ORANGE COUNTY WATER DISTRICT
Orange County's Groundwater Authority

May 13, 2004

The Honorable Frederick P. Horn
Presiding Judge of the Superior Court
700 Civic Center Drive West
Santa Ana, CA 92701

Dear Judge Horn:

Enclosed is a copy of the Orange County Water District (OCWD) board of directors' responses to the Orange County Grand Jury's 2003-2004 report, "The Groundwater Replenishment System—Providing Water for the Future," which was distributed to OCWD in February 2004.

In compliance with Penal Code 933, our responses are being sent to your attention within 90 days of the public release date, which was Feb. 17, 2004.

A separate copy of these responses also has been sent to the grand jury under separate cover.

On behalf of the entire board of directors, I thank the grand jury for their thorough study of OCWD and the Groundwater Replenishment System, along with their commendation to our staff for their foresight, expertise and dedication. It certainly is well-deserved and their acknowledgement is appreciated.

Sincerely,

Denis R. Bilodeau

Denis R. Bilodeau
President
Board of Directors

c: Orange County Grand Jury

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FINDINGS

1) Increased urbanization in the upper Santa Ana River basin will increase the amount of Santa Ana River water available for capture in the Anaheim recharge facilities.

Orange County Water District (OCWD)'s board of directors agrees that increased urbanization in the Santa Ana River watershed will increase the amount of Santa Ana River water available for capture in the Anaheim recharge facilities. In fact, OCWD has an ongoing program to add additional recharge capabilities and research methods to increase the recharge of Santa Ana River water. OCWD also has an ongoing monitoring program to evaluate the quality of Santa Ana River water and ensure that recharge of Santa Ana River water into the groundwater basin provides a safe source of drinking water.

2) Using Kraemer Basin to recharge purified wastewater will reduce capacity to capture Santa Ana River floodwater and result in the loss of some floodwater during abnormally wet years.

Our operational experience indicates that once every ten years, approximately 2,800 acre-feet of flood water will be lost to the ocean. This finding requires the examination of typical storm flows conveyed by the Santa Ana River, the capability to transfer water to Kraemer Basin during storm events and the recharge potential of Kraemer Basin during those same periods.

Losses to the ocean are greatly dependent on the accumulated amount of rainfall during the winter season. Approximately one out of 10 years is defined as a "wet" year, in which rainfall significantly exceeds the long-term average for the region. During these wet years, a large volume of water is captured behind Prado Dam and sustained flows in the Santa Ana River range from 500 cubic feet per second (cfs) to 5,000 cfs. Typically, about nine out of 10 years, annual rainfall totals fall within the "dry" to "normal" range and result in very minor losses to the ocean. Although the storms in a typical year can generate substantial short-term runoff, the storms occur so infrequently that large volumes of water are not captured behind Prado Dam, and flows in the river quickly revert to baseflow (around 300 cfs) following the storm events.

To understand the impacts of the GWR System on the recharge system, it is important to discuss how water is transferred from the river to Kraemer Basin: The storm flows are diverted and routed sequentially through OCWD's Warner, Anaheim, Miller and Kraemer basins for recharge.

Prior to the storm water reaching Kraemer Basin, however, a few operational factors must be considered:

- Kraemer Basin is located at the terminal end of the previously mentioned basins, so storm flows must exceed the combined holding and recharge capacity of Warner, Anaheim and Miller basins before the flows can enter Kraemer Basin.
- Transfer capacity to distribute peak storm flows from the Santa Ana River to Kraemer Basin is limited to 180 cfs.
- The recharge capacity of Miller and Anaheim lakes is as much as 140 cfs.

During typical (dry-to-average) years, the peak flows in the river last less than 48 hours. Due to the pipeline transfer restriction, it is unlikely that flows generated during short-term peak storm periods could be captured and transferred to Kraemer Basin prior to conclusion of the storm event. Because the recharge capacity of Miller and Anaheim lakes is as much as 140 cfs, and the transfer capacity is 180 cfs, only 40 cfs actually will reach Kraemer Basin. This is far less than its recharge capacity of 100 cfs and would still allow 60 cfs of capacity for the GWR System during storm events.

