State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services

SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

December 15, 2004

Mr. Jonathan Bishop
Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 4th Street, Suite 200
Los Angeles, CA 90013

Dear Mr. Bishop:

WEST BASIN WATER RECYCLING PLANT (WBWRP), WEST COAST BASIN BARRIER PROJECT EXPANSION PHASE III – FINDINGS OF FACT

The West Basin Municipal Water District (WBMWD) has submitted to this Department a Title 22 Engineering Report, an amended report, and other supplemental information and responses to Department comments pertaining to the West Coast Basin Barrier Project Expansion Phase III. In addition, we have had multiple meetings and discussions with WBMWD about this proposed groundwater recharge project. On December 10, 2002, this Department held a public hearing in El Segundo, California, to consider the West Coast Basin Barrier Project Expansion Phase III. Enclosed please find this Department's Summary of Public Hearing, Findings of Fact and Conditions for the West Coast Basin Barrier Project Expansion Phase III.

The West Coast Basin Barrier Project Expansion Phase III is a water supply and water quality improvement project that will produce highly treated recycled water for recharge by direct injection into the West Coast Barrier Project. The proposed expansion project will increase recycled water injection up to 17.5 mgd in a phased manner. The WBWRP is located at 1935 Hughes Way, El Segundo, California 90245

The WBWRP receives secondary treated wastewater from the City of Los Angeles Hyperion Wastewater Treatment Plant located at 12000 Vista Del Mar Boulevard, Playa Del Rey, California 90293. The WBWRP Expansion will consist of four major components: (1) replacement of the existing lime clarification pretreatment system with a microfiltration (MF) pretreatment system; (2) utilization of thin film composite membranes for all reverse osmosis (RO) treatment trains; (3) installation of UV light

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disinfection of the total barrier recycled water flow stream; and (4) addition of hydrogen peroxide storage and feed facilities, which in conjunction with UV disinfection provide advanced oxidation. The expanded and modified facilities will be located at the same site as the existing WBWRP in El Segundo.

As detailed in the Findings of Fact and Conditions, this Department considers the above treatment processes to be the best available treatment technology for recycled water used for groundwater recharge by direct injection. This Department finds that the proposed project complies with Section 60320 of Article 5.1, entitled "Groundwater Recharge" of the California Code of Regulations, Title 22, Division 4, Chapter 3, entitled "Water Recycling Criteria". Furthermore, this Department finds that the proposed operation of the West Coast Basin Barrier Project Expansion Phase III will not degrade the quality of the water in the receiving aquifers as a source of domestic water supply provided that WBMWD meets all of the enclosed Conditions.

It is the recommendation of this Department that the California Regional Water Quality Control Board, Los Angeles Office, incorporate all of the enclosed Findings of Fact and Conditions into the water reclamation requirements to be issued to WBMWD for the West Coast Basin Barrier Project Expansion Phase III.

If you have any questions, please contact me at (559) 447-3130.

Sincerely,

Cindy A. Forbes, P.E., Chief
Southern California Branch
Drinking Water Field Operations
State of California Department of Health Services

cc: Richard Nagel, Water Quality Manager, WBMWD
Gary Yamamoto, DHS
Bob Hultquist, DHS
Jeff Stone, DHS
Kurt Souza, DHS
Joseph Crisologo, DHS
Heather Collins, DHS
Sean McCarthy, DHS
Chi Diep, DHS

SUMMARY OF PUBLIC HEARING

In the Matter of:

West Basin Municipal Water District)
West Basin Water Recycling Plant)
West Coast Basin Barrier Project Expansion, Phase III)

On December 10, 2002, the California Department of Health Services (Department) held a public hearing in El Segundo, California, to consider the proposed West Basin Water Recycling Plant (WBWRP), West Coast Basin Barrier Project Expansion Phase III, which is a water supply and seawater intrusion barrier project sponsored by the West Basin Municipal Water District (WBMWD or District).

A list of public hearing attendees is included in Attachment A.

The hearing panel included:

Hearing Officer

Cindy Forbes, P.E., Chief of the Southern California Branch, Drinking Water Field Operations, State of California Department of Health Services

Presentations on the proposed project were made by Director Edward Little and General Manager Darryl Miller from the District and by Dr. Michael McGuire from McGuire Environmental Consultants, chair of the District's Technical Advisory Panel. They presented an overview of the District, including its water sources and supply shortages. The history of the WBWRP was described, along with the need for expansion and the project's benefits. The existing WBWRP produces up to 7.5 million gallons per day (mgd), or 7,500 acre-feet per year (afy), of recycled water for injection into the West Coast Basin Barrier Project. The proposed expansion project will increase recycled water injection up to 17.5 mgd in a phased manner. They described the groundwater basin and details of the project components, which include the advanced water treatment facilities and seawater intrusion barrier. Water quality data were presented and compared with proposed criteria. The conclusions and recommendations of the Expert Advisory Panel that independently reviewed the proposed project were reviewed. In conclusion, the District believes that the proposed expansion project will protect public health, assist in drought-proofing its service area, improve water quality, and reduce demand on imported water supplies.

The presentations were followed by statements from two members of the audience. Dr. Jack Skinner voiced concerns that potential public health issues be adequately addressed by the regulatory agencies, and Ms. Frances Spivey-Weber praised the District's management of the project and its role in assuring water supplies for Mono Lake.

FINDINGS OF FACT

1. Section 13540 of the California Water Code requires that recycled water may only be injected into an aquifer that is used as a source of domestic water supply if the Department finds that the recharge will not degrade the quality of water in the receiving aquifer as a source of water supply for domestic purposes.

2. West Basin Municipal Water District (WBMWD or District) is a public agency formed in 1947 that wholesales water to local cities, mutual water companies, private companies, and investor-owned utilities in a 200-square mile area of southwest Los Angeles County, California. Groundwater from the West Coast Basin (Basin) is a source of local water for the WBMWD service area. When local groundwater resources are insufficient to meet the area's water demands, WBMWD buys imported water from the Metropolitan Water District of Southern California (MWD), which is supplied via the State Water Project and the Colorado River Aqueduct. The District provides about 150,000 acre-feet per year or 80 percent of the water used in its South Bay service area. The remaining 20 percent is local groundwater pumped by retail water agencies. To protect the Basin from seawater intrusion, the District provides water for injection into the West Coast Basin Barrier Project (WCBBP or Barrier), as well as to recharge the Basin.

