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ORANGE COUNTY WATER DISTRICT

STATE WATER RESOURCES CONTROL BOARD

OF THE STATE OF CALIFORNIA

In the Matter of State Water Resources Control Board Hearing on Water Rights Applications 31165 and 31370 of San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County; Application 31174 of Orange County Water District; Application 31369 of Chino Basin Watermaster; Application 31371 of San Bernardino Valley Water Conservation District; and Application 31372 and Waste Water Change Petition WW-0045 of the City of Riverside.	Application No. 31174 DIRECT TESTIMONY OF CRAIG D. MILLER, P.E., ON BEHALF OF ORANGE COUNTY WATER DISTRICT FOR WATER RIGHTS APPLICATION 31174 Date: May 2, 2007 Time: 9:00 a.m. Location: Cal EPA Building Coastal Hearing Room

DECLARATION OF CRAIG D. MILLER, P.E.

I, Craig D. Miller, P.E., declare and state as follows:

I. BACKGROUND AND QUALIFICATIONS.

1. I am an Assistant General Manager at the Orange County Water District ("OCWD"). I hold a BS degree in civil engineering from California State University Long Beach and am a California professional engineer. I am responsible for overseeing the departments of engineering, planning and watershed management, wetlands operations, hydrogeology, and natural resources. My primary focus at OCWD is the development and operation of programs that sustain and protect the Orange County Groundwater Basin, as well as maximizing beneficial use of the basin. My biography is Exhibit OCWD 1-2.

2. The following written testimony was prepared by me and under my supervision, with the assistance of Greg D. Woodside, Planning and Watershed Management Director at OCWD and a California professional geologist and certified hydrogeologist, and other OCWD staff.

3. OCWD is applying for a permit to divert a wet-year maximum of 505,000 acre-feet annually ("AFA")[1] of water from the Santa Ana River ("SAR") at its diversion facilities below Prado Dam. My testimony addresses the following matters:

- The physical regime within which OCWD operates;
- OCWD's operations, mandate and mission;
- The importance of the SAR to California water supplies;
- Coordinated planning in the SAR Watershed to maximize the use of local water supplies;
- OCWD's projects to maximize the beneficial use of the SAR, protect

[1] One acre-foot is the amount of water that would cover one acre of land – about a football field – one foot deep (326,000 gallons).

water quality, and enhance natural resources in the SAR Watershed;

- OCWD's plans to increase the beneficial use of available SAR flows.

II. LEGISLATIVE MANDATE OF OCWD.

4. OCWD was formed in 1933 by a special act of the California Legislature for the purpose of protecting the Orange County groundwater basin. OCWD now meets the water needs of over two million people, and encompasses an area of 229,000 acres, covering most of the northern half of Orange County. A map of OCWD's boundary is submitted as Exhibit OCWD 1-3.

5. OCWD's powers are defined in the District's enabling legislation[2], and include:

- Manage, replenish, regulate, and protect groundwater supplies;
- Regulate and control the storage of water and the use of groundwater basin storage space;
- Appropriate and acquire water and water rights;
- Conserve and reclaim water; and
- Provide for protection and enhancement of the environment.

6. OCWD's mission is to implement these powers to manage and protect the groundwater basin and provide a safe, reliable water supply in an environmentally responsible manner. It is important to note that OCWD is not a water retailer and does not serve water to the public. Instead, OCWD manages the groundwater basin for the benefit of the public. There are 19 major producers from the basin which include cities, water districts, and private water companies that pump water from the basin and retail it

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[2] California Legislature, Ch. 924, Stats. 1933, as amended.

to the public[3]. There are also approximately 200 small independent well owners who produce water primarily for irrigation purposes.

III. THE PHYSICAL ENVIRONMENT IN WHICH OCWD OPERATES.

7. OCWD's recharge facilities are located in and generally adjacent to the SAR in the cities of Anaheim and Orange, approximately 10 miles below Prado Dam. Exhibit OCWD 1-4 is a map of OCWD's recharge facilities. The first location where OCWD diverts water from the SAR for groundwater recharge is approximately one-half mile downstream of Imperial Highway, where OCWD's Imperial Inflatable Dam is located in the river channel. Exhibit OCWD 1-5 is a photograph of the SAR in the vicinity of Imperial Highway. Exhibit OCWD 1-6 is a photograph of the Imperial Inflatable Dam.

8. Starting upstream of this diversion point, in the area stretching from Weir Canyon Road to the Pacific Ocean, the SAR has been modified significantly for flood control purposes. A series of drop structures have been created in the river bottom and the sides have been constructed with concrete and/or rip-rap. Exhibit OCWD 1-7 is a photograph of one of the drop structures in the area where recharge occurs through the river bottom, near Orangewood Avenue. Exhibit OCWD 1-8 is a photograph of the SAR channel showing the construction of levees to increase the rate of groundwater recharge.

9. Downstream of the area where the SAR channel bottom recharges the groundwater basin, the Riverview Golf Course occupies and operates within the river channel. Exhibit OCWD 1-9 is a photograph of the Riverview Golf Course in the SAR in Santa Ana. Downstream of the golf course, the channel bottom is lined with concrete,

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[3] The entities that produce water from the basin to provide to the public are the cities of Anaheim, Buena Park, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, La Palma, Newport Beach, Orange, Santa Ana, Seal Beach, Tustin, Westminster, as well as East Orange County Water District, Irvine Ranch Water District, Mesa Consolidated Water District, Serrano Water District, Yorba Linda Water District, and Golden State Water Company.

