-1 (Dec., 2000) (illustrating SDCWA's compliance with all 14 BMPs).

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program, which in the past 11 years installed approximately 423,000 ultra-low-flush toilets in San Diego County. SDCWA's water saving showerhead incentive program has resulted in the installation of approximately 555,000 water saving showerheads over that same 11-year period. One of our newest and most innovative strategies is the residential high efficiency clothes washer incentive program. Nearly 11,000 high-efficiency clothes washers that use 40 percent less water and 55 percent less energy have been installed in the SDCWA's service area through this program. SDCWA's commercial-industrial-institutional hardware incentive program has saved more than 3,900 acre-feet through the installation of plumbing and cooling fixtures, and coin-op high efficiency clothes washers in business establishments.

SDCWA has also actively assisted its customers in being more water use efficient through residential home surveys and large landscape audits. These programs combined have saved more than 21,000 acre feet annually by eliminating inefficient water use and irrigation practices in single-family homes, multi-family housing complexes, and parks and schools. Through its Agricultural Audit Program, the SDCWA has also worked with agricultural water users, who are extremely efficient users of water, to increase production while maintaining highly efficient irrigation standards.

The effectiveness of the SDCWA's BMPs and water conservation programs can best be demonstrated with hard numbers. In Fiscal Year 1989-90, the urban per capita use of water in San Diego County was 192 gallons per day. In fiscal year 2000-01 per capita use was only 175 gallons per day. San Diego residents and industries today use eight percent less water per capita than they did 11 years ago. These water use savings show up each and every month in meter readings taken at homes, businesses and agricultural operations that receive water from the SDCWA's 23 retail member agencies, demonstrating that the San Diego County community has developed a water conservation philosophy that has become a sustained, permanent way of life. In sum, water conservation programs operated by the SDCWA and its member agencies have saved over 170,000 acre-feet

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[10] *See* SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-3 (Dec., 2000).

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over the past 11 years.[11]

The SDCWA has also found that one of the best ways to encourage San Diego residents to develop a strong water efficiency ethic is through comprehensive school education programs. Annually, SDCWA's presents its conservation message to more than 100,000 area students and teachers. Through the SDCWA's program, students learn about San Diego's water resources and how to use water wisely. The SDCWA's programs include: an innovative performance that teaches more than 40,000 elementary school students each year about the water cycle and the need to conserve water; classroom presentations that reach more than 10,000 third, fourth and fifth grade students in the county each year; and a "teaching garden" for low-water use landscaping at the Del Mar Hills Elementary School where the SDCWA hosts workshops about low-water-use landscaping for area teachers who, in turn, apply the lessons they learn to create low-water use gardens in their own schools. The SDCWA in partnership with the San Diego County Office of Education also sponsors the award-winning Splash Science Mobile Lab. The Splash Lab is a fully staffed mobile science unit that brings a "field trip" to more than 15,000 elementary students throughout the county.

In recognition of the successful water conservation efforts and accomplishments, the SDCWA and its staff recently received two awards. Bill Jacoby, SDCWA Water Resources Manager, received the California Urban Water Conservation Council 2000 Excellence Award for Statewide/Institutional Innovations. The award was presented to Mr. Jacoby, "In recognition of his many years of quiet and diplomatic leadership and tireless commitment to promoting water conservation throughout California." The SDCWA also received the 2001 Governor's Environmental and Economic Leadership Award in the category of Energy Conservation for its high efficiency coin-op clothes washer program. SDCWA and its member agencies continue to explore and implement cost-effective new opportunities for water conservation.

Projecting future water conservation is an integral part in the development of SDCWA's water demand forecast. The SDCWA has developed estimates of water savings from water conservation based on projected implementation of the conservation BMPs and SANDAG demographic

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[11] *See also,* SDCWA Exh. 7: *2000 Urban Water Management Plan* § 4.1 (Dec., 2000).

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information for the period 2000 through 2020 and deducted those savings from its baseline demand forecast. In other words, SDCWA's anticipated future water demands (discussed below) reflects a net demand for water *after* accounting for projected savings from water conservation activities. In sum, water conservation measures are expected to reduce total M&I demands by approximately 12 percent in 2020, with an estimated savings of 93,200 acre-feet per year.[12]

C. Projected Future Demand

Despite SDCWA's tremendous successes in maximizing existing water supplies through water conservation and BMPs, these measures alone are not sufficient to supply projected new demand over the next twenty years. Anticipated population growth in the San Diego County region, and thus increased demand, will require additional water resources/supplies.