3. In 1990, the District embarked on a large-scale conservation and water recycling program to improve water supply reliability and reduce the use of imported water. The cornerstone of the recycling program is the West Basin Water Recycling Plant (WBWRP), which has been in service since 1995. The WBWRP consists of three treatment trains currently designed to produce a total of up to 42.5 million gallons per day (mgd) of recycled water. One treatment train produces up to 30 mgd of recycled water for landscape and agricultural irrigation and industrial applications and is referred to as the Title 22 Plant. Another treatment train produces up to 7.5 mgd of recycled water for barrier injection along the coastal reaches of aquifers to mitigate seawater intrusion into the groundwater basin and is referred to as the Barrier Plant. The third treatment train produces up to 5 mgd of highly treated recycled water for the boiler feed system at the Chevron Refinery in El Segundo. The WBWRP is located at 1935 Hughes Way, El Segundo, California 90245. The District operates the WBWRP under California Regional Water Quality Control Board, Los Angeles Region (RWQCB) Order No. 97-069 and Monitoring and Reporting Program No. 7485 of RWQCB Order No. 95-014 as amended by Order No. 97-069.

4. The WBWRP produces recycled water for direct injection into the Barrier, which consists of pipelines and 153 injection wells, primarily located parallel to the coast, south of Los Angeles International Airport and west of Interstate 405, in the Cities of El Segundo, Manhattan Beach, Hermosa Beach, and Redondo Beach, California. The Barrier is owned and operated by the Los Angeles

County Department of Public Works, Hydraulics/Water Conservation Division (County). Currently, a blend of approximately 17.5 mgd of recycled water and imported water is injected at the Barrier to prevent seawater intrusion and to artificially recharge the West Coast Groundwater Basin, which is used as a source of domestic water supply. No changes are proposed in the existing distribution system or Barrier injection facilities.

5. The District has submitted a Title 22 Engineering Report, an amended report, a Groundwater Monitoring and Tracer Plan, and other supplemental information and responses to Department comments pertaining to the WBWRP.

6. The WBWRP receives secondary treated wastewater from the City of Los Angeles Hyperion Wastewater Treatment Plant located at 12000 Vista Del Mar Boulevard, Playa Del Rey, California 90293. The Hyperion Wastewater Treatment Plant is operated by the City of Los Angeles Bureau of Sanitation under a National Pollutant Discharge Elimination System (NPDES) permit issued by the U.S. Environmental Protection Agency, NPDES Permit No. CA0109991 and RWQCB Order No. 94-021.

7. The District plans to expand the capacity of the WBWRP to increase the amount of recycled water injected into the Barrier from 7.5 to 17.5 mgd (7,500 to 17,500 acre-feet per year (afy)) in a two-phase manner. The first phase of the expansion will increase recycled water production and injection into the Barrier up to 12.5 mgd (12,500 afy). During this initial phase, approximately 5 mgd (5,000 afy) of imported potable water will be blended with this recycled water supply and injected into the Barrier. Pending the Department's approval, the District proposes to implement a second phase expansion to increase recycled water production and injection into the Barrier up to 17.5 mgd (17,500 afy). Besides expanding the facilities, the project will upgrade and modify the existing treatment systems. The existing lime pretreatment system will be replaced by a new microfiltration system, and an ultraviolet (UV) disinfection system will be added. Furthermore, hydrogen peroxide will be added upstream of the UV system for advanced oxidation of the high quality product water. The WBWRP Expansion will treat wastewater to meet drinking water standards and other limits imposed on recycled water intended for groundwater recharge and indirect potable reuse.

   The WBWRP Expansion will consist of four major components: (1) replacement of the existing lime clarification pretreatment system with a microfiltration (MF) pretreatment system; (2) utilization of thin film composite membranes for all reverse osmosis (RO) treatment trains; (3) installation of UV light disinfection of the total barrier recycled water flow stream; and (4) addition of hydrogen peroxide storage and feed facilities, which in conjunction with UV disinfection provide advanced oxidation. The expanded and modified facilities will be located at the same site as the existing WBWRP in El Segundo.

The treatment technology used for the proposed WBWRP Expansion will consist of:

- Source Control: The City of Los Angeles Bureau of Sanitation (City) maintains a comprehensive industrial pretreatment and source control program approved by the U.S. Environmental Protection Agency for control of waste discharges from industrial sources into the wastewater collection system. The City is responsible for collecting all water quality samples of the treated effluent to fulfill the requirements of its NPDES permits issued by the Los Angeles Regional Water Quality Control Board. On May 19, 2004, the City agreed to investigate the industrial sources of perchlorate, NDMA and 1,4-dioxane. The City also agreed to work cooperatively with the West Basin to develop an Implementation Plan for increased source control investigation.

- Secondary Treatment: Wastewater will be treated at the City of Los Angeles' Hyperion Wastewater Treatment Plant, which features preliminary, advanced primary, and secondary treatment processes. The existing rated capacity of the Hyperion Treatment Plant is nearly 600 mgd. Preliminary treatment consists of barscreens and grit removal. Primary treatment consists of coagulant addition and sedimentation. Primary effluent is oxidized using a pure oxygen activated sludge process. Secondary clarifiers at the activated sludge system produce fully oxidized and clarified secondary effluent. Secondary effluent will be the source water supplied to the WBWRP Expansion.

The following treatment processes will be provided at the WBWRP:

- Pretreatment Strainers: Secondary treated wastewater pumped from the Hyperion Treatment Plant will pass through automatic in-line strainers and be chloraminated prior to microfiltration. Fine solids that are captured will be returned to the existing dewatering holding basin at WBWRP.