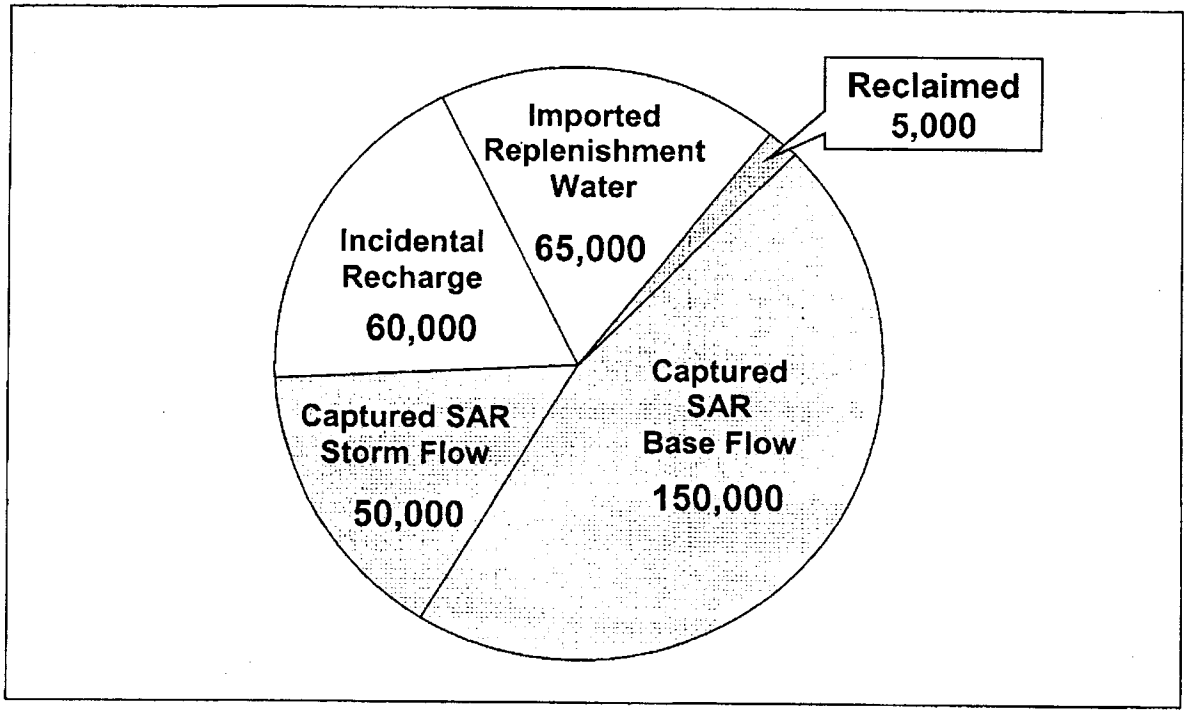
except for the lower section near the Pacific Ocean. Exhibit OCWD 1-10 is a photograph of the concrete-lined channel through Santa Ana. Downstream of the 405 Freeway, most of the channel bottom is unlined and is subject to sand and vegetation removal by the Army Corps and County of Orange. Exhibit OCWD 1-11 is a photograph of sand removal from the SAR channel downstream of the 405 Freeway. Exhibit OCWD-12 is a photograph of the confluence of the SAR and the Pacific Ocean.

IV. IMPORTANCE OF SAR DIVERSION TO ORANGE COUNTY'S WATER SUPPLY AND STATEWIDE WATER SUPPLY.

10. The Orange County Groundwater Basin is the primary source of water supply for the 2.3 million people that live in the OCWD service area. The SAR is the primary source of supply used to replenish the basin (see Figure 1).

Figure 1. Groundwater Basin Supplies

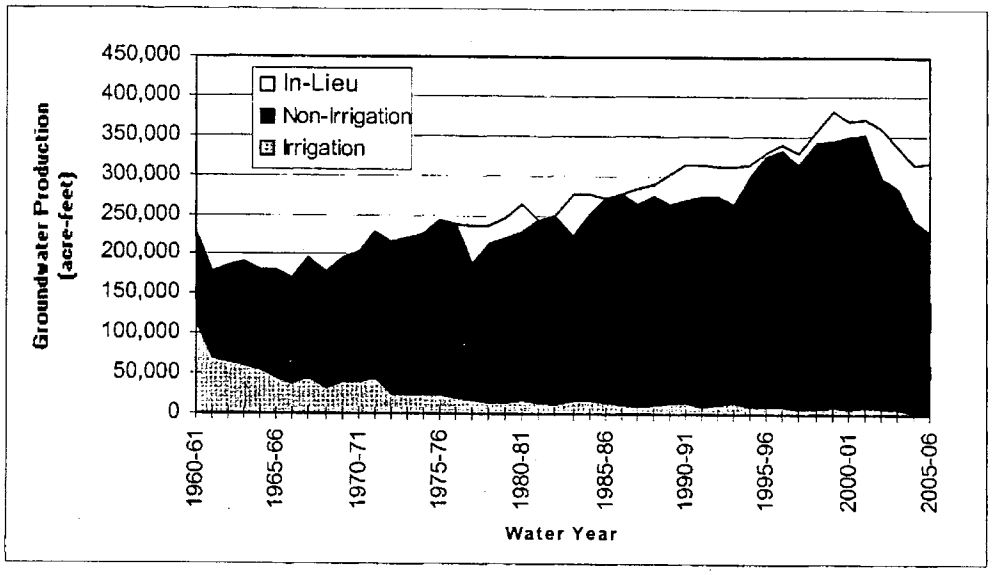
(330,000 AFA average production)



Residents, businesses, and other water users rely upon pumping from the groundwater basin as their primary source of water supply. Without the replenishment supply from the SAR, production from the basin would have to be significantly reduced by an average of 200,000 AFA to maintain a sustainable basin yield. See Figure 2. The existing demands supplied from the basin would have to be replaced by an imported water source, if such were available.

Figure 2

Historical Groundwater Production



11. The Water Quality Control Plan for the Santa Ana River Basin adopted by the Regional Water Quality Control Board, Santa Ana Region, identifies Reach 2 of the Santa Ana River, the portion from 17th Street in Santa Ana to Prado Dam, as having a "GWR" or Groundwater Recharge beneficial use.[4] OCWD's recharge activities that take place in this reach reflect this beneficial use designation.

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[4] California Regional Water Quality Control Board, Santa Ana Region. 1995. *Water Quality Control Plan for the Santa Ana River Basin*, as amended (the "Basin Plan"). All references not listed as exhibits are published documents available in the public (continued...)

12. In the last four years, the SAR supplied more water to Orange County than the Colorado River or the State Water Project.[5] The SAR also supplies a quantity of water that is generally comparable to the City of Los Angeles' Owens Valley Aqueducts.[6] Given the interconnected nature of water supplies across the State, the SAR is a key foundation of the water supply of California and the Colorado River Basin.

13. The water OCWD manages in the Orange County Groundwater Basin also is one of the key foundations of Southern California's future water supply. This is reflected in the Integrated Water Resource Plan ("IRP") prepared by the Metropolitan Water District of Southern California ("Met"). This IRP projects the need for 420,000 AFA of groundwater production from the Orange County Groundwater Basin in 2025 for dry year conditions.[7]

14. In the unfortunate event that the SAR was not available to replenish the groundwater basin, significant water supply impacts would affect areas in Southern California and beyond. There are no other sources of supply readily available that can replace the 200,000 AFA provided by the SAR. The loss of SAR water for replenishment of the Orange County Groundwater Basin would likely result in significant, negative environmental impacts not only locally, but would also shift demand and additional environmental impacts to the State Water Project and Colorado River

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(...continued)
domain. If a reader cannot locate such a document, OCWD will be pleased to assist in getting a copy.

[5] From July 1, 2002 to June 30, 2006, the SAR supplied 213,000 AFA to Orange County; in this same time period, the Colorado River supplied 156,000 AFA and the State Water Project supplied 207,000 AFA (data from Municipal Water District of Orange County, 2007).