In 1999, the SDCWA conducted a new forecast of the region's water supply demands to the year 2020 as part of the UWMP for 2000. The 1999 forecast incorporated the latest member agency demographic projections from SANDAG's 2020 Cities/County forecast.[13]

Based on these demographic projections, and taking into account estimated water conservation savings, SDCWA forecasted that demand for water from M&I uses will increase to 721,500

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[12] *See also,* SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-5 (Dec., 2000).

[13] The SDCWA uses an econometric computer based model to forecast future water demand. The model, CWA-MAIN, is based on forecasting model known as IWR-MAIN (Institute for Water Resources - Municipal And Industrial Needs). Versions of this econometric model have evolved over a 20-year period and are being used by many U.S. cities and water agencies.

In running its model, the SDCWA utilizes demographic data developed by the San Diego Association of Governments (SANDAG) and published in SANDAG's official Cities/County forecast. (SDCWA Exh. 18: San Diego Association of Governments, *INFO: 2020 Cities/County Forecast for the San Diego Region* (Sept. – Oct., 1999; SDCWA Exh. 19: San Diego Association of Governments, 2020 Cities/County Forecast: Overview, vol. 1 (Dec., 1998).) In 1992, the SDCWA and SANDAG entered into a memorandum of agreement (MOA) whereby the SDCWA agreed to use SANDAG's most recent regional growth forecasts for planning purposes. (SDCWA Exh. 20: *Memorandum between the San Diego County Water Authority and the San Diego Association of Governments Establishing Implementation of the Regional Growth Management Strategy's Section on Water* (dated Oct. 8, 1992); *see also* SDCWA Exh. 21: *Resolution No. 92-50 – Resolution of the San Diego County Water Authority Adopting the Water Portion of the Regional Growth Management Strategy Produced by the San Diego Association of Governments*; SDCWA Exh. 22: San Diego Association of Governments, *Water* (updated Jan., 2002).) In addition, the MOA recognizes that water supply reliability must be a component of San Diego County's regional growth management strategy. As required in Proposition C, which was passed by the San Diego County voters in 1988, SANDAG has prepared a growth management strategy that includes a water supply element. (SDCWA Exh. 23: San Diego Association of Governments, *Regional Growth Management Strategy* (Jan., 1993).) The MOA ensures that the water demand projections for the San Diego region are linked to SANDAG's demographic projections and that water supply is a component of the overall regional growth management strategy.

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acre-feet by 2020.[14] On the other hand, agricultural demand will decrease about 17 percent over the 20-year period due to the conversion of land from agricultural to non-agricultural uses to an estimated demand of 91,500 acre-feet.[15] Agricultural water use in San Diego County is extremely efficient. This is caused in large part by the higher price agriculture in San Diego County pays for water compared to other agricultural areas of California and the nation.

As illustrated in the table below, total water demand by 2020, taking into account the continued aggressive implementation of water conservation (as discussed above), is estimated to be 813,000 acre-feet, an approximate increase of 120,000 acre-feet, or twenty percent, from year 2000 water use.[16]

Year	Population Forecast	M&I Baseline Forecast (af)	Estimated Conservation Savings (af)	M&I Forecast Reduced by Conservation (af)	Agricultural Forecast (af)	Total Projected Demand
2005	3,113,000	643,900	54,900	596,200	109,900	706,100
2010	3,319,000	693,600	74,400	628,100	105,200	733,300
2015	3,494,000	747,100	83,400	672,600	99,400	772,000
2020	3,673,000	805,800	93,200	721,500	91,500	813,000

As a result of this projected increase in water demand over the next twenty years, SDCWA has recognized the need to develop reliable alternative supply sources to meet this demand.

III. IMPORTANCE OF WATER SUPPLY RELIABILITY

The San Diego region historically and presently relies heavily on imported supplies. SDCWA has imported 75 to 95 percent of the region's water supply and MWD provides the sole source of that imported water supply. MWD's ability to continue to provide reliable supplies, especially in dry years, however is constrained by uncertainties regarding the continued reliability and availability of Colorado River and SWP supplies.

[14] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 2-5 (Dec., 2000).

[15] SDCWA has developed a new agricultural water use model that estimates agricultural demand in the SDCWA service area based on agricultural acreage projections provided by SANDAG, crop distribution data derived from DWR and California Avocado Commission, and average watering requirements.

[16] *See also*, SDCWA Exh. 7: SDCWA, *2000 Urban Water Management Plan*, Table 1-3, Table 2-2 (Dec., 2000).