- Microfiltration: Pretreated chloraminated secondary effluent will flow to the microfiltration (MF) system containing hollow fiber membranes. Depending on the specific type of equipment selected for installation, the MF system will feature either: (a) pressurized MF units with polyvinylidine fluoride membranes with a maximum pore size of 0.1 micron; or (b) in-basin MF units with polypropylene membranes with a maximum pore size of 0.2 micron, or with proprietary material membranes with a maximum pore size of 0.02 micron. These MF systems have been accepted by the Department as approved alternatives to media filtration. Two new 5.9 mgd MF systems, one to replace the existing lime pretreatment system and one to expand the plant capacity, will be installed. The new 11.8 mgd of MF filtrate capacity will bring the total installed barrier water MF filtrate capacity up to a total of 14.6 mgd. Later, the ultimate expanded MF filtrate capacity

will be 17.6 mgd, for a total MF system capacity of 20.4 mgd. MF filtrate will be discharged to the existing intermediate storage basin. The MF units will be periodically backwashed to clean the membranes. Waste backwash will be discharged to the existing barrier water backwash waste equalization basin and then pumped to the solids handling system.

- Reverse osmosis: Stored MF filtrate will be pumped from the existing intermediate storage basin to the reverse osmosis (RO) system. Upstream of the RO process, the flow will be pretreated by adding sulfuric acid for pH control by adding a threshold inhibitor to prevent precipitation of sparingly soluble salts, and by 20-micron cartridge filtration. One new RO train with a product capacity of 3.5 mgd will be added, and the existing RO system will be modified to expand its capacity from 7.5 mgd to 9.0 mgd, thereby increasing the total barrier production up to 12.5 mgd. The new RO train will consist of a high pressure feed pump and 108 pressure vessels in two banks, arranged in a 72:36 array. The RO is a single-stage, dual pass process. Each pressure vessel will contain seven high rejection thin film composite polyamide membrane elements. The RO system is designed for an 85 percent recovery rate. Ultimately, another 5 mgd RO train will be added to increase the Barrier Plant capacity up to 17.5 mgd. Permeate from the RO system will be discharged to the advanced oxidation and UV light treatment/disinfection processes. Concentrated brine from the RO system will be discharged via an existing pipeline directly to the Hyperion Treatment Plant's ocean outfall for disposal.

- Advanced oxidation / disinfection: The advanced oxidation process (AOP) will consist of two steps: hydrogen peroxide will be added to the RO permeate upstream of UV light treatment. UV irradiation can be used for disinfection and reduction of light-sensitive contaminants. Hydrogen peroxide exposed to UV irradiation produces hydroxyl radicals that result in advanced oxidation. The UV system will conform to the requirements delineated in the "Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse" (December 2000) published by the National Water Research Institute (NWRI). The AOP system is designed and constructed to disinfect RO permeate and reduce N-Nitrosodimethylamine (NDMA) levels to a concentration below 5 parts per trillion (ppt). The hydrogen peroxide dosage will be optimized during development of the operations, maintenance and monitoring plan. The closed, in-vessel type UV system will feature low pressure, low-pressure high-output, or medium pressure UV lamps with the reactors arranged in at least two trains. The total nominal capacity of the UV system will be 12.5 mgd

- Decarbonation: Following AOP/UV disinfection, part of the water will pass through decarbonators to release excess carbon dioxide. The decarbonation system will consist of one new 5 mgd decarbonator,

three relocated existing post-decarbonators and one relocated existing pre-decarbonator. The entire decarbonation system will be located atop the existing chlorine contact basin, which will be converted into a product water storage tank to serve as a clearwell for the Barrier Water Pump Station.

- Lime stabilization: Lime will be added to the final product water to adjust the pH and reduce the potential for minerals to be leached from the cement lining used in the transmission pipelines.
- Barrier Water Pump Station: Two new pumps, one duty and one standby unit, will be added at the existing Barrier Water Pump Station.
- Solids Handling Process: Upgrades will be made to increase the capacity of the existing solids handling systems, which consist of the dewatering holding basin and washwater equalization basin serving the barrier water treatment processes. Solids will be removed using high-rate clarifiers, thickened using gravity thickeners, and dewatered using plate-and-frame presses. The recovered liquid stream will be returned to the Title 22 Plant for treatment. Dewatered cake solids will be hauled to a landfall for disposal.

The proposed project complies with Section 60320 of Article 5.1, entitled "Groundwater Recharge", of the California Code of Regulations Title 22, Division 4, Chapter 3, entitled "Water Recycling Criteria". The Department considers the above treatment to be the best available treatment technology for recycled water used for groundwater recharge by direct injection.

8. During construction of WBWRP Expansion, the existing WRWRP will remain in operation to supply recycled water to the Barrier.

9. An effective source control program is currently administered by the City of Los Angeles Bureau of Sanitation to minimize the risk that wastewater treated at the Hyperion Treatment Plant will be contaminated with toxic chemicals that impact the treatment facilities and the marine environment. The scope and purpose of this Los Angeles source control program needs to be supplemented by the approved Source Control Implementation Plan to include not only contaminants that may be detrimental to the facilities or environment, but also to include contaminants specified by the Department that may be harmful to human health and drinking water supplies. The supplement to the source control program will be administered locally solely for the purpose of addressing West Basin's water quality needs and does not require modification of the existing EPA approved and enforced program. The existing City source control program does not address all contaminants that have drinking water maximum contaminant levels (See Attachment B). WBMWD, through a comprehensive source monitoring program defined in the Source Control Implementation Plan, will be able to ensure that the recycled water produced at the WBWRP for recharge into the basin via injection at the Barrier is not contaminated with toxic chemicals of industrial origin that are of concern to the Department in drinking water sources.

West Basin agreed to develop a Source Control Implementation Plan in consultation with the City of Los Angeles, which will be approved by DHS before increased barrier operations may begin.

10. WBMWD has not developed an operating plan for the WBWRP Expansion to describe the proper operating parameters.

11. Pathogenic microorganisms may be present in the recycled water so a minimum retention time for the recycled water in the Basin before the water is extracted for drinking purposes and a minimum horizontal separation distance between the Barrier injection wells and all drinking water wells should be provided.