[6] The Owens Valley Aqueducts operated by the City of Los Angeles are estimated to provide on average approximately 250,000 AFA of existing supplies; (Metropolitan Water District of Southern California. 2005. *Urban Water Management Plan*).

[7] Metropolitan Water District of Southern California. 2004. *Integrated Water Resources Plan, 2003 Update.*

system, because these are the likely locations that would be used for acquiring an alternative water supply.

15. Replenishment of the groundwater basin also allows local water suppliers to weather droughts. Due to the groundwater basin's storage capacity, the basin provides a buffer against short-term declines in precipitation and the availability of replenishment water. Using the basin's storage capacity, groundwater pumping from the basin can be maintained over a four-year drought, even though the supply of replenishment water could be reduced by as much as 200,000 AF during the drought.[8] SAR supplies are critical to refilling the basin between such drawdowns.

16. Climate change's potential impacts on statewide water resources heighten the importance of maximizing local water supplies. In July 2006, the California Department of Water Resources ("DWR") prepared a technical memorandum report entitled "Progress on Incorporating Climate Change Into Management of California's Water Resources."[9] DWR's report states that climate change increases the uncertainty in supplies from the Sacramento/San Joaquin Delta. Potential impacts on the Sacramento/San Joaquin Delta from climate change that are described in the DWR report include changes in runoff timing and amount and sea level rise. These potential impacts add further uncertainty with respect to supplies from the Sacramento/San Joaquin Delta and increase the importance on reducing future demands on the Delta. With respect to future actions and considerations, the DWR climate change report states:

> "Lastly, we need to explore ways of increasing supply to or reducing demand of SWP and CVP contractors."[10]

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[8] OCWD. 2004. Groundwater Management Plan.

[9] California Department of Water Resources. 2006. *Progress on Incorporating Climate Change into Planning and Management of California's Water Resources*, Technical Memorandum Report.

[10] California Department of Water Resources. 2006.

17. Given the challenges facing the Delta, and the additional, general uncertainty due to climate change, the importance of local supplies becomes even greater. Maximum reliance on local water supplies and increased recycling and re-use, as opposed to increased imported water usage, are reflected in OCWD's application.

18. Increased use of local supplies also reduces generation of greenhouse gases like carbon dioxide. As discussed in the DWR climate change report, the California Energy Commission estimated 44 million tons of carbon dioxide are emitted per year to provide water in CA.[11] Transferring water from northern to southern California creates one of the largest power demands in California. On the other hand, SAR water flows to OCWD's recharge facilities by gravity without the need to pump the water. If SAR flows were not available to replenish the Orange County Groundwater Basin, an alternative water supply would require increased energy usage and increase the generation of carbon dioxide. Reducing the need to pump water into Southern California will help reduce the generation of greenhouse gases such as carbon dioxide. As stated in the DWR climate change report, such "reductions in energy consumption related to water will help the state meet its greenhouse gas reduction goals."[12]

19. As additional flows become available from the SAR, replenishment of the groundwater basin with this water will help reduce the generation of greenhouse gases, as compared to meeting increased water supplies through more energy-intensive means.

V. MAXIMIZING LOCAL WATER RESOURCES THROUGH COORDINATED PLANNING AND COOPERATION.

A. Coordination with Upstream Agencies.

20. Water supply agencies in the SAR Watershed have a long history of working together to protect the SAR's environment and resources, and to maximize its

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[11] California Department of Water Resources. 2006.

[12] California Department of Water Resources. 2006.

beneficial use as a critical water supply source. This cooperative relationship allows water in the watershed to be used and reused, such that SAR flows are typically used several times before water is discharged to the ocean.[13]

21. The Santa Ana Watershed Project Authority ("SAWPA") was formed in 1968 to coordinate planning among the water agencies in the SAR Watershed. SAWPA is made up of five member agencies: Eastern Municipal Water District, Inland Empire Utilities Agency, Orange County Water District, San Bernardino Valley Municipal Water District and Western Municipal Water District. The member agencies' boundaries encompass most of the Santa Ana River watershed. Since 1968, SAWPA's mission has grown to include building facilities, in addition to its planning role.

22. SAWPA has prepared an Integrated Watershed Plan and Integrated Regional Water Management Plan for the SAR Watershed. The plan includes a range of cooperative activities and projects to protect water quality, increase available water supplies, enhance natural resources, and provide recreational and community outreach benefits.[14] Selected highlights of the member agencies' achievements through SAWPA include:

- The Santa Ana Regional Interceptor ("SARI"), a regional brineline with over 40 miles of pipeline to collect high salt wastewater and transport it for treatment downstream in Orange County. The SARI is a vital salt management infrastructure that keeps high salt wastewater out of the groundwater basins such as the Chino Basin and the Orange County Groundwater Basin.
- Planning, constructing and operating desalters – SAWPA has played a key

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[13] Regional Water Quality Control Board. 1995. Water Quality Control Plan for the Santa Ana River Basin, as amended.

[14] Santa Ana Watershed Project Authority. 2005. *Santa Ana Integrated Watershed Plan, 2005 Update.* Exhibit OCWD 1-13.

role in the Arlington desalter and Chino 1 desalter, which extract and treat high salt groundwater. Potable water produced from the desalters is provided to local communities and the extracted salt is transported out of the watershed through the SARI.

- Facilitating the Nitrogen/Total Dissolved Solids ("TDS") Task Force that revised the Santa Ana River Basin Plan nitrogen and TDS water quality objectives in groundwater basins throughout the region. The Task Force has also implemented a monitoring program to assess water quality in the Santa Ana River and in the groundwater basins to ensure compliance with water quality objectives.

B. OCWD Actively Works with the Army Corps of Engineers and Flood Control Agencies To Maximize Use of Local Water Supplies.

23. Prado Dam was built in 1941, primarily for flood control purposes. Since its inception, the Army Corps has operated Prado Dam to also provide for water conservation. The Army Corps subordinates water conservation to the primary flood control purpose of Prado Dam. Water conservation is enabled by controlling releases so that the water can be recharged downstream in the Orange County Groundwater Basin.[15] Between 1941 and 1991, various changes were made to the Prado Reservoir regulation schedule to accommodate water conservation. Beginning the 1991, the Army Corps and OCWD began working on a Memorandum of Agreement, signed by the Assistant Secretary of the Army in 1993, which formalized water conservation activities at Prado Dam. A new Memorandum of Agreement was executed in 2006 (Exhibit OCWD 1-15). The congressional authorization for storage at Prado Dam for water conservation purposes is Exhibit OCWD 1-16. The agreement with the Army Corps provides for the

[15] Letter dated December 1, 2005 from Mark M. Weintraub of Army Corps of Engineers to Samantha K. Olson of Division of Water Rights, SWRCB. Exhibit OCWD 1-14.

temporary storage of water for conservation at Prado Dam up to an elevation of 498 feet mean sea level during the flood season, and up to an elevation of 505 feet during the non-flood season. However, if the temporarily stored water needs to be released for flood control purposes based on a forecast of future precipitation or other factors, the Army Corps promptly releases the water.