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The reliability of Colorado River water supplies, which make up the majority of the imported supply that SDCWA receives from MWD, are subject to great uncertainty. In 1964, as a result of the U.S. Supreme Court's decree in *Arizona v. California* (Decree), MWD's firm allocation to Colorado River water was reduced by more than half. MWD has, in the intervening period, filled its Colorado River Aqueduct (CRA), which was initially sized to carry its initial allocation, by accessing unused apportionments from other lower Basin States or declarations of surplus water from the Department of Interior. However, the water demands of the other lower Basin States have increased to near-apportionment levels, thereby reducing the additional or surplus quantity available to MWD.[17]

The reliability of SWP supplies is limited by both the level of SWP supply development compared to current and future demands and, increasingly, by pumping restrictions due to state and federal environmental regulations. The facilities needed to produce satisfy all contracting agencies' full contract entitlements have not been built. Moreover, more stringent water quality standards adopted to protect the Bay-Delta have also reduced the amount of water available for diversion. SDCWA has determined that under a 2020 demand scenario, existing SWP facilities have a less than 25 percent chance of making full deliveries.[18]

Prior water shortages have demonstrated the necessity of having a reliable water supply. In the last drought of 1986-1992, San Diego County was faced with a situation where local sources, primarily surface water runoff, were yielding only about five percent of San Diego County's water supply. At the same time the Sierra Nevada watershed was experiencing consecutive critically dry years resulting in decreased deliveries of State Water Project water to MWD and its member agencies, the SDCWA among them. In response to these diminishing supplies the SDCWA instituted extraordinary water conservation measures and asked for a 20 percent mandatory reduction in water consumption by its member agencies. In 1991 MWD notified its member agencies to expect Water delivery reductions of 50 percent due to excessive curtailment of State Water Project

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[17] SDCWA Exh.7: *2000 Urban Water Management Plan* at 3-4 to 3-6 (Dec., 2000).

[18] SDCWA Exh. 7: *2000 Urban Water Management Plan* at 3-9 (Dec., 2000).

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deliveries by DWR.[19]

These cutbacks caused severe economic hardship on many businesses and industries. At several SDCWA Board meetings, business owners and their employees related the hardship that the water shortages and resulting cutbacks would have for them, specifically in the form of economic damage. It was only through SDCWA's purchase of alternative supplies from the State Water Bank and the return of rains during the Miracle March Storms of 1991 that the SDCWA averted imposing the most severe of the cutbacks on its customers.

These experiences have led SDCWA to the realization that water supply reliability is a key factor in maintaining the region's $117 billion annual economy. As a result, the SDCWA Board of Directors adopted its first Water Resources Plan in 1993 (1993 Plan).[20] The 1993 Plan stressed the need for continued aggressive water conservation as well as the development of local water sources such as reclaimed water and the recovery of brackish ground water, with the goal being to maximize water supply reliability. The 1993 Plan also anticipated the need for dry year transfers similar to those that the SDCWA purchased form the State Water Bank during the height of the drought in 1991. Additionally, in recognition of the importance of water supply diversification as the means to increase reliability, the 1993 Plan provided for the funding of new programs to assist SDCWA member agencies with the implementation of conservation BMPs and planning of water recycling and groundwater recovery projects, and it provided financial incentives to member agencies to offset operating costs associated with water recycling projects.

The Water Resources Plan was updated in 1997 (1997 Plan).[21] In evaluating water supply reliability for the San Diego County region, it became apparent that the reliability of supplies, especially imported supplies, was not only affected by hydrologic uncertainties, such as drought, but also by legal, environmental and regulatory limitations unrelated to annual precipitation.

[19] *See* SDCWA Exh. 29: Ordinance No. 91-1 (adopted Mar. 14, 1991).

[20] SDCWA Exh. 8: San Diego County Water Authority, *Water Resources Plan* (Nov., 1993).

[21] SDCWA Exh. 9: San Diego County Water Authority, *Water Resources Plan* (1997).