12. The County has operated the Barrier since the 1960's, initially injecting imported potable water to prevent seawater intrusion into the West Coast Groundwater Basin. Since completion of the WBWRP, the County has supplemented the injection supply with recycled water produced by the Barrier Plant. The amount of recycled water injected has historically averaged about 43 percent of the total recharge. The majority of injected water flows inland to replenish the Basin aquifers, which are sources of municipal water supplies. The failure to maintain an effective seawater intrusion barrier would cause serious water quality degradation in drinking water aquifers in western Los Angeles County and the potential loss of this water resource.

13. The West Coast Basin located in the southwestern Los Angeles coastal plain consists of five principal aquifers that form a complex series of interconnected sand and gravel deposits: (1) Gardena, (2) 200-ft Sand (Gage), (3) 400-ft Gravel (Lynwood), (4) Silverado, and (5) Lower San Pedro. The majority of the production is from the Silverado Aquifer, which underlies most of the Basin. The Basin is bounded on the north by the Ballona Escarpment, on the east by the Newport-Inglewood Uplift, and on the south and west by the Pacific Ocean. The Basin is impacted by many variables including factors that are some distance from the proposed project. Some of these include drought, pumping patterns and volumes, new and existing extraction projects, and amounts of recharge.

14. The Barrier consists of 153 existing injection wells. The barrier injection wells recharge three of the Basin aquifers: the 200-ft. Sand (Gage), Silverado, and Lower San Pedro Aquifers. No new injection wells are included in the project.

15. The District proposes a phased approach to injection of 100 percent recycled water at the Barrier. Initially when the WBWRP produces 12.5 mgd of recycled water, a blend of up to a maximum of 75 percent recycled water and a minimum of 25 percent water of non-wastewater origin will be injected at the Barrier. The diluent will be approximately 5 mgd of imported potable water purchased from MWD. After the WBWRP demonstrates compliance with Department criteria for recycled water quality and groundwater quality at this initial level for at least one year after the blended recharge water has reached at least one monitoring well, the proposed plan would be to increase the recycled water contribution up to

100 percent, or 17.5 mgd with completion of the ultimate WBWRP Expansion, upon Department approval. These percentages will be calculated based on the running-monthly-average recycled water contribution for the preceding period up to 60 months.

16. The closest active domestic well to the Barrier is Well No. 12-01, which is owned and operated by the California Water Service Company and is located 7,409 feet to the east of the Barrier. The rate of groundwater movement eastward from the Barrier is estimated to be 300 to 500 feet per year. This domestic water production well is more than 15 years underground travel time from the Barrier.

17. Ordinances have been adopted to effectively prevent the use of groundwater for drinking water purposes within the aquifer treatment zone that has been established as no wells closer than 2,000 feet and less than 12 months underground retention time from the Barrier. This is important in order to achieve the necessary log reduction of organism density. The ordinances also prohibit the construction of new domestic water wells in the buffer zone.

18. Eight existing monitoring wells have monitored the groundwater near the Barrier since before the first recycled water was injected in 1995. One new monitoring well is proposed for the WBWRP Expansion and Barrier Project. The new monitoring well will be constructed in Redondo Beach along the same flow path from the Barrier as existing monitoring wells 17B and 17C. The new multi-depth monitoring well will be located approximately three months underground travel time from the Barrier and will sample the same aquifers recharged by the injection wells. The following nine monitoring wells will monitor the underground movement of the recharge water and the water quality of various aquifers comprising the Basin:

Monitoring Well Number	Distance from Barrier	Aquifer(s) Monitored
1318N	2,866 feet east	200-ft Sand (Gage)
690A	450 feet west	200-ft Sand (Gage) and Silverado
703G	391 feet west	Silverado
735A	3,075 feet east	Lower San Pedro
9B	2,162 feet east	Silverado
14B	1,850 feet east	Silverado
17B	566 feet east	200-ft Sand (Gage) and Silverado
17C	566 feet east	Lower San Pedro
New	$\leq$ 100 feet east	200-ft Sand (Gage), Silverado, and Lower San Pedro

19. The estimated underground travel time to the proposed new monitoring well is approximately three months. Along this same flow path, the estimated

underground travel time to monitoring wells 17B and 17C is two to three years. These estimates are based on sampling and analysis of naturally occurring, intrinsic tracer constituents in the injected recycled water, such as chloride. A study entitled "Naturally Occurring Tracer Constituents in Water Injected for Maintenance of the West Basin Seawater Intrusion Barrier" prepared by McGuire Environmental Consultants, concluded that "naturally existing anions and their ratios should function as adequate tracers of groundwater movement for water injected into seawater intrusion barriers due to the distinct characteristics of the various source waters."

20. The District has operated an existing 2.5 mgd capacity flow train at the existing WBWRP since December 1998 that utilizes the same treatment processes, MF and RO, as those proposed for the WBWRP Expansion. In addition, the District has conducted pilot AOP (hydrogen peroxide and UV) studies. The water quality produced by the MF/RO/AOP treatment train is representative of that anticipated from the WBWRP Expansion. Water quality data from the MF/RO/AOP train indicate that the WBWRP Expansion recycled water will meet all requirements of the California Drinking Water Primary and Secondary Maximum Contaminant Levels (MCLs). Data from the MF/RO/AOP train also have indicated that selected pharmaceutically active compounds and other toxic contaminants not included in the drinking water standards are removed or reduced to low levels in the product water.

21. An independent Expert Advisory Panel has reviewed the planning and preliminary design of the WBWRP Expansion. The Chair of the Expert. Advisory Panel is Dr. Michael McGuire, water treatment and water quality specialist and registered engineer, President, McGuire Environmental Consultants, Inc. Other panel members include Dr. Harvey Collins, water treatment and water quality specialist and registered engineer, Former Deputy Director of Public Health Programs and Former Chief, Division of Drinking Water and Environmental Management, California Department of Health Services; Dr. David Jenkins, water and wastewater treatment and water recycling specialist, Professor in the Graduate School, from University of California, Berkley; Dr. Perry McCarty, water and wastewater treatment and water recycling specialist, Professor Emeritus from Stanford University; and Dr. Dennis Williams, groundwater hydrologist, President, Geoscience Support Services, Inc. The expert panel prepared a report on their findings and made recommendations. The Department concurs with the expert panel's findings and recommendations.