24. The agreement for water conservation at Prado Dam was achieved after extensive environmental analysis, coordination with the local flood control agencies, and commitment of OCWD to mitigate for environmental impacts associated with the temporary water storage. Based on this cooperative effort, up to 25,760 AF of water can be temporarily stored at Prado Dam for subsequent release and recharge into the Orange County Groundwater Basin.

25. The County of Orange and OCWD also coordinate to utilize other flood control facilities for multiple benefits. Under a cooperative agreement with the County of Orange, OCWD also recharges water in Miller Basin, Raymond Basin, and Placentia Basin. These facilities were originally constructed by the County of Orange for flood control purposes. The County and OCWD have a long history of working together to allow these facilities to serve their flood control purpose and also recharge the groundwater basin.

C. Additional Highlights of Cooperative, Watershed-Based Planning.

26. For the past several decades, OCWD, the United States Army Corps of Engineers, and others have monitored the flow of the SAR. The quantity of storm flow and base flow of the SAR at Prado Dam are determined and published annually by the SAR Watermaster, based on streamgaging data collected by the United States Geological Survey ("USGS") and Prado Basin storage data collected by the Army Corps. The five-member SAR Watermaster Committee is appointed by the Superior Court to administer the provisions of the Stipulated Judgment in the case of OCWD vs. City of Chino et al, entered by the court on April 17, 1969 (Case No. 117628-County of Orange). The five-

member committee includes representatives from agencies above and below Prado Dam and has provided an effective, consensus-based mechanism to monitor and evaluate annual flows in the SAR.

27. Additionally, the Santa Ana Watershed Association ("SAWA") is a partnership formed by five resource conservation districts and OCWD to develop, coordinate, and implement natural resources programs to support a sustainable ecosystem in the SAR Watershed. Our partnering agencies include the California Department of Fish and Game, United States Fish and Wildlife Services, Army Corps of Engineers, United States Forest Service, and the Santa Ana Regional Water Quality Control Board. SAWA provides coordinated natural resources management from the San Bernardino Mountains to the Pacific Ocean. SAWA's work has helped restore the endangered least Bell's vireo in the watershed. SAWA has also removed approximately 3,000 acres of the invasive weed Arundo Donax, resulting in approximately 11,000 AFA in water conservation, enhanced habitat for endangered species, and reduced fire hazard.

VI. OCWD'S PROJECTS AND OPERATIONS.

A. Current Operations.

28. OCWD's operations are focused on managing the groundwater basin, protecting and improving water quality, replenishing the groundwater basin, and enhancing the watershed's natural resources. To replenish the groundwater basin, OCWD operates 26 recharge facilities in Anaheim and Orange. The two sources of recharge water at these facilities are SAR flows and imported water purchased from Met.

29. In general terms, the SAR flows that reach Prado Dam consists of base flow, storm flow, and a relatively minor amount of non-tributary water. For the purposes of this discussion, non-tributary water is included in SAR base flow. An example of non-tributary water is potable water discharged into the SAR from the Arlington desalter. The majority of base flow reaching Prado, especially in summer months, is composed of tertiary-treated wastewater discharges from wastewater treatment facilities upstream of

Prado Dam. From water year 2002/03 to 2004/05, the average amount of base flow at Prado Dam was 148,000 AFA.[16] OCWD recharges essentially all the base flow at the OCWD recharge facilities in Anaheim and Orange.

30. OCWD has invested over $92 million to capture and recharge SAR storm flow. The rate of storm flow releases from Prado Dam varies significantly through time. During the winter season, storm flow releases will increase from essentially zero to 3,000 to 5,000 cfs under storm conditions in a matter of one to two days. During non-storm periods releases from Prado are typically less than 300 cfs. Recharge of storm flow has significant salt reduction benefits, since the TDS of storm water is typically 200 to 300 milligrams per liter, considerably lower than SAR base flow.[17]

31. Because the SAR Watershed is very flashy, large quantities of flow reach Prado in a very short time frame under storm conditions. It is not practical to build a recharge system that has the capacity to recharge 3,000 – 5,000 cfs flows released from Prado because flows of that magnitude occur infrequently. However, with the conjunctive use of storage and recharge facilities it is possible to greatly improve the amount of water that is captured annually. Storage capacity, such as the Prado conservation program, is used to capture the short-term, high volume storm flows. The captured water is then released slowly over time, at a rate which matches the maximum recharge capacity of the downstream recharge facilities. The District is constantly striving to increase recharge capacity so that captured water can be recharged faster to free up storage space for subsequent storms.

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[16] Santa Ana River Watermaster. 2006. *Santa Ana River Watermaster 35th Annual Report.* Exhibit OCWD 3-3.

[17] OCWD. 2004. *Santa Ana River Water Quality and Health Study Final Report.*

32. Water conservation at Prado Dam for subsequent groundwater recharge in Orange County provides a substantial benefit in recharging SAR stormflow. OCWD's diversion and recharge capacity is typically limited to 500 cfs, except for short periods of time. The rate of baseflow is typically 200 to 250 cfs. During periods when only baseflow is present in the SAR, OCWD typically has unused recharge capacity. Small storms typically do not generate enough storm flow to exceed OCWD's diversion and recharge capacity. However, when the amount of runoff reaches a certain magnitude, the flow rate in the SAR exceeds OCWD's diversion and recharge capacity. When this occurs, the remaining water in the SAR flows to the Pacific Ocean. Off stream storage and utilization of the Prado conservation pool are the only foreseeable methods to minimize such losses to the ocean. However, storage by itself does not create additional recharge, but storage, diversion downstream in Orange County, and subsequent recharge through the OCWD recharge facilities provides a valuable mechanism to replenish the groundwater basin with low TDS concentration water.

33. OCWD operates 26 facilities to recharge SAR flows. Exhibit OCWD 1-4 shows the locations of these facilities. OCWD diverts SAR flows from the river to recharge facilities adjacent to and distal from the river primarily through two inflatable dams. The upstream inflatable dam is located near Imperial Highway in Anaheim. Exhibit 1-6 is a photograph of the Imperial inflatable rubber dam. A second inflatable dam, the Five Coves inflatable dam, is located approximately three miles downstream of the Imperial Highway inflatable dam.

34. Additionally, there are three relatively smaller diversion points located between the two inflatable dams that divert water from the SAR into the Off-River recharge basin. These three diversion points are pipes or "tubes" of 30-inch to 36-inch diameter. There are four tubes at each of these diversions. The tubes are constructed through the levee of the SAR channel.