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The most important of these issues was a concern over the SWP's ability to maintain or enhance its deliveries to southern California in light of potential restrictions in exports from the Bay-Delta as a result of limitations imposed by application of the Endangered Species Act and associated water quality issues.[22] With respect to Colorado River supplies, the 1997 Plan identified significant uncertainties regarding California's ability to continue to rely on surplus Colorado River deliveries. SDCWA recognized that the requirement that California reduce its diversions of Colorado River water to its basic apportionment of 4.4 million acre-feet per year would impair MWD's ability to maintain a full Colorado River Aqueduct (CRA), and thus to make water available to SDCWA.[23]

As a result of these identified concerns relating to the short and long-term reliability of SDCWA's primary supply of water, the 1997 Plan provided for a more diversified mix of resources to offset SDCWA's reliance on MWD as its sole source of supply. It continued to emphasize SDCWA's aggressive implementation of water conservation and BMPs, development of highly reliable local supplies such as water recycling and groundwater projects, and consideration of the efficacy of core water transfers as a means of enhancing the reliability of SDCWA's imported water sources. The 1997 Plan specifically evaluated core transfers from both the Colorado River and Northern California and concluded that core transfers of approximately 200,000 acre-feet from prior right holders on the Colorado River, such as the IID, had a substantial chance of being implemented and would constitute a highly reliable source of supply.

In December 2000, the SDCWA Board of Directors adopted its 2000 update of the Urban Water Management Plan (2000 UWMP).[24] The SDCWA's 2000 UWMP continues the Board's policy of seeking to diversify the San Diego region's water supply in order to enhance reliability. Central to SDCWA's 2000 UWMP for 2020 is the proposed core transfer with IID for 200,000 acre-feet.[25] Although initially SDCWA's reliance on the IID water transfer will be only 20,000 acre-feet

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[22] SDCWA Exh. 9: San Diego County Water Authority, *Water Resources Plan* at 3-12 (1997).

[23] SDCWA Exh. 9: San Diego County Water Authority, *Water Resources Plan* at 3-7 (1997).

[24] SDCWA Exh. 7: San Diego County Water Authority, *2000 Urban Water Management Plan* (Dec., 2000).

[25] SDCWA Exh. 7: San Diego County Water Authority, *2000 Urban Water Management Plan* at § 3.2 (Dec., 2000).

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with a ramp-up in each year after, within ten years, SDCWA anticipates taking delivery of the full 200,000 acre-feet per year provided for by the IID/SDCWA Agreement. This 200,000 acre-feet imported supply is an essential element of SDCWA's water supply balance for the future and without it SDCWA could face shortages. The table below illustrates the fundamental role that the IID transfer plays in satisfying SDCWA's 2020 demand projections.

Additionally, SDCWA plans to save as much as 93,000 acre-feet by 2020 as a result of the implementation of water conservation measures and its member agencies propose to develop over 100,000 acre-feet in local supplies, namely recycled water and groundwater, and although previously considered too costly, the SDCWA proposes to develop as much as 25,000 acre-feet of water from seawater desalination will be developed by 2020.

Local Supplies	**2005**	**2010**	**2015**	**2020**
Surface Water	85,600	85,600	85,600	85,600
Water Recycling	33,400	45,100	51,800	53,400
Groundwater	31,100	53,500	57,500	59,500
Seawater Desalination	0	0	0	25,000
Imported Supplies				
IID Water Transfer	80,000	180,000	200,000	200,000
Firm Supply from Metropolitan	303,630	303,630	303,630	303,630
Other competitive Imported Sources	172,370	65,470	73,740	85,870
TOTAL PROJECTED SUPPLIES	706,100	733,300	772,000	813,000
TOTAL ESTIMATED DEMANDS	706,100	733,300	772,000	813,000
DIFFERENCE	0	0	0	0

The addition of these diverse but highly reliable water supply options to SDCWA's water supply portfolio will help to assure SDCWA's member agencies and their constituencies that SDCWA can satisfy the region's projected 2020 demand of 813,000 acre-feet per year by 2020. These resources will reduce the amount of water we would otherwise have had to purchase from MWD. While imported supplies from MWD will continue to provide the largest portion of SDCWA's water supply, increased diversity and greater reliability for the balance of SDCWA's supplies will provide SDCWA the capability of satisfying future demand, even in the wake of yet another drought cycle.[26]

[26] SDCWA Exh. 7: San Diego County Water Authority, *2000 Urban Water Management Plan* at 5-2 (Dec., 2000).

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IV. WATER SUPPLY OPTIONS EVALUATED

Beginning in earnest in 1993 with the development and approval of the 1993 Plan, SDCWA has been evaluating the feasibility of a great number of water supply alternatives. These have included additional water conservation, water recycling, groundwater development, seawater desalination, dry year water transfers and core water transfers. The SDCWA has also considered non-traditional sources of supply such as water bags, icebergs, and single hull tankers. While some of these measures have been incorporated into SDCWA's water supply plan for the future (as discussed above), the most important of these in terms of the quantity of supply provided being the IID/SDCWA transfer, others have been rejected on the basis of their infeasibility in terms of cost, probability of success, and other related factors.