CONDITIONS

Based on the above FINDINGS OF FACT, which are made pursuant to the information provided by West Basin Municipal Water District (WBMWD or District) in the "West Basin Water Recycling Plant, West Coast Basin Barrier Project Expansion Phase III Amended Engineering Report" dated March 2002, subsequent submittals in the form of letters and technical memoranda, and the presentations by the District and comments made by members of the public at the Public Hearing held by the California Department of Health Services, Drinking Water Field Operations Branch, on December 10, 2002, in El Segundo, California, the California Department of Health Services (Department) FINDS that the proposed operation of the West Basin Water Recycling Plant (WBWRP) and West Coast Basin Barrier Project Expansion Phase III (Barrier) will not degrade the quality of the water in the receiving aquifers as a source of domestic water supply PROVIDED THAT ALL OF THE FOLLOWING CONDITIONS ARE MET:

1. The total volume of recycled water recharged by injection shall be up to 17.5 million gallons per day (mgd) based on a monthly average (up to 17,500 acre-feet per year (afy)).

2. Treatment of recycled water intended for groundwater recharge shall consist of advanced primary sedimentation and secondary treatment, followed by microfiltration (MF), reverse osmosis (RO), advanced oxidation process (AOP), including hydrogen peroxide addition and ultraviolet (UV) light treatment and disinfection, with decarbonation and/or lime stabilization as needed for pH adjustment. Major modifications to the treatment train as described in the Engineering Report, technical memoranda and correspondence shall be subject to review by the Department and the California Regional Water Quality Control Board, Los Angeles Region (RWQCB).

3. Recycled water for injection shall, at all times, be adequately oxidized, filtered, subject to organics removal by RO and AOP using UV and hydrogen peroxide addition, and disinfected. There shall be no bypassing of any treatment process, except for decarbonation and lime treatment, which provide pH adjustment as required for stabilization in Condition 2.

4. The West Basin shall develop a Source Control Implementation Plan for proactive source control. This plan should include, but is not limited to the following elements: 1) monitoring of raw influent water from LA Bureau of Sanitation Hyperion Plant in addition to West Basin influent; 2) proactive plan for maintaining an inventory of compounds discharged into the City's wastewater collection system so that new compounds of concern can be evaluated rapidly; 3) analysis of percent reduction through each West Basin plant process for all drinking water MCL's; 4) spike or seed studies for possibly constituents of concern determined by the DHS; 5) investigation program focused on the

identified target compounds and their potential ability to persist through the treatment systems; 6) cooperative Memorandum of Agreement with the City of Los Angeles to address the source(s) of persistent constituents of concern, including evaluation of all chemicals and parameters listed in Attachment 1, and develop an comprehensive outreach program; and 7) time schedule for implementation of the preceding elements. The required Source Control Implementation Plan supplementing the source control program shall be provided to the Department by June 30, 2005 for review and approval, before expanded barrier operations may commence. A Memorandum of Agreement between West Basin and the City of L.A specifying responsibility of the Source Control Implementation Plan shall be signed and agreed upon by both parties following approval of the SCIP by DHS. All above elements must be implemented prior to increasing the monthly running average RWC to 100 percent. No expanded plant operations may begin without Department approval of the Source Control Implementation Plan and signature of the Memorandum of Agreement between West Basin and the City of Los Angeles.

5. During the initial operating period, the monthly running average recycled water contribution (RWC) that is injected into the Barrier shall not exceed 75 percent of the total water injected at the Barrier. Diluent for the Barrier shall be imported treated drinking water. Compliance shall be determined on a monthly running average basis over a time period up to a maximum of the preceding 60 months. Once a month, the average RWC shall be calculated during this period by dividing the total volume of recycled water injected during the preceding months by the total volume of injection water during that period. If the average RWC does not comply with the above requirement, the District shall notify the Department and RWQCB within 7 days and submit a report to the Department and the RWQCB within 60 days describing the reason and corrective actions taken to avoid future occurrences.

6. Following the successful completion of the initial operating period as specified below, the District may increase the monthly running average RWC to 100 percent if the following are documented in a report submitted to and approved by the Department:

    - The initial operating period shall be defined by injection of recharge water that has reached at least one Barrier monitoring well for at least one year with an average recycled water contribution (RWC) of at least 0.6 (60 percent recycled water) and the WBWRP has been in compliance with the existing DHS-specified maximum average RWC of 0.75 (75 percent recycled water);
    - Operations, monitoring, and compliance data;
    - Recycled water quality produced at the WBWRP has consistently met all requirements;

- Appropriate construction and siting of the monitoring well used in the demonstration have been validated;
- An updated engineering report;
- Review and assessment of the increased RWC by a scientific peer advisory panel; and
- Water quality data collected at the monitoring well used in the demonstration:
  - Meets all primary drinking water standards specified below in Condition No. 8;
  - Meets the total nitrogen criteria specified below in Condition No. 9; and
  - Indicates that the non-regulated contaminants, including TOC and those specified in Tables 64449-A and 64449-B, total coliform levels, and any endocrine disrupting chemicals, pharmaceuticals, or other water quality constituents specified by the Department based on the results of the receiving water monitoring are not increasing over the levels in the recycled water due to the recharge operation.

7. Any recycled water that may already be present in the groundwater because of on-going project related activities should be accounted for as a part of the total amount of recycled water in calculating the percent of recycled water in an aquifer.

8. The recycled water injected shall meet all maximum contaminant levels and other limits specified in the Drinking Water Quality and Monitoring Requirements, California Code of Regulations (CCR), Title 22, Chapter 15 as follows:

   - Inorganic chemicals in Table 64431-A (except for nitrogen compounds);
   - Radionuclides in Table 4, Section 64443;
   - Organic chemicals in Table 64444-A;
   - Any new Federal or State maximum contaminant level upon adoption;
   - Disinfection byproducts:
     - Total Trihalomethanes – 0.080 mg/L
       - Bromodichloromethane
       - Bromoform
       - Chloroform
       - Dibromochloromethane
     - Haloacetic acids – 0.060 mg/L
       - Monochloroacetic acid
       - Dichloroacetic acid

        - Trichloroacetic acid
        - Monobromoacetic acid
        - Dibromoacetic acid
    - Bromate – 0.010 mg/L
    - Chlorite - 1.0 mg/L
- Action levels for lead and copper in Section 64678; and
- Secondary maximum contaminant levels in Tables 64449-A and 64449-B ("Upper" levels).