35. The SAR bottom is also a diversion point. The bottom of the SAR channel provides for up to 300 cfs of recharge into the groundwater basin. The locations of the diversion through the SAR bottom (diversion number 7), the three sets of transfer tubes (diversions number 3, number 4, and number 5) and the two inflatable dams (diversion number 2 and number 6) are shown on Exhibit OCWD 1-4.

36. These diversions, together with the diversion to the Prado Wetlands above Prado Dam and diversion at Prado Dam to the conservation pool, are summarized in Table 1. Water diverted to the Prado Wetlands at River Road is returned to the SAR above Prado Dam Water diverted to the conservation pool at Prado Dam is returned to the SAR channel below Prado Dam. Not counting the diversion to Prado Wetlands and diversion to the conservation pool at Prado Dam, OCWD's existing diversion capacity is 1,670 cfs.

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TABLE 1
OCWD EXISTING DIVERSION POINTS

	Diversion Point	Diversion Structure	Capacity (cfs)	Diverts to
1	River Road[1]	Six 36-inch tubes and gates	150	Prado Wetlands above Prado Dam
2	Imperial Inflatable Dam	Inflatable Dam/Headgates	550	Off-river recharge facilities
3	Below Lakeview	Four 30-inch tubes and valves	100	Off-river recharge facilities
4	Below Tustin Avenue	Four 36-inch diameter tubes and valves	80	Off-river recharge facilities
5	East of Glassell Street	Four 36-inch tubes and valves	140	Off-river recharge facilities
6	Five Coves Inflatable Dam	Inflatable Dam	500	Off-river recharge facilities
7	Diversion through SAR bottom	River bottom	300	Orange County Groundwater Basin
		Total Diversion Capacity not counting diversion to Prado Wetlands and conservation pool	1,670	
8	Diversion at Prado Dam (conservation pool)[2]	Numerous inlets into conservation pool	20,000[3]	Conservation pool

[1]Water diverted at River Road is returned to SAR channel above Prado Dam.
[2]Water diverted (stored) at Prado Dam is returned to SAR channel below Prado Dam.
[3]Capacity accounts for instantaneous rate flow during storm event.

37. Exhibit OCWD 1-17 shows the characteristics of OCWD's recharge facilities. OCWD now can recharge 250,000 AFA of surface water into the groundwater basin.[18] These facilities include shallow (generally 25 feet deep or less) and deep recharge basins, as well as portions of the SAR channel bottom and the Santiago Creek channel bottom. Most of the facilities are owned by OCWD. Exhibit OCWD 1-18 shows the property owned by OCWD in the Anaheim and Orange area. Under an agreement with the

[18] OCWD. 2006. *Program EIR for OCWD's Application to Appropriate SAR Water.* State Clearinghouse No. 2002081024. Certified by OCWD in July 2006.

County of Orange, OCWD also recharges in Miller Basin, Raymond Basin, and Placentia Basin, which are flood control facilities owned by the county.

38. In 2003, OCWD completed a Recharge Study that evaluated the recharge system and recommended future projects to optimize the system's efficiency. The Recharge Study identified the accumulation of fine-grained sediment as the primary source of clogging in the recharge basins, and the major limiting factor to increasing recharge efficiency. Fine-grained sediment accumulates on the basin bottom, along with biological material, to form a thin layer that has a low permeability. This thin layer, called a 'clogging layer' develops over time and reduces each basin's recharge rate.

39. OCWD cleans the recharge basins to remove the clogging layer. Removal of the clogging layer restores the basin's recharge rate to the highest rate possible. For over 30 years, OCWD has been cleaning the recharge basins using heavy construction equipment such as bulldozers and scrapers. In order to clean a basin the water must be removed, the basin allowed to dry and then the heavy equipment is used to scrape off a very thin layer from the bottom and sides of the basin. The process can take from 2 to 12 weeks depending on the size and location of the facility.

40. Mechanical cleaning with heavy equipment is not the most efficient method to clean the basins. Unfortunately, the process unnecessarily removes some of the native, clean sediment from the recharge facilities. Additionally, the recharge basins must be drained and allowed to dry before the heavy equipment can operate in them, which can take weeks. OCWD has therefore conducted extensive research and testing of alternative cleaning methods. Based on this research and testing, two additional methods of cleaning are being employed.

41. OCWD has installed four basin cleaning vehicles ("BCV") that allow for basin cleaning without having to drain the basins. The BCVs utilize a floating barge with a unique patented dredge type head that is connected to an undercarriage traveling at the bottom of the recharge basin. The dredge spins a brush head that is located in a vacuum hood which extracts the suspended solids from the basin. All electrical components,

controls and the operator are located on the floating barge. Exhibit OCWD 1-19 shows a photograph of the BCV in Miller Recharge Basin. This design has demonstrated success in increasing recharge in shallow recharge basins.

42. OCWD has also purchased a beachcleaner to remove the clogging layer. The beachcleaner, originally developed to remove trash from sandy beaches, effectively removes the thin clogging layer in the bottom of recharge basins once they are dry. A picture of the beachcleaner is shown in Exhibit OCWD 1-20.

43. OCWD also has a team of OCWD staff called the "Recharge Enhancement Working Group" that works to enhance the operations of the District's recharge system. The team initiates, tests, and implements new ideas to clean the recharge basins, remove sediment from the recharge water, and other improvements to maximize recharge. Outside experts from other organizations are also invited to the Recharge Enhancement Working Group meetings to evaluate concepts developed by other agencies.

44. OCWD also constructed a pump station and 66-inch diameter pipeline to convey SAR flows from the Burris Basin to Santiago Basin. The Santiago Basin includes Bond Pit, Blue Diamond Pit, and Smith Pit. The pump station and pipeline can convey up to 235 cfs to Santiago Basin. OCWD can divert up to approximately 15 cfs from the 66-inch diameter pipeline into Santiago Creek for groundwater recharge in the unlined portion of Santiago Creek.

B. New Source of 72,000 AFA of Water – The Groundwater Replenishment System.

45. In order to further maximize the use of local resources and replace the need to import water from outside the watershed, OCWD and the Orange County Sanitation District ("OCSD") are in the final stages of construction of the $480 million Groundwater Replenishment System. This system will recycle water that OCSD otherwise would discharge to an ocean outfall. Phase 1 will be completed in Fall 2007 and produce 72,000 AFA of new water supply. The new water supply will be used for the seawater intrusion barrier in the Talbert Gap and to replenish the groundwater basin using the Kraemer

Recharge Basin in Anaheim. The Groundwater Replenishment System will purify secondary treated wastewater using microfiltration, reverse osmosis, and advanced oxidation. The advanced oxidation treatment will be provided by ultraviolet light and hydrogen peroxide. Because of the high degree of treatment, the water produced is near distilled water quality and minerals need to be added back in to prevent the water from dissolving minerals from the pipeline used to transport the water. The backbone of the treatment plant is constructed to treat up to 110,000 AFA. Additional phases, beyond Phase 1, will be constructed as additional secondary treated wastewater becomes available.