Increased losses to the ocean will occur during wet years. As the recharge system percolates silt-laden storm water through the winter and spring, recharge rates will decline. Heavy spring precipitation will likely generate a large pool of water behind Prado Dam. The required releases from the pool will increase flows in the river to 500 cfs, filling the entire recharge system, and forcing the transfer pipeline to Kraemer to be operated at the 180 cfs capacity for months. As the recharge capacity in Anaheim and Miller basins decrease from 140 cfs to 30 cfs over the same period, the pipeline can now send 150 cfs to Kraemer Basin. Because the maximum percolation rate of Kraemer is approximately 100 cfs, there is 50 cfs of surplus water in the system that must be released to the ocean. Under these conditions, there could be losses of up to 2,800 acre-feet to the ocean. This condition is estimated to occur only once every 10 years.

To compensate for these potential losses, OCWD has embarked upon several projects designed to improve recharge capacity. Recently completed projects and their recharge capacity include:

- Santiago Pits Pump Station (25 cfs)
- Santiago Creek (12 cfs)
- Riverview Basin (5 cfs)
- Basin Cleaning Vehicles (40 cfs)
- Flood Control Basins (30 cfs)

Other potential projects include:

- La Jolla Basin (12 cfs)
- Fletcher Basin (5 cfs)
- Santa Ana River desilting facilities
- Sand wash plant
- Multi-lateral injection wells, recharge galleries and trenches

The additional recharge capacity resulting from the implementation of these facilities will more than offset the potential losses of Santa Ana River water to the ocean during wet periods. After these improvements are implemented, the utilization of Kraemer Basin to recharge GWR System product water—even during abnormally wet years—is not expected to result in increased losses of Santa Ana River water to the ocean.

3) Increased rates of recharge in the Anaheim recharge facilities will cause local groundwater levels to rise.

Groundwater flow modeling evaluations by OCWD predict that rates of recharge significantly above current rates will cause groundwater level increases in the vicinity of OCWD's recharge facilities. While increasing groundwater levels, also known as groundwater mounding, do not significantly impact current recharge operations; they may ultimately reduce recharge rates due to reducing the water table gradient away from the recharge facilities. This potential condition was projected to occur when the groundwater storage in the basin was within 200,000 acre-feet from full (today's storage is 393,000 acre-feet from full). Based on this model projection, OCWD recognizes that future recharge and groundwater production facilities will need to be better distributed around the basin to reduce the potential for shallow groundwater mounding in the localized recharge areas.

4) Depressed groundwater levels near the coast have exacerbated the inland advance of saline water.

Through regular groundwater monitoring and investigations, including construction of five multi-depth monitoring wells and isotopic analyses, OCWD has confirmed that saline groundwater has been moving inland in coastal areas—including beneath the Newport and Huntington Beach mesas and portions of the Bolsa and Sunset gaps. OCWD has taken significant steps to halt this encroachment including:

- Reducing overall basin pumping by 55,000 acre-feet per year.
- Temporarily shifting approximately 20,000 acre-feet of pumping from coastal agencies to inland agencies.
- Implementing a management plan to methodically reduce basin overdraft in average hydrology years.
- Developing a calibrated groundwater model of the Talbert Gap to evaluate seawater intrusion control alternatives.
- Expanding the Talbert Seawater Barrier's injection capacity 30 percent by constructing six new injection wells in 2003-04, with 16 more injection wells to be constructed in 2004-05 as part of the GWR System. In OCWD's ongoing planning, conceptual designs of additional saline water control facilities spanning the basin coastal area are being developed.

5) Seasonal increases in groundwater withdrawal rates place added stress on the aquifer.

Groundwater production historically has followed seasonal demand patterns—where more groundwater is pumped in the warmer, drier summer and fall months and less in the winter and spring months. Correspondingly, groundwater levels rise and fall seasonally, as less or more groundwater is pumped. These water level fluctuations became more pronounced in the 1990s, particularly in coastal portions of the basin, as groundwater producers installed more wells to take advantage of cost incentives by Metropolitan Water District of Southern California (MWD) that encouraged more groundwater pumping (and less imported water usage) in the summer. This "seasonal shift" of pumping amplified the seasonal pumping pattern and helped cause historically low water levels in August and September each year. MWD's seasonal pumping incentive program has ceased with most producers, so peak summer pumping is expected to return to more of a straight, demand-based pattern in the near future.

6) Saline water is migrating around the eastern end on the Talbert Gap seawater-intrusion barrier.