Although SDCWA has aggressively implemented a variety of water saving measures that have been extremely successful, conservation alone cannot solve SDCWA's supply needs. Generally, water conservation measures produce a finite quantity of saving that cannot be stretched beyond the initial savings achieved at the time of implementation (e.g., upon installation of low-flow toilets, showerheads and clothes washers).

In the area of water recycling, SDCWA member agencies and other local agencies have developed and continue to operate approximately 15 water recycling projects in the county since the early 1990s. These projects beneficially re-use approximately 13,000 acre-feet annually. It is estimated that that savings will increase to about 50,000 acre-feet by 2020. However, several factors limit more widespread use of recycling in the area.

First, the area lacks heavy industry users that typically are year-round customers for recycled water. Second, one of the predominant water uses in San Diego County is landscape irrigation, which is a seasonal use. This limits the use of production capabilities of tertiary treatment plants in the winter months. Third, wide-spread water re-use requires both the construction and/or retrofitting of separate and independent distribution and delivery systems capable of serving customers of varying size and type (e.g., urban users in developed areas and agricultural users in distant rural areas), and is costly. It is much more cost effective to provide recycled water to new communities where the necessary infrastructure can be installed from the start. Fourth, agricultural use of

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recycled water is limited to those irrigators that have salt tolerant crops or plants due to the relatively high salinity of recycled water, ~1000 mg/l or greater. Lastly, the potential for utilizing groundwater basins for the purpose of additional purification in the region are limited by local geologic conditions, thus, the volume of water used for recharge is limited and more costly treatments are required to inject water because of a lack of spreading basin opportunities.

Further groundwater development potential is limited as a result of the absence of large homogenous groundwater basins in San Diego County and brackish groundwater conditions caused by seawater intrusion and the historic over-irrigation of agricultural lands with higher salinity Colorado River water. The most promising projects are located within narrow alluvial valleys and are relatively small. The predominant method of project implementation has been brackish groundwater recovery using reverse osmosis. Additionally, as these groundwater basins are in close proximity to stream systems, excessive extractions cannot be maintained without having adverse impacts on nearby riparian habitat and vegetation. These factors limit the quantity of groundwater that can be developed within those basins without artificial recharge. As a result, the SDCWA's 2000 UWMP estimates that only approximately 50,000 acre-feet per year of local groundwater will be available to offset increased demand by 2020.

Although considered to be too costly in the past, the SDCWA has evaluated the potential for seawater desalination. A 1994 study considered the development of a seawater desalination project in conjunction with San Diego Gas & Electric's repowering of the Southbay Power Plant. At approximately $1,200 per acre-foot in 1994 the project was considered infeasible. More recently incremental efficiencies in technology and recent costs experienced by seawater desalination projects in Tampa Florida and elsewhere have focused attention on desalination as a potential part of the water supply mix for the SDCWA. The SDCWA is currently evaluating the potential for a project in Carlsbad that could provide 56,000 acre-feet of desalted seawater for San Diego County. It is also again exploring the opportunity for a new project at the Southbay Power Plant. However the potential for further development of desalinated seawater in San Diego is limited by the availability of coastal locations for siting the necessary facilities, the distance and topography from the regional distribution system, the need for increased pumping at high pressures in order to deliver the

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resulting product into SDCWA's aqueducts, and environmental issues related to the disposal of residual brine.

SDCWA has also considered a variety of water transfer proposals to further diversify its supplies. In May 1998, the SDCWA Board of Directors authorized issuance of a Request For Proposals (RFP) soliciting proposals to transfer up to 100,000 acre-feet per year of water that would meet specified water quality standards. Additionally, the SDCWA Board authorized initiation of discussions with Kern County Water Agency (KCWA) to explore the possibility of a transfer of 100,000 acre-feet of KCWA's State Water Project entitlement and groundwater banking in Kern County.

In response to that RFP, the SDCWA received 14 proposals. These proposals were from north and south of the delta and varied in duration, quantities and proposed terms of transfer. The types of proposed transfer also varied in the type of transfer proposed – i.e., core, options, dry year storage or one time spot transfers. SDCWA reviewed and evaluated these proposals and developed a short list of seven of the more promising transfer opportunities. The remaining proposals were eliminated based on issues relating to concerns associated with north-of-Delta transfers given unknown Bay-Delta operating requirements, uncertainty of water rights, and a failure to meet the minimum quantities in the RFP. SDCWA staff engaged in preliminary discussions with the top proposers, but ultimately, uncertainties concerning the price of wheeling water from Northern and Central California stymied these discussions.