46. The high degree of treatment allows another increment of use for water that would otherwise be disposed in the Pacific Ocean. OCSD partnered with OCWD on the project because of the projects water supply and reliability benefits, and the project allows the Sanitation District to defer construction of a second ocean outfall.

C. OCWD's Water Quality Enhancement Program.

47. OCWD's water quality protection program improves water quality in the SAR and the groundwater basin. The program includes the Prado Wetlands, the Irvine and Tustin Desalters, and the North Basin Groundwater Protection Project. OCWD also engages in a proactive water quality monitoring program.

48. OCWD re-constructed the 450-acre Prado Wetlands in 1996 to remove nitrate from the SAR. Exhibit OCWD 1-21 is a map of the Prado Wetlands. From 1986 to 1992, base flow in the SAR exceeded the nitrate water quality objective for Reach 3 of the SAR.[19] In response to this, the Regional Board required the dischargers upstream of Prado Dam to provide additional treatment. In order to improve the quality of the source water to the Orange County groundwater basin, OCWD constructed substantial improvement at the Prado Wetlands. The wetlands had existed since the 1950s as duck hunting ponds, but were not optimized to improve water quality through nitrate reduction. OCWD's reconstruction

[19] SAWPA. 2006. *2005 Annual Report on Santa Ana River Water Quality. Final Report.*

in 1996 improved the wetlands' treatment capacity and resulted in a treatment efficiency that can remove up to 90 percent of the nitrate in the SAR water diverted to the wetlands.

49. OCWD and the Irvine Ranch Water District, with supporting funding from the Department of Defense, constructed the Irvine Desalter to remediate volatile organic compound contamination from the now closed El Toro Marine Corps Air Station. In addition to remediating the volatile organic compound contamination, the Irvine Desalter also remediates high salt and nitrate concentration groundwater in the Irvine area. The desalter began operation in 2006 and is estimated to remove 2,000 tons per year of salts from the groundwater basin.

50. OCWD and the City of Tustin constructed the Tustin Seventeenth Street Desalter, which began operation in 1996. The desalter extracts and treats groundwater with high nitrate and TDS concentration using three production wells and a reverse osmosis treatment system. The reverse osmosis treatment capacity is 2 million gallons per day.

51. OCWD has completed review under the California Environmental Quality Act ("CEQA") and is in final design to construct the North Basin Groundwater Protection Project. The purpose of the project is to control migration of groundwater contaminated with volatile organic compounds and remove contaminated groundwater from the groundwater basin. After extraction through five wells, the water will be treated and recharged back into the groundwater basin. The estimated cost of the project is $50 million. OCWD is pursuing legal action against the parties responsible for the contamination.

52. OCWD is also pursuing legal action against parties that are responsible for contaminating groundwater with MTBE.

D. Proactive Water Quality Monitoring Program.

53. OCWD has a far-reaching monitoring program for the SAR and the groundwater basin. From 1994 to 2004, OCWD voluntarily conducted the Santa Ana River Water Quality and Health ("SARWQH") Study at a cost of $10 million. The final report

for the project was published in 2004.[20] OCWD conducted the study because of the high percentage of wastewater in the SAR during non-storm periods. The goals of the SARWQH Study were to apply advanced water quality characterization methods to assess the quality of the SAR water and the groundwater after SAR water is recharged. The multi-disciplinary study design included an examination of hydrogeology, microbiology, inorganic and organic water chemistry, toxicology and public health. Analyses and research in the SARWQH Study were conducted by scientists, researchers, and water quality experts from numerous organizations, including Stanford University, Lawrence Livermore Nation Lab, USGS, Oregon State University, and Met. The results of this extensive study confirmed that current recharge practices using SAR water are protective of public health. Findings from the SARWQH Study provided information necessary for the planning and permitting of other projects, such as the Groundwater Replenishment System currently under construction at OCWD. Results are also helping to shape the California Department of Health Services (DHS) proposed regulations for groundwater recharge.

54. OCWD requested that the National Water Research Institute ("NWRI") conduct an independent review of the results from the SARWQH Study. NWRI assembled a group of experts in the fields of hydrogeology, water chemistry, microbiology, and the other requisite fields to form the Scientific Advisory Panel for OCWD SARWQH Study. The Scientific Advisory Panel met annually during the study to review the results and provide recommendations on future work. The panel also prepared a final report (Exhibit OCWD 1-22). The panel's report states:

"Based on the scientific data collected during the SARWQH Study, the Panel found that:

- The SAR met all water-quality standards and guidelines that have been published for inorganic and organic contaminants in drinking water.
- No chemicals of wastewater origin were identified at concentrations that are

[20] OCWD. 2004. *Final Report, Santa Ana River Water Quality and Health Study.*

of public health concern in the SAR, in water in the infiltration basins, or in nearby groundwaters.

The constituents that were considered included non-regulated chemicals (e.g., pharmaceutically active chemicals) and contaminants of concern that arose during the course of the SARWQH study (e.g., N-nitrosodimethylamine [NDMA]). The unprecedented classification of the major components of DOC and the transformations that occur within these chemical classes as water moves downstream and into the aquifer provided significant new evidence to support the conclusion that the product water is suitable for potable consumption and is also becoming comparable to other sources of drinking water, such as the Colorado River, in its organic profile."[21]

55. To support ongoing water quality assessments, OCWD has a Water Quality Department with 10 staff members that collect samples from over 500 wells across the groundwater basin. OCWD's Water Quality Department also collects samples from the SAR and key tributaries to the SAR. OCWD also has a Laboratory Department staffed with 24 chemists and technicians that conduct over 300,000 water quality analyses per year. OCWD has also finished final design and is bidding construction of a new 41,000 square foot water quality laboratory. The total cost of the new laboratory is estimated to be $24 million.

56. Over the last 20 years, OCWD has invested $92 million in recharge enhancement projects in Anaheim and Orange to increase recharge of the SAR. OCWD has also invested $9 million dollars in the Prado Basin to improve water quality, provide for temporary water storage by the Army Corps, and enhance natural resources. These program investments, together with the Groundwater Replenishment System and other OCWD projects, allow OCWD to maximize the beneficial use of the SAR, protect water

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[21] NWRI. 2004. *Report of the Scientific Advisory Panel, OCWD's Santa Ana River Water Quality and Health Study.*

quality, and provide an additional use of SAR water before it is discharged to the Pacific Ocean. Like most of OCWD's programs, these efforts are funded with revenues OCWD collects from the basin producers, in the form of the Replenishment Assessment and Basin Equity Assessment.