Recycled water shall be monitored on a quarterly basis at regular intervals by analyzing a 24-hour composite or grab sample to determine compliance with primary maximum contaminant levels referenced above for inorganic chemicals, radionuclides, organic chemicals, and disinfection byproducts and with federal action levels for lead and copper referenced above. Compliance shall be based on the running-quarterly average, calculated each quarter using the previous four quarters of data. If the recycled water is out of compliance, a report shall be submitted to the Department and RWQCB that describes the reasons and the corrective actions taken.

Prior to the commencement of injection of recycled water, at least one 24-hour composite or grab sample of recycled water shall be collected and analyzed to determine compliance with primary maximum contaminant levels referenced above for inorganic chemicals, radionuclides, organic chemicals, and disinfection byproducts, and with action levels for lead and copper referenced above and to demonstrate the effectiveness of the treatment process. The results for the initial recycled water quality analysis shall be submitted to the Department and RWQCB.

Recycled water shall be monitored on an annual basis by analyzing a representative grab sample to determine compliance with secondary maximum contaminant levels listed above. If the single sample result (or average of samples collected during the year, if more than one) exceeds a secondary maximum contaminant level, a report shall be submitted to the Department and RWQCB that describes the reasons and corrective actions taken.

9. The total nitrogen concentration of the recycled water shall not exceed 5 mg/L as nitrogen. Total nitrogen shall be defined as the sum of ammonia, nitrite, nitrate, and organic nitrogen concentrations, expressed as nitrogen. Each week two grab or 24-hour composite samples of recycled water shall be collected at least three days apart for total nitrogen analysis. The District shall require the laboratory to complete the analysis within 72 hours, and if the total nitrogen concentration exceeds 5 mg/L as nitrogen, the laboratory must report the result to the District within the same 72 hours. If the average of two consecutive samples exceeds 5 mg/L as nitrogen, then the District shall investigate the causes, take appropriate actions to reduce the nitrogen levels, and within 24 hours of receiving the laboratory sample results, notify the Department and the

RWQCB. If the average of all samples collected over the ensuing two week period exceeds 5 mg/L, or more than 25% of the samples collected in any two week period exceed 10 mg/L, the District shall suspend recharge of the recycled water until appropriate corrections have been made to reduce total nitrogen levels to below 5 mg/L.

Within 30 days of conclusion of enhanced groundwater monitoring, a report summarizing the results of the enhanced groundwater monitoring program and describing the causes of the exceedance and corrective actions taken to avoid future violations of these requirements shall be submitted to the Department and RWQCB.

10. Diluent water shall be monitored quarterly for nitrate and nitrite. Within 48 hours of being informed by the laboratory of a nitrate and/or nitrite result greater than a maximum contaminant level, a confirmation sample shall be collected and analyzed. If the average of the initial and confirmation samples exceeds the maximum contaminant level:

    1. The District shall notify the Department and RWQCB within 48 hours of receiving the confirmation sample result.

    2. The causes of the exceedance shall be investigated and appropriate corrections shall be made.

    3. Each week the District shall collect and analyze two grab or 24-hour composite samples at least three days apart.

    4. If the average of all samples collected over the ensuing two-week period exceeds the applicable criterion, recharge of the diluent water shall be suspended until appropriate corrections are made.

11. The Total Organic Carbon (TOC) concentration of the recycled water shall not exceed 0.5 mg/L divided by the Department-specified maximum average RWC. Each month, compliance shall be based on the average of the most recent 20 samples. Each week a grab sample of the recycled water shall be collected for TOC analysis. Determination of compliance shall begin as soon as four samples have been collected, averaging all available samples up to 20 samples. After that time, compliance shall be determined monthly based on the most recent 20 TOC samples. The average of the most recent 20 samples shall be determined monthly. If the average TOC concentration exceeds 0.5 mg/L divided by the Department-specified maximum average RWC, then injection of recycled water shall be suspended until the above TOC requirement can be met. Within seven days of the suspension, the District shall notify the Department and RWQCB. If the average of the last four recycled water samples exceeds the TOC concentration of 0.5 mg/L divided by the Department-specified maximum

average RWC, a report shall be submitted to the Department and the RWQCB within 60 days that describes the reasons and the corrective actions that have been taken to avoid future occurrences.

12. If the average RWC does not comply with the Department-specified maximum average RWC, then the District shall notify the Department and RWQCB within 7 days and submit a report to both within 60 days describing the reason and corrective actions taken to avoid future occurrences of the non-compliance.

13. The turbidity of the RO product water prior to disinfection shall not exceed 0.2 NTU more than 5 percent of the time in any 24-hour period and shall not exceed 0.5 NTU at any time. The turbidity of the RO product water shall be continuously measured with at least one reading every 1.2 hours and recorded. Compliance with the daily average turbidity shall be determined based on using the recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period. Should the continuous turbidity meter and recorder fail, grab sampling at a minimum frequency of 1.2 hours may be substituted for a period of up to 24 hours. The results of the daily average turbidity determinations shall be reported quarterly to the Department and the RWQCB. A failure to meet the turbidity performance requirements shall result in the suspension of injection of recycled water until such time that the cause of the failure has been identified and corrected. Any failure to meet the turbidity performance requirements shall be reported to the Department and the RWQCB in the next monthly report.