V. MECHANICS OF THE WATER TRANSFER AGREEMENT

By mid-1995, SDCWA began discussions with IID for a water conservation and transfer agreement, and on April 29, 1998, SDCWA and IID signed the Water Conservation and Transfer Agreement (Water Transfer Agreement).[27] Under the terms of the Water Transfer Agreement, Imperial Valley farmers who voluntarily participate in the program will conserve Colorado River by employing extra-ordinary on-farm conservation measures. The water that will be conserved will then be transferred to the SDCWA for use in San Diego County. The initial term of the Water Transfer

[27] IID Exh. 7: Agreement for Transfer of Conserved Water by and between the Imperial Irrigation District and San Diego County Water Authority (dated Sept. 9, 1995).

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Agreement is for 45 years, with a provision that either agency may extend the Water Transfer Agreement, subject to certain conditions, for an additional 30-year term. Deliveries into San Diego County from the transfer are expected to begin by 2003. The SDCWA will receive between 130,000 and 200,000 acre-feet per year after completion of a 20,000 acre-feet per year ramp-up period in the water deliveries.

To effect the delivery of the transfer water to San Diego County from the Colorado River, SDCWA entered into a water exchange agreement with MWD in November 1998 (Exchange Agreement).[28] The Exchange Agreement provides that an amount of water equal to the amount of water conserved by IID for transfer to SDCWA will be diverted into the CRA at MWD's Whitsett Intake at Lake Havasu, and an equivalent amount of water would be delivered by MWD, for a delivery fee, to the SDCWA service area. Under the Exchange Agreement, SDCWA would receive, for use in the SDCWA service area, at its "point of delivery" from MWD in the same manner it receives MWD water supplies. No new facilities will be constructed, or operations or maintenance practices changed to convey, receive, or use the water resulting from the IID transfer. The duration of the Exchange Agreement is 30 years.

MWD will deliver the transferred water to SDCWA along with SDCWA's regular purchases from MWD. Once delivered into SDCWA's system, SDCWA's raw water customers will likely put the water to a variety of M&I uses. Water purchased from MWD pursuant to the Exchange Agreement for sale to SDCWA's commercial, industrial and residential customers throughout SDCWA's service would be treated at local surface water treatment plants within San Diego County. It is not anticipated that the transferred water will be treated by MWD. On the other hand, the vast majority of SDCWA's agricultural customers are expected to continue to purchase "interruptible" water from MWD at a substantial discount from the "non-interruptible" (or non-firm) class of service.

VI. CONCLUSION

The SDCWA has been committed to a water resource management strategy that seeks water reliability by diversifying SDCWA's supply to the extent practicable and feasible. It has aggres-

[28] SDCWA Exh. 14: Agreement between Metropolitan Water District of Southern California and the San Diego County Water Authority for the Exchange of Water (dated Nov. 10, 1998).

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sively implemented water conservation measures and BMPs, and has significantly reduced its total water demand as a result. Additionally, SDCWA member agencies plan to enhance their use of local supplies, to the extent feasible, and thereby reduce their reliance on imported supplies. For example, SDCWA member agencies are presently beneficially reusing wastewater that would otherwise be discharged to the Pacific Ocean; SDCWA is recovering brackish groundwater and is presently evaluating the role of seawater desalination. However, each of these water supply options has its practical and economic limitations and no single source is the sole answer. Imported water from the Colorado River has been a mainstay of water reliability for San Diego for over 50 years and will continue to be into the future.

It is my opinion, based on my personal participation in the development of SDCWA's Water Resources Plans over the past decade and most recently in 2000 UWMP, and having reviewed all of the available water supply options available to SDCWA for meeting its anticipated future demand, that the water supply made available by the Water Transfer Agreement is a beneficial water supply alternative for San Diego County. It is at a volume that is achievable, practical and economically affordable for the San Diego region and would significantly enhance the reliability the SDCWA's water supply, while allowing SDCWA to reduce its reliance on a single imported supply.

I declare under perjury pursuant to the laws of the State of California that the foregoing is true and correct.

Executed on March 22 2002, at San Diego, California.

Ken Weinberg, Director of Water Resources
San Diego County Water Authority

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