VII. OCWD'S FUTURE PROJECTS TO MAXIMIZE USE OF THE SAR.

57. OCWD has a program consisting of short-term and long-term projects to increase recharge of the SAR. The projects include enhancements to OCWD's existing facilities, new recharge facilities, and increased water storage. Implementation of these projects will leverage OCWD's previous investments by increasing the efficiency of existing facilities. Implementation will also allow OCWD to recharge up to 505,000 AFA. Projects to expand storage and recharge are included in the future projects, since increased recharge capacity is needed to drain the new storage as quickly as possible. By draining stored water as quickly as possible, new storage space is created for subsequent storms.

58. The increased diversions and the proposed recharge and storage facilities provide an opportunity for the District to achieve the following project objectives:

- Protect beneficial uses of the Orange County Groundwater Basin;
- Improve the reliability of local groundwater supply to serve local water demands;
- Maximize sustainable water supplies during drought periods;
- Increase the sustainable yield of the Orange County Groundwater Basin in a cost effective manner to maximize the use of local water supplies to serve local water demands;
- Improve beneficial use of local water supplies;
- Reduce dependence on imported water; and
- Increase operational flexibility by increasing both recharge capacity and recharge location options to better manage groundwater basin conditions.

59. OCWD's future projects to maximize the use of the SAR and their CEQA coverage are listed in Table 2. All the projects have undergone program-level CEQA

analysis, as set forth in the OCWD Application to Appropriate SAR Water Program EIR (State Clearinghouse No. 2002081024) certified by the OCWD Board of Directors in July 2006. OCWD prepared a draft EIR, and circulated it for comments. Based on comments received, OCWD recirculated the draft EIR. OCWD prepared responses to the comments and a Mitigation Monitoring and Reporting Program, and certified the Final EIR in July 2006. This Final EIR is Exhibit OCWD 1-23.[22] OCWD also prepared a Project Summary Report for the EIR, which is Exhibit OCWD 1-24. OCWD also completed project-level CEQA analyses on six additional projects in 2006 and 2007. These projects are:

- La Jolla Recharge Basin (EIR certified in May 2006; this EIR is Exhibit OCWD 1-25);
- Anaheim Lake BCV (Categorical exemption adopted in 2007);[23]
- Kraemer Basin BCV (Categorical exemption adopted in 2007);
- Increased water conservation at Prado Dam – Prado Basin Water Conservation Feasibility Study EIR (EIR certified in August 2006; this EIR is Exhibit OCWD 1-27);
- Burris Pit BCV (Categorical exemption adopted in 2007); and
- Bond Pit BCV (Categorical exemption adopted in 2007).

60. At this time, ten of the projects listed in Table 2 have undergone project-level CEQA analysis. With these ten projects and the 14,000 AFA recharge capacity attributed to the Santiago Creek Replenishment and River View Recharge Basin Projects that have completed project-level CEQA and been implemented since the OCWD application to appropriate was submitted, an additional 112,000 AFA of recharge capacity has undergone project-level CEQA analysis. As indicated in Table 2, when OCWD's

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[22] The CEQA documentation for prior OCWD projects is included in this EIR under Appendix M, except for a Negative Declaration for Prado Wetlands Reconstruction, Exhibit OCWD 1-32.

[23] The categorical exemption for the four BCVs in Anaheim Lake, Kraemer Basin, Burris Pit, and Bond Pit is Exhibit OCWD 1-26.

application to appropriate was submitted, OCWD's existing facilities recharge capacity was 250,000 AFA. Combining OCWD's recharge capacity when the application to appropriate was filed and ten new projects with project-level CEQA, 362,000 AFA recharge capacity has undergone project-level CEQA review. OCWD's remaining projects have undergone program-level review, and project-level review will follow as the projects move into development.

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TABLE 2
SUMMARY OF NEAR-TERM AND LONG-TERM PROJECTS

		Recharge (Diversion) Capacity (AF/Y)	Storage Capacity (AF) *	CEQA Coverage
	Near-Term Projects			
1	La Jolla Recharge Basin	9,000		La Jolla Recharge Basin EIR, SCH No. 2003041190, certified in May 2006
2	Mira Loma Recharge Basin	10,000		EIR to be prepared in future
3	Santiago Creek Expanded Recharge	3,000		OCWD Application to Appropriate SAR Water EIR, SCH No. 2002081024, certified in July 2006
4	Anaheim Lake Expanded Recharge	2,000		OCWD Application to Appropriate SAR Water EIR, SCH No. 2002081024, certified in July 2006
	Basin Cleaning Vehicles [1] [BCV]			
5	Anaheim Lake	18,000		Categorical exemption adopted April 2007
6	Kraemer Basin	18,000		Categorical exemption adopted April 2007
7	Miller Basin **	7,000		Categorical exemption adopted May 2003
8	Weir Pond #3 **	8,000		Categorical exemption adopted May 2003
9	Five Coves **	8,000		Categorical exemption adopted May 2003
10	Prado Dam (Flood season 498 feet) [2]		10,000	Prado Basin Water Conservation Feasibility Study EIR SCH No. 2004051004 certified in August 2006
	Subtotal	**97,000[4]**	**10,000**	
	Long-Term Projects			
11	Prado Dam (Conservation elev. = 514) [2]		23,600	Program-level review of additional long-term recharge basins and storage facilities provided in OCWD Application to Appropriate SAR Water EIR, SCH No. 2002081024,. Additional project-level CEQA to be provided in future as appropriate.
12	Fletcher Recharge Basin	1,000		
13	Additional Recharge Basins [3]	77,000		
	Basin Cleaning Vehicle			
14	Burris Pit	15,000		Categorical Exemption adopted April 2007
15	Bond Pit	10,000		Categorical Exemption adopted April 2007
16	Subsurface Collection/ Recharge System (SCARS) – Multiple Sites	10,000		Program-level review of additional long-term recharge basins and storage facilities provided in OCWD Application to Appropriate SAR Water EIR, SCH No. 2002081024, Additional project-level CEQA to be provided in future as appropriate.
17	Deep Basin Filtration Recharge – 3 sites	25,000		
18	Recharge Galleries – 2 sites	20,000		
19	Gypsum Canyon Reservoir [2]		30,000	
20	Aliso Canyon Reservoir [2]		30,000	
	Subtotal	**158,000**	**83,600**	
	Existing Facilities When Application Submitted	250,000		
	Total	**505,000**	**93,600**	

Notes for Table 2

[1] Deep Basin continuous cleaning device will increase percolation rates.
[2] Storm flows captured for later release to the SAR for diversion downstream at recharge facilities when capacity becomes available.
[3] 150 acres total – multiple sites.
[4] Includes 14,000 af attributed to Santiago Creek Replenishment and River View Recharge Basin projects that have been implemented since the application was submitted.
* Denotes size of reservoir. Reservoirs may be filled and drained multiple times per year.
** OCWD has completed separate CEQA review and these projects are in development.