14. The recycled water intended for recharge via injection shall be disinfected such that the 7-day median number of total coliforms shall not exceed 2.2 total coliform bacteria per 100 milliliters (mL), and the number of total coliform organisms shall not exceed 23 total coliform bacteria per 100 mL in more than one sample in any 30-day period prior to injection. No sample shall exceed 240 total coliform bacteria per 100 mL. A grab sample shall be analyzed daily for total coliform bacteria. A failure to meet these requirements shall require the submission of a report describing the cause of the failure and the corrective actions taken to avoid future violations of these requirements. Failure to meet the 7-day median coliform requirement for two consecutive days shall result in the suspension of the injection of recycled water until such time the cause of the failure has been identified and corrected. Any failure to meet the total coliform requirements shall be reported to the Department and RWQCB in the next monthly report.

    UV irradiation following membrane filtration has been recognized by the Department as an acceptable alternative disinfection method to chlorination to achieve at least 5-log inactivation of virus. UV disinfection shall comply with the "Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse" (December 2000) published by the National Water Research Institute (NWRI) which specify for RO permeate that: (1) the design UV dose shall be at least 50 millijoules per square centimeter (mJ/cm^2) under maximum day flow; (2) the effluent turbidity shall be equal to or less than 0.2 NTU 95 percent of the time,

and not to exceed 0.5 NTU at any time; and (3) the RO permeate UV transmittance shall be 90 percent or greater at 254 nanometers (nm).

15. Each quarter, samples of the recycled water shall be collected and analyzed as follows, and any positive results shall be reported to the Department and RWQCB in the next monthly report:

    - Unregulated chemicals in Table 64450, Chapter 15, Title 22, CCR, Drinking Water Quality and Monitoring Requirements;
    - Priority toxic pollutants (chemicals listed in the Water Quality Standards, Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California, and 40 CFR Part 131, Federal Register 65 (97), May 18, 2000, p. 31682); and
    - The following chemicals with State notification levels: N-nitrosodimethylamine (NDMA), 1,4-dioxane, and perchlorate.

    The Department may request WBMWD to further investigate positive results and identify, if appropriate, corrective actions. An investigation may include such actions as positive result confirmation, comparison to diluent water quality, groundwater monitoring, source control and/or treatment as specified in Condition No. 4.

    After the first year of operation, the Department may allow the monitoring frequency to be reduced to annually for the above chemicals based on the initial sample results.

    Each year, the District shall collect and analyze samples of the recycled water for endocrine disrupting chemicals and pharmaceuticals specified by the Department and by using methods accepted by the Department. The results of this monitoring shall be submitted to the Department and RWQCB annually.

16. The District shall demonstrate the efficacy of the AOP system (advanced oxidation/ disinfection processes) through a Department approved commingling study or equivalent.

17. Each year, the District shall collect samples of the recycled water and conduct a Tentatively Identified Chemicals (TIC) Analysis. The results of this monitoring shall be submitted to the Department and RWQCB annually.

18. The District shall submit an annual report of findings prepared by an independent, qualified engineer registered in California and experienced in the field of advanced wastewater treatment for groundwater recharge regarding the operation of the WBWRP facilities and the results of the monitoring and investigations of the impacts of recycled water injection at the Barrier. This report shall demonstrate a mass balance to ensure that blending is occurring in the aquifer for the initial phase of operation. Injection recharge water flow paths shall be determined annually from groundwater elevation contours and compared to the flow and transport model's flow paths. The flow and transport model shall be updated to match as closely as possible the actual flow patterns

observed within the aquifer if the flow paths have significantly changed. This report shall also include Title 22 drinking water quality data for the nearest domestic water supply well in the vicinity of the injection operation at the Barrier. Prior to start-up of the WBWRP Expansion Project, tracers will need to be identified. It is not determined at this time whether intrinsic tracers are acceptable to the Department or if the WBMWD will need to add artificial tracers to track the flow paths of the recycled water.

19. To ensure that the WBWRP Expansion meets all of the performance criteria for the purposes of protecting health, the WBMWD shall operate all equipment and facilities for treatment and recharge at levels of peak performance in order to limit the presence of contaminants in the recycled water. An operations plan shall be initially developed prior to start-up and updated as required. This operations plan shall include all equipment and contingency plans in order to achieve these peak performance levels to include operations, maintenance and monitoring procedures for normal, start-up, off-spec and emergency conditions. This plan should also include a contingency plan for off-spec water and an emergency response plan.

20. A draft operations, maintenance and monitoring plan (OMM Plan) shall be developed for the WBWRP Expansion Project and submitted to the Department and the RWQCB for approval prior to startup of the WBWRP Expansion Project. The District shall operate its facilities in accordance with the approved OMM Plan. After a year of operation, the OMM Plan shall be updated and submitted to the Department and RWQCB for review and approval. The OMM Plan shall cover critical operational parameters to include routine testing procedures for the MF, RO and AOP systems, optimization of the hydrogen peroxide dose, UV dose for disinfection and reduction of light-sensitive contaminants, and all treatment processes, maintenance and calibration schedules for monitoring equipment, process alarm set points, and response procedures for alarms in each treatment process of the WBWRP, including criteria for diverting recycled water if water quality requirements are not met, start-up, and emergency response and contingency plans. During the first year of operation of the WBWRP Expansion, all treatment processes shall be optimized to reduce contaminant levels. The results of these initial optimization efforts shall be incorporated into the updated OMM Plan. The OMM Plan shall include staffing levels with applicable certifications levels for WBWRP operations personnel. Significant changes in the operation of any of the treatment processes shall be reported to the Department and RWQCB. Significant changes in the approved OMM Plan which may include provisions to comply with Condition No. 4 must be approved by the Department and RWQCB prior to instituting changes.

21. At the Barrier, the recycled water shall be retained in the Basin for a minimum of 12 months prior to being withdrawn at a domestic water supply well. A numerical model, tracer, or other method shall be used to determine the underground retention time and recycled water contribution to each aquifer. If a tracer is used, the tracer shall be determined prior to start-up.

22. At the Barrier, no domestic drinking water wells shall be allowed within a buffer zone defined by the area less than 2,000 feet and 12 months underground travel time from the Barrier.

23. Ordinances that effectively prevent the use of groundwater for drinking water purposes and construction of any domestic supply wells within the area required to achieve 12 months underground retention time and 2,000 feet of horizontal separation from the Barrier shall be maintained.