As mentioned in the response to finding No. 4, OCWD has identified movement of saline groundwater beneath the Newport Mesa, southeasterly of the existing Talbert Seawater Barrier injection wells. As a result, OCWD plans to address this issue by:

- installing four injection wells in 2004-05 southeast of the existing Talbert Barrier along the Santa Ana River.
- evaluating the hydraulic effectiveness of these new wells in raising freshwater elevations to prevent seawater intrusion.
- collecting hydrogeologic data necessary for the design of potential, additional injection wells east of the Santa Ana River on the Newport Mesa.

7) There are physical limits on the aquifer's capacity to transport water from areas of recharge to areas of withdrawal.

The OCWD board agrees with this finding, and our staff has conducted groundwater modeling evaluations to estimate the maximum amount of recharge and production that the basin can sustain. Limiting factors identified include seawater intrusion, water level drawdown in coastal areas and groundwater mounding (shallow groundwater) in the recharge area. The modeling results indicated that the basin could sustain additional groundwater pumping and recharge above today's levels, provided that certain management programs are implemented to mitigate the aforementioned limiting factors. These programs include:

- expansion of the coastal seawater intrusion barriers.
- development of recharge projects such as mid-basin injection wells and Orange/Santiago recharge facilities to maintain groundwater elevations in the central and coastal areas of the basin.
- focusing pumping increases in inland areas and less utilized aquifers (shallow and deep) where feasible.

8) Changes in groundwater management strategies will be required to increase the current rate of groundwater withdrawals to satisfy future water needs.

Changes in groundwater management practices will be needed if extraction from the basin is increased to meet increasing water demands. To increase extractions from the basin in a sustainable manner, OCWD will need to recharge more water into the basin. This requires increasing OCWD's physical recharge capacity and also having increased amounts

of recharge water. OCWD has an ongoing program to increase its capacity to recharge Santa Ana River water and also is evaluating any additional facilities and programs it will need for the next 20 years.

With respect to having increased amounts of recharge water, increased urbanization in the upper Santa Ana River basin will increase the amount of Santa Ana River water available for capture in the Anaheim recharge facilities as the grand jury described in Finding No. 1. OCWD also will evaluate increasing the supply of recharge water through potential water supply projects, such as expansion of the Groundwater Replenishment System.

RECOMMENDATIONS

1) Orange County Water District continue to explore opportunities to increase recharge capacity in the Anaheim recharge facilities, including plans to increase the capacity of pipelines that transport water to the deep-basin system.

OCWD staff has examined opportunities to increase recharge capacity in the Anaheim Forebay area and may pursue additional property for installation of recharge basins and infiltration galleries, if funding sources can be identified. Additionally, OCWD is investigating using its own property for locating future, multi-lateral injection wells and recharge trenches—as well as expanding the current Santa Ana River desilting facilities. OCWD is in the process of increasing the capacity of the transfer system with the Lakeview Pipeline project, which is currently in design. When completed in 2006, this pipeline will double conveyance capacity with an additional 180 cubic feet per second to the deep-basin system and future recharge facilities, such as the La Jolla Basin.

2) Orange County Water District develop inland well fields to increase the rate of groundwater withdrawals near the recharge facilities.

It is important to note that OCWD may encourage—but cannot determine—the location of future municipal wells or well fields, which are developed by the retail water agencies (cities and local water districts). OCWD's long-range basin modeling has indicated that well fields constructed in the vicinity of its Anaheim recharge facilities would help to reduce groundwater mounding under projected, increased recharge conditions. OCWD concurs that development of well fields in inland areas of the basin is to be encouraged. Significant issues identified in previous inland well field feasibility studies include satisfying state Department of Health Services source water protection, setback/travel time requirements and joint use/permitting of imported water pipelines to convey the pumped groundwater to coastal water utilities.

3) Orange County Water District curtail groundwater withdrawals from deep wells and obtain blending water for the Talbert Gap seawater intrusion barrier from other sources.

OCWD plans to cease operation of the deep blending wells in late 2006 in preparation for start-up of the GWR System, which will constitute the sole water supply source for the Talbert Gap seawater barrier after the initial GWR System operational period. For the initial operational period, non-reclaimed blending water for the barrier will be provided by imported water

supplied by Metropolitan Water District of Southern California via a pipeline connection in Huntington Beach.

4) Orange County Water District discourage seasonal increases in rates of groundwater withdrawals to minimize stress on the aquifer.

OCWD has no regulatory power to control seasonal groundwater pumping. The District Act is based upon an annual accounting of groundwater pumping, with no ability to distinguish between summer and winter seasons.