VIII. PRIOR WATER RIGHTS.

61. Historically OCWD's operations have been based on rights to use Santa Ana River ("SAR") water which arose as early as the mid-1800's. At the time that OCWD was formed, the Anaheim Union Water Company ("AUWC") and the Santa Ana Valley Irrigation Company ("SAVI") owned pre-1914 water rights dating back to the 1870s, which entitled each of them to take one-half of the normal surface flow of the SAR below the present location of Prado Dam.[24] They each also held licenses to divert 6.1 cfs of water from the SAR from June 1 through December 1 of each year. AUWC possessed License 6378 for diversion and use of SAR water. Exhibit OCWD 1-28. SAVI possessed License 6403 for diversion and use of SAR water. Exhibit OCWD 1-29. As those exhibits show, OCWD acquired the water rights held by AUWC and SAVI by condemnation of AUWC's water rights in 1967 and purchase of SAVI's water rights in 1968. It thereby acquired the license rights and pre-1914 rights to divert the surface flow of the SAR once it reaches Prado Dam.

62. In order to resolve conflicting demands for water in the watershed, in 1963 OCWD filed an action to obtain an adjudication of water rights against substantially all water users in the area tributary to Prado Dam. Thirteen cross-complaints were filed in 1968, by which this adjudication was extended to substantially all water users within the SAR watershed. It soon became apparent to the Court and the parties that rather than define the rights of all parties in the watershed, it was necessary to develop a "physical

[24] See Orange County Water District vs. City of Riverside (1959) 173 Cal. App. 2d 137, 175; Yorba vs. Anaheim Union Water Company (1953) 41 Cal. 2d 265, 272.

solution" which would meet the needs of all parties. The parties negotiated and stipulated to such a settlement, which was embodied in a Judgment, commonly called the "1969 Judgment", entered in the case of OCWD v. City of Chino, et al. by the Court on April 17, 1969 (Case No. 117628) (Exhibit OCWD 1-30). Said physical solution accomplishes a general inter-basin allocation of the natural water supply of the Santa Ana River system . . . ,"[25] allotting to OCWD a guaranteed minimum of 42,000 AFA of base flow at Prado Dam, subject to certain water quality criteria, plus all of the storm flow that reaches Prado. The great merit of this physical solution lies in the fact that flows in the upper watershed, after being used and re-used as necessary, ultimately flow downstream to Prado, where OCWD can capture, clean and re-use the water again.

63. In 1961, OCWD obtained License Nos. 006378 and 006403, each to divert 6.1 CFS. These licenses were premised on salvage, based on clearing phreatophytes from the stream above Prado Dam. OCWD 1-31.

64. In 1969, OCWD became party to the Stipulated Judgment which, along with related documents, is described in the April 5, 2007 Stipulation submitted to the State Water Resources Control Board for these proceedings.

IX. PROTEST RESOLUTION STATUS.

65. All of the active protests to OCWD's Application have been resolved.

66. Protests to OCWD's Application were submitted to the State Board by (1) the California Sportfishing Protection Alliance ("CSPA") on February 18, 2002; (2) the City of San Bernardino Municipal Water Department ("SBMWD") on July 15, 2002; (3) East Valley Water District ("EVWD") on July 16, 2002; (4) the City of Redlands on July 16, 2002; (5) the Orange County Flood Control District, San Bernardino Flood Control District, and Riverside County Flood Control and Water Conservation District (collectively, "Local Sponsors") on July 16, 2002;(6) the City of Riverside on July 17, 2003; (7) the

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[25] Exhibit OCWD 1-30, Stipulation and Order Re Dismissal of Certain Defendants, p. 4, lines 12-13.

United States Forest Service on July 31, 2003; (8) the California Department of Fish and Game on November 5, 2002.[26] No other entity or party protested OCWD's Application.

67. The State Board accepted the protests of, and required OCWD to respond to, each of the protests except for the protests submitted by CSPA and the City of Redlands. These protests were held in abeyance pending further action by the protestants. A copy of the letter from the State Board to CSPA holding its protest in abeyance is Exhibit OCWD 1-33. The letter holding Redlands' protest in abeyance is Exhibit OCWD 1-34. State Board staff agreed with OCWD that if the State Board ever accepted either CSPA or Redlands' protest for consideration, OCWD would have 45 days to respond. A letter memorializing that agreement is attached as OCWD 1-35. That triggering event did not occur, the State Board never informed OCWD that these protests were active, and OCWD was never asked to respond to them. Accordingly, neither CSPA nor Redlands has an active protest for purposes of this hearing.

68. OCWD negotiated resolutions with each of the protestants with active protests, whereby the parties have withdrawn their protests.[27] Copies of the protest resolution agreements are as follows:

- September 1, 2004 *Agreement Between Orange County Water District and City*

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[26] The California Sportfishing Protection Alliance submitted a protest on February 19, 2002, which was not accepted by the State Board. Similarly, the City of Redlands submitted a protest on July 16, 2003, modified on August 14, 2002, which was never accepted by the State Board.

[27] Although OCWD understands that Board staff feels that some of the protests were "conditionally withdrawn," the plain language of the agreements is clear that no conditions were placed on withdrawal. The withdrawals were unconditional releases of the protests, in some cases accompanied by a request that the withdrawal agreement be incorporated in any permit that was issued. None of the protest withdrawals stated that they were made contingent on such a request being granted; indeed, in our negotiations to end the protests, all parties acknowledged that a request that a private agreement be incorporated into the permit was unlikely to be granted. I personally participated in these negotiations and neither OCWD nor any other parties to these agreements ever indicated any intent or understanding that that the protest withdrawals were conditional. All parties understood that these were final agreements, not to be rendered moot if the State Board declined to incorporate them as permit terms.

of San Bernardino Concerning Water Rights, Exhibit OCWD 1-36;

- June 23, 2006 *Agreement Between Orange County Water District and East Valley Water District Concerning Water Rights* , Exhibit OCWD 1-37, and June 29, 2006 letter to Arthur Baggett on behalf of EVWD requesting dismissal of its protest, Exhibit OCWD 1-38;
- July 24, 2006 *Agreement Between Orange County Water District and City of Riverside Concerning Water Rights*, Exhibit OCWD 1-39, and September 5, 2006 letter to Mitchell Moody enclosing same, Exhibit OCWD 1-40;
- September 26, 2006 *Agreement Between the Orange County Water District and the Department of Fish and Game to Dismiss Department's Protest regarding Water Application No. 31174*, Exhibit OCWD 1-41;
- September 27, 3006 letter to Victoria Whitney from the U.S. Forest Service withdrawing its protest, Exhibit OCWD 1-42;
- January 3, 2007 letter from Robert Donlan on behalf of the Local Sponsors to Jane Farwell withdrawing Local Sponsors' protest, Exhibit OCWD 1-43.

Executed under the penalty of perjury under the laws of the State of California in Fountain Valley, California on April 11, 2007.

Craig D. Miller, P.E.