24. Groundwater monitoring to detect the influence of the Barrier injection operation shall be performed. A monitoring well shall be sited at a location within approximately three months underground travel time of the Barrier injection wells and at additional intermediate points between the Barrier and the nearest downgradient domestic water supply well, and such that samples can be obtained independently from each aquifer potentially conveying the recharge water. Monitoring well locations shall be determined by a numerical model, tracer, or other method to determine the estimated underground travel time from the recharge operation to the monitoring well sites. If a tracer is used, the tracer shall be determined prior to start-up.

25. At a minimum, one new multi-depth groundwater monitoring well shall be constructed in Redondo Beach between the Barrier injection wells and the nearest domestic water supply well, Cal Water 12-01. The new monitoring well shall be installed approximately three months underground travel time from the Barrier in compliance with Condition No. 23. For the new monitoring well, samples shall be taken independently from the aquifers receiving the injection water as follows: (1) 200-ft Sand (Gage) Aquifer; (2) Silverado Aquifer; and (3) Lower San Pedro Aquifer. Two existing monitoring wells, 17B and 17C, located approximately two to three years travel time from the Barrier to the Cal Water 12-01 production well, shall also be monitored. For well 17B, samples shall be taken independently from the 200-ft Sand (Gage) and Silverado Aquifers receiving the injection water. For well 17C, samples shall be taken from the Lower San Pedro Aquifer.

26. The groundwater monitoring program shall be periodically reviewed and modified based on results of the monitoring program. Changes to the monitoring program, including well locations, shall be approved by the Department and the RWQCB.

27. Each quarter, at a minimum, samples shall be collected from the aquifers and at the depths listed above at each monitoring well and analyzed for the following:

    - TOC;
    - Total nitrogen;
    - Constituents and characteristics in CCR, Title 22, Chapter 15, Tables 64449-A and 64449-B;

- Total coliform levels; and
- Any water quality constituents specified by the Department based on the results of the recycled water monitoring conducted pursuant to these analyses.

If any of the monitoring results indicates that a maximum contaminant level has been exceeded or that coliforms are present, the District shall notify the Department within 48 hours of receiving the results and make note of any positive findings in the quarterly report submitted to the RWQCB.

28. The District shall submit all water quality data groundwater monitoring in a format acceptable to the Department and RWQCB. Analytical results shall be reported to the current Department electronically using the Electronic Deliverable Format as defined in the current Electronic Deliverable Format (EDF) prepared by the Department.

29. During the initial 75 percent or less (up to 12.5 mgd) RWC period operation period, the District shall submit annually a report to the Department and the RWQCB evaluating the compliance with the minimum underground retention time, distance to the nearest point of extraction, blending, and the maximum RWC requirements. The annual report shall include water quality data on turbidity, coliforms, total nitrogen, regulated contaminants, TOC, and non-regulated contaminants compliance. The annual report shall also include a summary of corrective actions taken as a result of violations, suspensions of recharge, detections of monitored constituents and any observed trends, information on the travel of the recycled water, description of any changes in operation of any unit processes or facilities, and description of any anticipated changes, including any impacts on other unit processes.

30. An independent advisory panel shall provide scientific peer review prior to the next expansion phase of the WBWRP. Members of the advisory panel, as a minimum, shall have expertise in the fields of toxicology, engineering geology or hydrogeology, microbiology, chemistry, and engineering with experience in the fields of wastewater treatment and public water supply. The engineer and the engineering geologist or hydrogeologist shall be registered in California.

31. Prior to the onset of operation, the WBWRP shall have in place a resolution adopted by its governing board that it will be responsible for developing a plan for providing an alternative source of domestic water supply, or a Department approved treatment mechanism, to any user whose domestic water well is found to violate California drinking water quality regulations as a direct result of the GRRP or when CDHS makes an analysis and finding that the domestic water well is unsuitable for human consumption as a direct result of the GRRP. Such alternative sources can include water delivered for blending of the producing well, imported water, water produced at a well head treatment plant, and water produced from new wells. The WBMWD shall notify the Department in a timely manner, when such a determination is made.

32. The District shall provide an update to the 2002 engineering report every five years to the Department and the RWQCB.

Provided that the District meets all of the above conditions and findings of fact, the Department finds that the WBWRP Expansion and Barrier Project can provide injection recharge water that will not degrade the groundwater basin as a source of water supply for domestic purposes.

December 15, 2004

Date

Cindy Forbes, P.E.
Chief of the Southern California Branch
Drinking Water Field Operations
State of California Department of Health Services
Hearing Officer

ATTACHMENT A

DHS Public Hearing – West Coast Basin Seawater Barrier Conservation Project Expansion

Tuesday, December 10, 2002 (10:00 am – 11:45 am)
El Segundo Library (Matsui Room)
111 N. Mariposa Avenue
El Segundo, CA 90245

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Mike Wehner	OCWD	714 378-3297	mwehner@ocwd
~~x~~ PW: print Wm. Sauvoers	LACDPW	(626) 458-6187	WSAUVOER@LADPW.ORG
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Everyone needs court transcripts

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CINDY FORBES	DHS-DCP		
Frances Spivy-Weber	Mono Lake Committee	310-316-0041/ 8509 (fax)	frances@monolake.org

ATTACHMENT B

ATTACHMENT B

List of Chemicals or Parameters That Are of Concern to the California Department of Health Services and Must Be Addressed in a Source Control Program of the Sewage

Nitrite
Asbestos
Foaming Agents
Radium-226
Radium-228
Gross Alpha Activity
Tritium
Strontium-90
Gross Beta Activity
Uranium
Bromate
Bromide
Monochloroacetic Acid
Dichloroacetic Acid
Trichloroacetic Acid
Monobromoacetic Acid
Dibromoacetic Acid
1,1,2-Trichloro-1,2,2-Trifluoroethane
Bentazon
Benzo(a)pyrene
Dalapon
Di(2-ethylhexyl)adipate
Diquat
Endothall
Ethylene Dibromide
Glyphosate
Lindane
Molinate
Oxamyl
Picloram
Thiobencarb
2,4,5-TP (Silvex)
Perchlorate