In 1998, OCWD attempted to modify its District Act to acquire additional powers in attempt to reduce high summertime pumping. This effort required the approval of legislation in Sacramento but was blocked by a local city.

In 2000, OCWD initiated a trial program with the city of Santa Ana, which provided financial incentives for the city to significantly reduce summer pumping in favor of increased winter time pumping. This program was successful. To make the program financially attractive to the city, however, they were allowed to pump approximately 10 percent above the current basin production percentage. The additional basin pumping created by a larger program would be too significant to justify the program.

In 2003, OCWD initiated a Coastal Pumping Transfer Program, which, through financial incentives, shifted 20,000 acre-feet of pumping inland, away from the coast. This program appeared to be successful and improved summertime water levels along the coast. The program, however, has been discontinued because of its high cost.

The completion of the GWR System in 2007 will allow OCWD to inject much larger amounts of water into the seawater barrier.

5) Orange County Water District initiate data-collection programs to define the lateral and vertical extent of permeable zones on the east side of the Santa Ana River to facilitate easterly extension of the Talbert Gap seawater intrusion barrier.

The board agrees that additional hydrogeologic data is needed to evaluate the feasibility and design of potential injection wells to control seawater intrusion east of the Santa Ana River, beneath the Newport Mesa. The easterly extension of the Talbert Barrier could be required. Prioritization of data collection and planning activities associated with the Talbert Barrier extension will be conducted during the next fiscal budgeting cycle, beginning in December 2004.

6) Orange County Water District expedite planning-data collection and analysis efforts to secure necessary permits for a mid-basin injection program.

OCWD is moving forward with planning, data collection and analysis efforts to secure the permits for mid-basin injection. This process is estimated to take roughly 8 years. Funding sources and staffing for this work, however, are still being identified.

There are many steps that OCWD must take to implement this recommendation, including:

- performing laboratory studies into the potential water quality effects of injecting water with very low concentrations of dissolved minerals.
- monitoring performance of Interim Water Factory 21 (Interim Microfiltration) for water quality and reliability (beginning 2004).
- preparing computer model runs to predict flow directions and rates for water injected mid-basin.
- constructing monitoring wells and testing background water quality in the mid-basin locations where injection could be implemented.
- monitoring performance of full scale GWR System plant for water quality and reliability (beginning 2007).
- monitoring impacts of injection of 100 percent recycled water from GWR System into the Talbert Barrier (beginning 2009).
- reviewing mid-basin water quality data, GWR System plant performance and Talbert Barrier water quality data with the National Water Research Institute-appointed, independent scientific review panel required in the GWR System permit.
- preparing CEQA documents to identify and address environmental issues.
- coordinating with DHS to hold a public hearing and address public comments received at the hearing.
- obtaining findings from DHS on mid-basin injection, including recommended conditions for permit from Regional Board.
- obtaining permit from Regional Board authorizing OCWD to proceed with mid-basin injection.

The district currently is evaluating a mid-basin injection project. Implementation of such a project appears viable, contingent on evaluation of costs, implementation issues and schedule of available treated wastewater flows to supply the project. OCWD is evaluating modification of the GWR System pipeline (Unit 1) construction contract to include

turnouts for future service to mid-basin injection project injection wells, which would be located adjacent to the GWR System pipeline. This would facilitate future delivery of GWR System water to the mid-basin injection project.

7) OCWD seek waivers from regulatory agencies to expedite mid-basin injection based on laboratory and field investigations, which demonstrate that purified wastewater from the Groundwater Replenishment System will pose no risk to public health.

Waivers from regulatory requirements for mid-basin injection may not be feasible, especially in light of the fact that such injection would be groundbreaking and precedent-setting in California and therefore would receive great scrutiny and careful regulatory review. All previous injection projects have been for seawater intrusion barriers. Injection for the exclusive purpose of replenishing groundwater supplies could be approved, but only after detailed documentation of the potential impacts. Completion of the steps outlined in response to Grand Jury recommendation No. 6 would provide the information necessary for approval of mid-basin injection. Extraordinary types of studies might be possible to shorten the time period for approval of mid-basin injection from 8 years to 6 years, if the NWRI panel recommends consideration of such an approach and the Department of Health Services and Regional Board accept the approach. Such studies might entail expenditures of several million dollars for facilities and testing, some of which later could be used for project implementation.